Cultural Psychology of Education 9

Wolff-Michael Roth

Transactional Psychology of Education

Toward a Strong Version of the Social

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Volume 9

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Preface of the Series Editor

Overcoming Dichotomies: Transaction as a Core Issue in Educational Processes

When Wolff-Michael Roth sent me the first proposal of this book, *Transactional Psychology of Education: Toward a Strong Version of the Social*, I was positively surprised. Little time had passed since he had published his previous volume in my series, titled *Understanding Educational Psychology* (Roth and Jornet 2016). He was again ready with another interesting editorial project. The book "smelled" good even before reading it. In fact, after reading a few lines of the proposal, I was fully convinced of the relevance of Roth's line of argumentation. There was something intriguing. Hereafter, the book went through the long procedure of double-blind review, which allows this book series to be indexed in Scopus. Roth received many good feedbacks and some criticisms that helped him to develop his ideas even further.

The volume, eventually ready, kept the initial promise and offers the reader a refined synthesis of theoretical and empirical aspects of inquiry into education. *Transactional Psychology of Education* indeed combines the historical roots with the contemporary educational practice.

Wolff-Michael Roth acknowledges the great legacy of Vygotsky, but he goes beyond it in search of what has been not fully developed among the ideas of the Russian thinker. He suggests how these embryonic theorizations can benefit by the dialogue with other figures like Whitehead, Mead, Dewey, Mikhailov, and Ilyenkov.

Roth's book aims at presenting the foundations of the transactional psychology of education. As the author himself says:

> *Transaction means that there is a unity/identity of organism and environment, which leads to the fact that neither one can be understood independently of the other*. (Roth, this volume, p 23)

It means that if we want to reach an in-depth understanding of human conduct, we must keep together the individual and the environment. Dichotomic oppositions, such as inside and outside, individual and context, are poor and misleading theoretical tools when it comes to understand human development and educational processes.

Recalling Mead and Vygotsky, Wolff-Michael Roth proposes to overcome this dichotomy by adopting the transaction as the inherent characteristic of person-environment relationship. Transaction would be expressed in a way similar to what chemistry does:

> *…is not so different from what chemists do when, for example, they write carbon dioxide (CO_2) in the form of O = C = O, where each line represents a pair of electrons. Instead, we have to think about person and environment as irreducible intertwined when we think them as ingredient of events. What we need to do instead is to think {person | environment} as unity/identity, which means, there is both unity and identity of the two phases (person, environment) of the overall event.* (Roth, this volume, 2019, p. 24)

I could add that interesting examples of what Roth defines as a "transactional framework" of analysis have been provided also by modern biology. In Waddington's epigenetic approach (1940, 1957), the plasticity is related to the different possible responses (more or less adaptive, active, predictable, or reversible) of one organism to the various environmental conditions. Such fluid and open-ended plasticity is a relevant feature of border-crossing conditions (Marsico 2011, 2016) that are at the stake in any transaction.

Another example borrowed from contemporary theoretical biology is the Rayner's logic of *natural inclusionality* (2017), where natural inclusion is meant as co-creative, fluid dynamic transformation of all through all in receptive spatial context. It implies a mutual adaptation between the living systems and the environments to which they contribute in return.

The transactional view could be found also in the cultural psychology of semiotic dynamics, proposed in the last decades by Jaan Valsiner (2014), and particularly in the notion of *inclusive separation* (Valsiner 1987). This idea of a functional relationship between person and environment, in which the organism creates the context and the context creates the organism in return (even if they are not melted into one entity), shows an intriguing similarity with Roth's transactional proposal.

As the author points out in this volume, the transactional perspective has been already outlined by Vygotsky himself in his notion of *perezhivanie* and in his reflection upon thinking and speech (Vygotsky 2010). This also reverberates in the more recent reconceptualization of Vygotsky's Zone of Proximal Development (Moll 1990; Smagorinsky 2018) as a social system mutually created by teachers and students in the school setting.

Life is transactional and so are the educational processes that indeed work in the locus of transition, in the fuzzy "border zones," between the previous state "A" and the not-yet-reached state B (Marsico and Tateo 2018). This is the core issue of

Wolff-Michael Roth in this book. *Transactional Psychology of Education* will provide the reader with a renewed way of thinking the interface between the individual and the environment: something that is desperately needed today by educational psychologists.

Salerno, Italy
October 2018

Giuseppina Marsico

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Preface

> If change, which evidently is constitutive of all our experience, is the fleeting and elusive thing about which most philosophers have talked and if tone does not see in it more than the dust of states that replace other states, we are forced to re-establish this continuity between the states by means of artificial links. But this immobile substrate of mobility retreats to the same extent as we try approaching it because it cannot have any known attributes. (Bergson 1911, 34)

> All modern philosophy hinges round the difficulty of describing the world in terms of subject and predicate, substance and quality, particular and universal. The result always does violence to that immediate experience which we express in our actions, our hopes, our sympathies, our purposes, and which we enjoy in spite of our lack of phrases for its verbal analysis. (Whitehead 1929/1978, 49)

Educational psychology traditionally has provided individualistic theories of learning and development, which have their origins, among others, in Piagetian constructivism and information processing. This is also the case for those forms of educational psychology that avow a heritage in sociocultural and cultural-historical traditions but focus on the individualization (internalization) of knowledge and norms of the community. Indeed, these theories are based in orthodox philosophical systems that are conceived with solitary substances (individuals, objects) as their ontological presuppositions. The resulting individualism is the product of thinking the world generally and human behavior specifically in terms of material substances, things, distributed in space. Because each point in space is independent of another point (i.e., the philosophical concept of *partes extra partes*), they are not *inherently* related. Thus, the Cartesian identification of the body and (geometrical) space splits the world into bodies inherently outside other bodies (Bergson 1911). The mind becomes a substantive subject, and its contents are its predicates (Whitehead 1929/1978). For Kant, that geometrical space would be an *a priori* of experience and cognition, whereas for the process-oriented approach developed in this book, "space, like time, would appear to be an abstraction from events" (Whitehead 1920, 37). The geometrical approach to the body also splits the occupants of bodies, minds, leading to the isolation of individuals into separate subjectivities. Descartes does not question the subject-predicate approach, whereby

bodies are separate substances which have special qualities; and this led him into theorizing perception in terms of representation. Typically, then, *intersubjectivity* is a main problem of all epistemologies that are grounded on ontologies of geometrical bodies as things. When the social enters the theoretical framework, then it tends to be in a weak form: as a constraint or condition of individual learning. Thus, "while the cognitive perspective has been identified mainly with individual forms of learning, it is not inconsistent with the notions of group learning" (Vosniadou 2007, 56). What happens in the group is essentially individual learning that occurs in, and is shaped by, the social nature of the setting – but it is not social from the beginning. In the transactional approach developed in this book, however, every actual entity (theorized in evental terms) "is present in every other actual entity" so that our main task is one of "making clear the notion of 'being present in another entity'" (Whitehead 1929/1978, 50). Being present in another entity means sociality before any form of construction or thought has set in: the world generally and the human world specifically thus are social in a strong sense of the word. Classical approaches, psychological takes based on classical philosophical conceptions, cannot solve the problem of intersubjectivity because the relations between entities – for example, substances, individuals, body and mind, universals and particulars – are *external* rather than internal.

As a resource for making the case for the social nature of things (generally the social as a contingency), educational psychologists often draw on (an Anglo-Saxon reading of) the works of Lev S. Vygotsky (1896–1934), who is the main and often only representative of social and cultural psychology in the field. It is in and with his works that a cultural approach to psychology generally and to educational psychology particularly was born. Felix T. Mikhailov (2001), an important Russian philosopher of psychology, suggested that even the most eminent of the cultural approaches to the mind – he names Michael Cole and James Wertsch – emphasize internalization and thus the individual as a theoretical element even though these American scholars simultaneously emphasize the primacy of the cultural-historical determination of the mind. Other more recent evaluations of the ways in which the work of Vygotsky was taken up – and falsified – in the West are concordant with this assessment (e.g., Yasnitsky 2019). What remains in their work are all those features that are typical of Cartesianism, the psychophysical or body-mind problem (typified in the focus on *meaning* as separate from the sound), language and other signs as *mediators* between the separate individuals, and so on. Interestingly, Vygotsky's recently published personal notes suggest that he had become aware of his intellectualism (individualism) and the remnants of Cartesianism in his own earlier work. He describes his own work as deficient, and its main problem is "the untenability of the theory" (Vygotsky, in Zavershneva 2010, 54). He was on the verge of a significant breakthrough, though, when he was beginning to think that he needed to focus on "the movement of senses = their variation" (55). This meant he had to "develop a unified perspective: because dynamics of the *flüssig* type" (49, original underline and emphasis). He was on the verge of a solution to the perennial problems of psychology, one in which his basic ontology changed *things* to movement and flow – flüssig is German for liquid, in flow. He did not have time to work out

this new approach because, in a prophetic note, he described himself as having seen (like Moses) the "Promised Land" and that he would die before reaching it. And this is how it would have happened.

Unfortunately, Vygotsky was unaware of the fact that in his time there already existed a strong version of the social that had overcome Cartesianism, the body-mind problem, and the weak version of the social (intellectualism): in the works of the American pragmatic philosopher and social psychologist George Herbert Mead (1863–1931), who focused both on the social in a strong sense and on the *passage* of the present. Other contemporaries of Mead, such as the American pragmatic philosopher John Dewey (1859–1952) and the British-American philosopher Alfred North Whitehead (1861–1947), had developed ways of thinking about human behavior that dissolve those very problems that Vygotsky was still struggling with when he passed away in an untimely manner. Like most researchers today, he had been concerned with *things*, such as word-things and the meaning-things attached to them. There was nothing of the *flüssig* type that he anticipated developing. He had been subject to the dominance of things in experience that make us forget that life is continuously flowing, that is, that it is an event. As a result, Vygotsky continued to theorize situations in terms of the subject and, in this manner, was forced into a representational theory much in the way that Descartes was.

But life is moving so that even apparent permanences, like objects, have to be thought in terms of events. In other words, to get a hold of change and duration, we have to seize these phenomena in their original mobility (Bergson 1911). Thus, for example, "in perceiving an unchanging cliff the recognition of permanence, i.e. of the object, overwhelms all other perception, the *flux of events* becoming a vague background owing to the absence of their demarcation in our perceptual experience" (Whitehead 1919, 91, emphasis added). Even when Vygotsky writes about change, it is in terms of process-things rather than events (to which he began turning only in the months before his death when concerned with *perezhivanie*, [emotional] experience). In contrast, the common thread underlying the works of Dewey, Mead, and Whitehead is the primacy attributed to *event* at the expense of a primacy of objects characteristic of traditional psychology and philosophy. The approach is based on the understanding that

> *[e]ach actual entity* is itself only describable as an *organic process*. … It is a process proceeding from phase to phase, each phase being the real basis from which its successor proceeds towards the completion of the thing in question. … [E]ach actual entity, although complete so far as concerns its microscopic process, is yet incomplete by reason of its objective inclusion of the macroscopic process. (Whitehead 1929/1978, 215, emphasis added)

The shift from an object-thing-based process to an organic process with an event-based ontology has radical consequences for theorizing the topics that educational psychologists commonly attend to. In that move, the transactional approach abolishes the idea of the detached mind, and mental activity is but "one of the modes of feeling belonging to all actual entities in some degree, but only amounting to conscious intellectuality in some actual entities" (Whitehead 1929/1978, 56). For example, focusing on events and how they relate inherently makes for the social

constitution of the individual (see Chap. 3). Rather than being the solipsistic entity of traditional educational psychology, an entity that constructs its world including intersubjectivity with others, the individual and its world are social through and through. In the works of Mead and Whitehead, emergence is a character of a world in movement; and this world is fundamentally is social, where sociality is a character of the continually emerging evolution. In the works of these philosophers, therefore, the world in movement and the social go hand in hand.

The junction between philosophy and social (cultural) psychology is most clear in the works of Mead. His notion of "'situation' is often set forth in transactional form," though critics note that at least in some of his work, the development of ideas "is more frequently interactional rather than transactional" (Dewey and Bentley 1949/1999, 133). The assessment certainly depends on the specific texts, for the critique is more appropriate in the case of *Mind, Self, and Society* (Mead 1972) than it is in the case of *The Philosophy of the Act* (Mead 1938) or of *The Philosophy of the Present* (Mead 1932). The importance of the latter can be gauged from the fact that a mentor of the founder of ethnomethodology recommended it over the first in the preceding list of books (see Garfinkel 2002). Drawing on the writings of Dewey, Mead showed in *The Philosophy of the Present* that only a transactional approach would be able to explain the emergence of human culture from its animal beginnings. His writings thereby take a similar step as that which can be found in *Die deutsche Ideologie* [*The German Ideology*], which presents a historical analysis of the beginning of consciousness that arose from mere, instinctual "herd consciousness" to "herd consciousness as conscious instinct" (Marx and Engels 1978: 31). It is precisely that beginning that the present-day cultural-historical and sociocultural approaches actually fail to explain all the while emphasizing cultural determination of cognition (e.g., Holzkamp 1983). Although there are already parallels in the works of Vygotsky and Mead, the latter presented a much more elaborate theory of human development based on a *strong version of the social*. Thus, Vygotsky realized only during the last months of his life that in consciousness the word is impossible for one person but possible for two. The word as it appears in consciousness is ideal, generally referred to as "meaning" distinct from the sound. But Mead had already shown why not only the object that interlocutors talk about but also the word and even their senses of self and other *are social through and through*. Much more consequential and radical formulations can be found in the works of Whitehead, who entirely focuses on events in his process approach. Both Mead and Whitehead arrive in this way at an understanding of the emergent universe as social, which is the condition of sociality among animals generally and humans specifically. Sociality is the *consequence* of theorizing cultural phenomena in terms of events, inherently coming with novelty and thus generative, rather than substances. Thus, rather than thought, which is a substance, *thinking* is a type of event related to other events – for example, of the brain and the rest of the body – that enable and accompany it. Even those phenomena that we know as objects turn out to be abstractions from events; and they are what they are only relative to events in (Whitehead 1919). Objects (e.g., a cube), as distinct from the contents of sense-experience (e.g., what we *actually* see or feel), are abstractions, an insight that would later be worked out

within a very different line of inquiry (Merleau-Ponty 1945). And what Maurice Merleau-Ponty was doing for spatial objects, Edmund Husserl (1928) had done for temporal objects.

The idea of a transactional approach was most prominently developed by Dewey (e.g., 1929), though the name came into prominence only very late in his writings (e.g., Dewey and Bentley 1949/1999). But it is not so clear in his writings how and why transaction differs from interaction or how we would have to write research differently to make the two approaches distinct. Here is where Whitehead comes in, for in his work we see a decided shift toward the event rather than the object-thing as the minimum unit of analysis. As soon as we make the commitment and investigate how events are related, then the difference between interaction and transaction becomes fully evident (e.g., Whitehead 1919, 1920). This approach also implies the two main ways in which events can relate to one another. One of these ways leads to the spatial qualities of experience, the other to its temporal qualities. That is, in the works of Whitehead, we find a theory of the spatial and temporal characteristics of transaction.

Mead's approach essentially is a transactional (relational) view, one dimension of which is the unity/identity of individual organism and its environment. This unity/identity also was at the heart of Dewey's pragmatic approach as much as it was in the process approach of Whitehead. Vygotsky *began* thinking about the systemic approach – one in which there is a unity/identity of individual and environment – only at the end of his life in the introduction of the posthumously published *Myshlenie i resh'* [*Thinking and Speech*] (Vygotskij 1934) and in a lecture on the environment given one month before his death where he conceived the unity in terms of *perezhivanie* [experience] (Vygotskij 2001). He conceived of consciousness as *perezhivanie* of *perezhivanie* in the relation with the environment. Any secondary experience arises in and from, and is modeled on, the affective relations within the social group. In the history of our human species, therefore, "*a relation generative of man is nothing other than the affective, sense-giving relation of our animal forebears, in the first instance, toward one another*" (Mikhailov 2001: 26). One of the things that I describe in this volume is that in ontogenesis it is the affective, *sense-giving* relation between infant and parents toward each other that is generative of the person (see Chap. 4).

In this book, I present and develop a *transactional psychology of education*, which, by its very nature, is social and cultural through and through. Instead of saying transactional psychology, we could also name it an *evental* psychology, that is, a psychology that takes every phenomenon to be an event and then explains how stability and constancy (e.g., in the form of objects, things, or characteristics) come about. The two expressions – transactional psychology and evental psychology – refer to the same theoretical approach and analytic practice. This transactional psychology is based on the primacy of the event (process) over that of objects, time points, and point-like space. Transaction means that we cannot separate individual, environment, and passage without losing essential aspects of human behavior and performance. As the educational psychologist Richard E. Snow tended to suggest (without actually working out a strong version of the social), to understand the

effects of person characteristics on performance, we need to know the relevant salient features of the environment; and to understand the effects of the environment on performance, we need to know the personal qualities influencing the response (cf. Corno et al. 2002). But unlike in the work of Snow, where individual and environment appear as entities (things), the present work conceives them as related, intersecting events.

It was Mead who worked out a transactional approach to social psychology. Any object or any part of the environment that stands out for the individual always already is a *social object*, which has its complement in the inherently social self as social object. This "social object [is] one that answers to all the parts of the complex act, though these parts are found in the conduct of different individuals" (Mead 1932, 180). At the very heart of the self, thus, is the other, which is the conception that emerges from a further developed late Vygotskian approach. "Inside" and "outside" therefore are not suitable metaphors when we are theorizing the self (Bateson 1979). There is nothing on the inside that is not also outside so that "there is nothing which belongs merely to the privacy of feeling of one individual actuality. All origination is private. But what has been thus originated, publicly pervades the world" (Whitehead 1929/1978, 309). In a sense, therefore, Vygotsky was running behind others when, at the end of his life, he was beginning to take a transactional view. Interestingly, Vygotsky introduced the notion of *perezhivanie*, a notion that tends to be translated as (emotional) experience. But *perezhivanie* also translates *feeling*, which is the central term of *Process and Reality* (Whitehead 1928/1978). Feeling is always the feeling of something and thus has spatial quality; and it inherently has temporal quality. Feeling is always the feeling of a *physical* organism, and, as a (affective, intellectual) valuation, it has non-sensual qualities. With feeling, the Cartesian dualism has completely disappeared. We can therefore say that the transactional view is in some sense Vygotskian, because he was recognizing and sowing the seed for it in the last months of his life; but it is also post-Vygotskian, as it overcomes all the sins of the early Vygotsky that he himself recognized:

> The book of my whole life, is poorly written, but its thoughts are mine.—What becomes outdates is what relates to the evil of the day. (I am writing it not at the heights of the spirit but overwhelmed by the evil of the day.** Something will be l[e]ft for the future. The seed—children and p[u]pils, to wh[o]m I would dedicate it if I valued its future element more. But the past one is stronger, and I myself am under its p[o]wer…). (Vygotsky, in Zavershneva 2010, 40)

In this book, I work out an approach to the cultural psychology of education that was just dawning on the late Vygotsky in his notebooks and writings (in *Thinking and Speech* and *The Teachings of the Emotions*). He never had the time to address the problems of psychology that he nevertheless had identified; and he never had the time to develop whatever dim idea was apparent to him and that would have had to work itself out into a transactional (cultural) psychology of education. In this book, I particularly draw on the works of Mead, Dewey, Whitehead, Gregory Bateson, Mikhailov, and Evald Ilyenkov, all of whom already included a transactional perspective that Vygotsky only dimly saw and sketched in his lecture on the environment and *perezhivanie*. As apparent in the opening quotation, in this transactional

approach, each entity is but an abstracted characteristic of an organic process, an event. This book is not an attempt to somehow apply an existing theory to the special cases of the data, but instead, it is the result of my *thinking with* the various philosophers and social scientists while taking close looks at a variety of situations that traditionally have been of interest to classical educational psychologists and cultural psychologists of education.

My academic biography has been shaped by empirical investigations. It is precisely because of this orientation to empirical inquiry that I have first adopted and later rejected numerous theoretical paradigms – from the neo-Piagetian, information processing approaches of my dissertation via discursive psychology to, most recently, the structural takes on cultural-historical activity theory. Indeed, new theories and methods only began to make sense to me when I was working through some empirical issue; and, when the theories no longer made sense, it was in all cases again because of some empirical issue. My own theorizing was always grounded in empirical works. Thus, for example, when I first encountered the writings of Whitehead, they appeared obscure and unreadable. But after I had been working on some issues of transcription and the inherent connections between speakers and over time (see Chap. 3), I returned to Whitehead via some references to his work in the writings of Dewey and Mead. It was at that time that I recognized the pertinence of Whitehead's work on the relation between events to my own development of an approach to conversation that overcomes the elemental approach to individuals and their subjectivity in search of intersubjectivity. At that time, then, Whitehead's texts immediately made sense and provided me with a resource for thinking about the relationship between the events that already had appeared in my own analytic work. True to this academic biography, I therefore develop all theoretical concepts out of exemplifying empirical materials. The route to theory for me does not begin with ideal type models and formal configurations from which further aspects are derived through deductive reasoning. Instead, the empirical materials are used to develop initial propositions before moving to the construction of the theoretical model.

Chapter 9 is based on materials that first appeared in two studies in the context of mathematics education (Roth 2015; Roth and Maheux 2015), which I further developed for present purposes to articulate a transactional theory that was not part of the original publication.

Victoria, BC, Canada Wolff-Michael Roth
October 2018

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Contents

Chapter 1
Perennial Problems of (Educational) Psychology

> It was Zenon who, in drawing attention to the absurdities that arise from what he called movement and change, led philosophers – and first of all Plato – to search for a coherent and true reality *in that which does not change*. (Bergson 1911, 16, emphasis added)

Ninety years ago, psychology had been characterized in terms of a history of critiques: *scientific psychology*, established by Wilhelm Wundt and his followers, and its empirical methods focusing on biological processes (e.g. reaction time experiments) was opposed to *mythological* or *interpretive psychology* aimed at the (meta-physical) meanings (Politzer 1929; Vygotsky 1997). One of the essential schisms associated with the two forms of psychology continues to the present day: the dichotomy of body and mind. It exists because scientific psychology is concerned with biological processes whereas interpretive psychology is concerned with the ideal meanings. The schism is a direct consequence of the "tacit presupposition of the mind with its private ideas which are in fact qualities without intelligible connection with the entities represented" (Whitehead 1929/1978, 76). Even though the problem was framed such a long time ago, psychologists and cognitive scientists have been wondering much more recently about how the (mental, immaterial) world of (abstract) ideas is connected to the physical world of the body, a problem that has come to be known as the *symbol grounding problem* (Harnad 1990). That psycho-physiological schism manifests itself in the traditionally separate psychological treatments of intellect and affect (Vygotsky 1987). This separate treatment has continued to the present day, where mental-cognitive processes are thought to be influenced by affective states only from the outside, generally in terms of decreasing mental performance. The "affective domain (system)" is theorized separately from the "psychomotor domain (system)," which is in turn separate from the "cognitive domain (system)" (e.g. Sternberg and Williams 2010). We thereby get something like a system composed of subsystems, each of which exists in its own right (Fig. 1.1). The ways in which the independent subsystems come to interact does not tend to be further specified. This leaves open the question how an affective system, which quite obviously has bodily-physical qualities (e.g. blushing, increased heart

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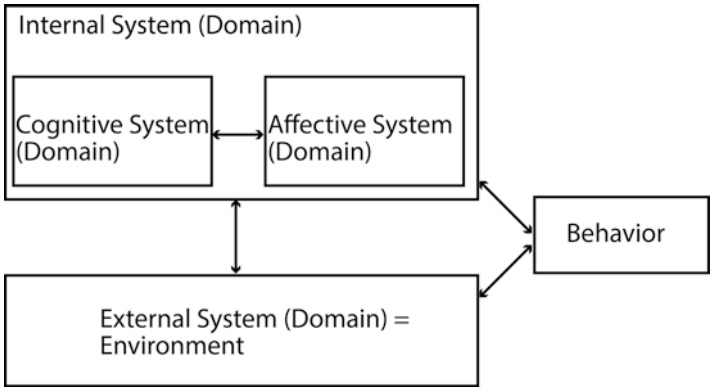

Fig. 1.1 Decomposition of human conduct typical for classical educational psychology

rates) can ever influence a non-bodily system (ideal meanings). Thus, for example, how would affects, which are manifestations of physiological events, come to bear on something that is not material physiological, such as thinking and ideas? In other words and using a computer analogy, we have to ask, "How does the hardware affect the software?" In computing, of course, the former does not affect the latter – or the results of a computation would (might) be different depending on the chip used because of material differences.

One way in which educational psychologists attempt to get around the problem is by expressing the affective system in mental terms. Thus, for example, as soon as motivation or attitudes are subsumed in the affective system, and as soon as motivation and attitudes are operationalized in terms of what people (students, teachers) say about their reasons for acting or orientations to particular topics, then a link between what people do and what they say they do is established. It is a link purely at the intellectual level – and the body has been cut out again. That is, once the affective system is expressed in mental-interpretive terms, then the double arrow between the two subsystems (Fig. 1.1) is much less mysterious. But the question returns with a vengeance as soon as we try to understand actions, such as the placement of a figure within an emerging category system (see Fragment 1.1 below). How does an immaterial thought come to be translated into a physical act? The typical move attempted by embodiment and enactivist theories, which posits underlying schemas, which, in the case of body movements, turn into physical expressions of something that can also verbally (diagrammatically) expressed. In any case, it is a form-thing that somehow is the property of an individual and that gets externalized in one or another form-thing. But the question returns: In what does a (mental and non-physical) schema exist such that it can thingify itself in words or hand movements (gestures)? How does a (mental) schema, a concept that even embodiment scholars borrow from the quintessential constructivist Kant (e.g. Johnson 1987), turn into a bodily schema and, conversely, how do Piaget's sensorimotor schemas (if physical) turn into mental schemas? To these and similar questions concerning the "relation between the body and thought … Kant has, in truth, *nothing* to say"

(Nancy 2008, 135). These questions continue to remain unresolved, which is why philosophers continue to see the remnants of Cartesianism in embodiment and enactivist theories (e.g. Sheets-Johnstone 2009). Descartes had postulated one organ, the pineal gland, which made that connection. It was the seat of the soul and its movements translated into bodily movements.

In the constructivist approach, the geometrical space is an a priori of experience and cognition. When space is thought as built up of points, each of which can be occupied only by one physical body, behavior characteristically is analyzed in terms of individuals. These are characterized by sets of attributes that they acquire in the course of their lives (Sternberg and Williams 2010). Individuals are said to *have* (lack) some form of knowledge, skill, cognitive framework, and the likes. Everything concerning the psychology of behavior tends to be specified in mental terms, even aspects of lives that are not inherently mental, such as gender. Thus, learning will be learning *about* gender and *about* the *construction* of gender roles and identities; affect is analyzed in terms of the motivations, attitudes, or feelings that people *express* in interviews or on formal psychological instruments. Virtually non-existent in current scholarship are approaches that recognize how any individual characteristics affect behavior requires knowing the situational characteristics, and how situational characteristics affect behavior requires knowing individual characteristics. Indeed even in such approaches, which are adjectivally marked as *transactional*, the very possibility of identifying individual characteristics manifests the underlying individual-as-thing approach. The difficulty of getting away from this kind of discourse is apparent in this alternative approach to educational psychology, when *person–situation connections* are characterized as affordances, and only a few sentences later affordances are attributed to situations. The setting is a thing-like entity "into which the person 'fits'" (Snow 1992, 24). The individual as the unit of analysis leads to the currently dominant ways of theorizing human behavior in terms of *self-acting* individuals that *interact* with others when there are groups or larger assemblies.

Self-Action and Interaction

> The epistemologies, logics, psychologies and sociologies today are still largely on a self-actional basis. In psychology a number of tentative efforts are being made towards an *inter-actional* presentation, with balanced components. (Dewey and Bentley 1949/1999, 120)

Reading across the different outlets for scholarship in educational psychology, we easily get the impression that the content of the introductory quotation to this chapter is as true today as it was some 70 years ago when it was first published. Even Vygotsky, in all of his early work, focuses on the individual and uses it as the unit of analysis (e.g. Spinuzzi 2019). Educational psychology is about the individual self, its possessions of various types (e.g. knowledge, identity, affects) and its characteristics (e.g. motivation, attitude), and how these come to affect, and be affected by, others with whom the individual engages in *inter*action. The self-actional

approach constitutes a "pre-scientific presentation in terms of presumptively independent 'actors,' 'souls,' 'minds,' 'selves,' 'powers' or 'forces,' taken as activating events" (Dewey and Bentley 1949/1999, 122). All those phenomena are taken to act out of their own powers – or in Vygotsky's case, agency (Spinuzzi 2019) – that is, they are constitutes as self-identical elements, entities, things, or particles from which more complex situations are constructed (see the opening section and Fig. 1.1). As the introductory quotation to this section suggests, even in mainstream (cognitive) psychology, the role of the relation between individual and others, between individual and culture, generally is recognized – which has changed nothing in the fact that examinations still isolate individuals physically and socially for the purpose of identifying those characteristics that can be said to be truly that of the individual. The relation with others, generally theorized as *inter*action, is an expansion of the self-actional approach in the sense that it juxtaposes self-actors to investigate what results when an action follows the action of another self and is in turn followed by yet another action. In the resulting analyses, "*thing* is balanced against *thing* in causal interconnection" (Dewey and Bentley 1949/1999, 132, emphasis added). We see this approach at work when a phrase in a verbal exchange comes to be theorized as a *question* all on its own, without reference to anything else in the situation; it is then followed by the *reply* of another person, again considered all of its own. Consider the following fragment, which is used here to exemplify the self-action and interaction approaches.

The fragment comes from the beginning of a lesson episode in which the students were pulling a mystery object from a black plastic back, which, upon inspection, they were to place with an existing category of objects or on a mat of its own (see offprint turn 1). The teacher had started the game by placing her mystery object, which turned out to be a cube, on a mat on the floor. The children were asked to give reasons for their placements; color and size were not allowed as reasons. As the children were adding their mystery objects, a categorization system emerged on the floor (see Chaps. 3 and 7). The following fragment derives from Gina's turn, which was the first student turn after the teacher had placed the object she had drawn from the bag (it was what we know as a cube). I use the fragment to articulate some of the key features of psychological theories centering on self-action and interaction.

Fragment 1.1

> 1 G: ((*Gina places object, as in offprint.*))

2 (0.8) ((*Gina retreats to her seat.*))

> 3 W: now can you tell us what you're thinking?

4 G: (3.5) ((*scratches her ear and brings her hand to her chin as culture associates with thinking.*))

5 W: there must be something different because you gave it its new, its own category; can you tell us what you thought was different between the two ((*points to objects*)).

6 (0.8)

> 7 G: they're different shapes? ((*Changes gaze and body from being oriented towards objects to face of Mrs. Winter.*))

08 W: in what way.

09 (2.3)

10 G: that one (.) the square one s a little bit shorter and that one ((*points to the cylinder closer to her*)) is a tiny bit taller.

11 (1.6)

12 W: okay.

(0.6)

u:m °what were the two:: things we said we weren't going to sort by.°

The fragment shows that Gina placed her object (a cylinder) but does not provide a reason (turns 1–2). There is then a repeated teacher talk that we can hear as an attempt to solicit a reason (turns 3, 5). The reason then is provided (turn 7), though an elaboration is asked for (turn 8). In that elaboration Gina uses a size comparison to justify the placement (turn 10), which is followed by a query about the criteria that should not be sorted by (turn 11).

In the self-action approach to psychology, each person is understood as an independent actor, who can be characterized by the knowledge, mental capacities, conceptions or conceptual frameworks, identity, motivation, interests, and so on. The preceding paragraph reproduces this way of thinking in attributing actions to individuals, which are followed by the actions of other individuals. Each actor interprets the world generally and the actions and talk of others specifically. For example, Mrs. Winter might be characterized in terms of her *pedagogical content knowledge*, a topic of interest to many scholars. It is something that she has and that she is said to deploy (draw on) when teaching mathematics to the children. Researchers employing the self-actional approach would write about how Mrs. Winter does not just accept children's replies, here Gina's placement of the object, but that her questioning is aimed at getting children to think about and articulate reasons for their (mathematical) actions of placing objects in the emerging category system. Investigators might say that Mrs. Winter is an experienced teacher, who has participated in developing elementary school curricula for the ministry of education, that she is "dedicated," or that she is engaged in educational issues beyond her classroom. In interpretive studies, such background information may then be used to explain why Mrs. Winter was successful in allowing these second-grade children to learn mathematics that was much in advance of what children at that age normally would achieve according to several theoretical frameworks (cf. Roth and Thom 2009). Gina, too, would be characterized in terms of individual characteristics and performance. Thus, for example, self-action approaches focus on the fact that Gina does not provide an answer in turn 2, and might suggest – especially if some form of pre-test or interview existed to confirm – that Gina does not know the answer, does not *have* the *knowledge, mental framework*, or *mathematical conception* to be able to provide a reply. It might be said that Gina has not yet attained the theoretically predetermined level necessary for doing classification of three-dimensional geometric object, as existing theories suggest (e.g. those of Piaget or van Hiele). Interpretive and quantitative researchers alike might focus on the fact that Gina has a learning disability or, especially if she were to be a little older, they might write about gender or dislike of mathematics to explain why Gina does not respond or why, in turn 10, she provides an explanation that uses size as a criterion even though it had been disallowed.

Analytically, the self-action approach essentializes statements so that Mrs. Winter is understood to ask a question in turn 3 independent of anything else that is going on; and in the same way, it turns 7 and 10 are replies. Whereas the question is attributed to and characterized in terms of Mrs. Winter's knowledge, the replies are attributed to Gina and her "interpretation," "construction," or "understanding" that are "behind" (i.e. the causes of) the actually heard (externalized) replies. Her think-

ing is theorized to be the cause of what Gina is saying. In self-actional takes, phenomena such as power (power-over) are attributed to individuals independently of the situation or any practical, real-life exchange event where individuals of different institutions or institutional positions participate. Research ethics boards also tend to characterize the researcher as in power-over the research participants; and in schools, teachers are characterized as having power-over the students.

In the interactional take, two or more self-identical individuals are put into relation, one action following another. Thus, for example, in Fragment 1.1, the teacher Mrs. Winter typically would be said to have asked a question at the end of turn 3. This question would be explained as the result of an interpretation that led Mrs. Winter to the conclusion that the situation unfolds *because* Gina does not know or has some other problem preventing her from providing the sought-for explanation for the choice to place the cylinder on a mat of its own. Interactional approaches take note that there is no verbal reply (turn 4), and then Mrs. Winter talks again. The Gina takes a turn, then Mrs. Winter again. Each phrase is grounded in the characteristics of the individual, but is understood as a response to the situation generally and to the talk of the other person specifically. Just as Dewey and Bentley note, in interactional approaches, thing gets balanced against thing; but each thing is grounded in the self-identical individual and in characteristics attributed to that individual alone. One self-identical person-thing acts upon another self-identical person-thing, each said to "construct" their own "meaning," which, when they differ, may be negotiated.

Some variants of interactional approaches are characterized by adjectives such as "sociocultural" and "cultural-historical," the former often situated by means of references to L. S. Vygotsky whereas the latter tend to be grounded in the writings of his student and collaborator Alexei N. Leont'ev.[1] A sociocultural study might focus on the fact that the student Gina, in the course of the exchange represented in the fragment, comes to provide a first answer. The teacher then might be said to have "scaffolded" the child into doing what she did not do on her own, but with the aid of the teacher was able to do. The analysis might elaborate that the Gina, with the aid of the teacher, produced both the classificatory act and provided the explanation – a standard mathematical and scientific "process skill." Other investigators might mobilize the concept of the *zone of proximal development*, which is defined by the difference between the level of a child's solo performance and the performance in the presence of an adult or more advanced peer. Here, Gina's answer following the exchange might be explained in terms of this concept, especially when the focus is on the reasoning skill; but further evidence might be sought in the fact that eventually, Gina will provide a reason that is acceptable in the context of this lesson. But at that point, the joining of categorizing and reasoning occur in public. Researchers operating within the interactional frame might say that the conjunction of the two practices was "socially constructed" given the fact that there was also a teacher

[1] These authors never used these adjectives. Instead, these adjectives initially were used by others to denounce the work that Vygotsky and Leont'ev were doing; they were later adopted more generally to refer to these particular kinds of psychological theories (Yasnitsky 2019).

solicitation (i.e. "there must be something different because you gave it its new, its own category; can you tell us what you thought was different between the two"). This type of study then tends to proceed making some argument about *internalization*, a process that moves whatever was jointly constructed in the relation to the inside of the individual. There are many studies that ground such explanations in the work of Vygotsky; and there is a whole chapter in *Mind in Society* (Vygotsky 1978) devoted to the internalization of higher psychological functions. A dichotomy thus is produced that juxtaposes whatever exists or is occurring on the outside with whatever (equivalently) exists or is occurring on the inside. A typical explanation might quote the psychologist, stating that what has taken place in the case of Gina is an internalization, that is, an "*internal* reconstruction of an *external* operation" (56, emphasis added). He uses the example of learning to point, which, in his account, begins with a child's failed attempt to grasp an object, followed by the mother's act of giving the object to the child (see the extended discussion of pointing in Chap. 4). The internalization is said to have occurred when the child makes the earlier movement but for the mother rather than actually reaching for the object. In such studies, investigators apparently never consider that participating in the exchange with a teacher, the latter's talk already makes sense to the former, and so there is nothing outside that is not already within. Inside and outside are poor concepts when it comes to understand human behavior and learning.

Many studies that self-identify with the cultural-historical tradition dissect the situation into a number of "elements" from the group {subject, object, tool, rule, community, division of labor, product}. These "elements" tend to be arranged in a triangle that epitomizes the Helsinki approach to cultural-historical activity theory. The triangle may be used in reduced form to show how the different "elements" in play constitute the mediation of the activity leading from the (mystery) object at the beginning to its correct classification as the end product. Thus, in this approach, the relation between Mrs. Winter and Gina would be *mediated* by the language-in-use whereas Mrs. Winter would mediate between Gina and the mystery object, which is also the object of the present task ("activity") (Fig. 1.2). It is quite apparent that the different kinds of "interaction" involve entities that are external to each other such that one entity (e.g. language, sign) comes to stand between and link two others (e.g.

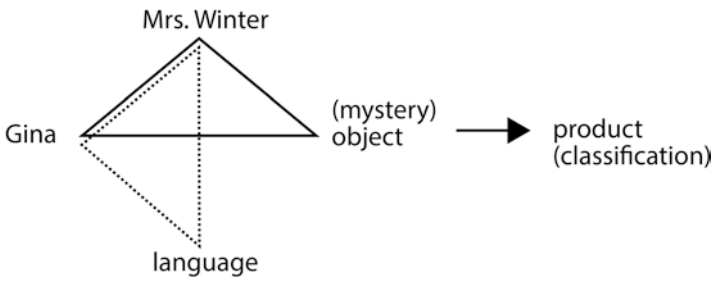

Fig. 1.2 Typical triangular explanation that might accompany the analysis of Fragment 1.1 and that draw on the concept of mediation

Mrs. Winter and Gina). Even before such cultural-historical conceptualization existed, Vygotsky (1989) had used such a discourse to describe how a sign (more correctly, a signifier) stands *between* a subject and another subject, between subjects and their tasks, or between subjects and their brains; and he had made use of triangular representations in each of these cases (see Chap. 5 below). That is, the earlier Vygotsky – despite all of his declared efforts to overcome the associated psychophysical (body–mind) problem (e.g. Vygotsky 1997) – did in fact reproduce it with his intellectualism and its self-actional underpinnings that characterize much of his earlier work. Intellectualism and the associated focus on words, concepts, and meanings "that prevented him from creating a theory of emotions, and beyond it a general psychological theory of consciousness" (Zavershneva 2010, 82). In its very intent, the intellectualism apparent when a focus is on interpretation and meaning produces the body–mind split and thus interferes with creating an appropriate theory of emotions, which requires the unity/identity of body and mind.

In both the self-actional and interactional approaches, one person-body-thing (e.g. Gina) is separate from another person-body-thing (e.g. Mrs. Winter) because of the underlying *partes extra partes* condition that comes with thinking of body-things that take up space that cannot be taken up by other body-things. Each person-body-thing is endowed with a mind. The two minds are separate entities precisely because of the separate bodies. This is where language has to come in, for it allows for a relation between the two minds – though each will "interpret" whatever has been said in her own way. Each person-body-thing (Mrs. Winter, Gina) will have her mental construction of the task, of what is going on, and of whatever else is important. It should be apparent to the reader that in the very positing of the person-body as thing, the Cartesian dualism is reproduced based on the spatial separation of the person-body-things that led to a separation of the immaterial mind-things (e.g. meanings) from body-things (e.g. sounds heard as words). That spatialization – e.g. of time, life, perception – is at the source of the problems in epistemology, psychology, and psychophysiology (Bergson 1911). Such problems are overcome only in recognizing that reality is but mobility, whether we are dealing with the inside or outside, the self or external objects.

One "canary-in-the-coal-mine" indicator for the pervasive self-actional take in educational psychology (including the sociocultural and cultural historical variants) is the problematization of "intersubjectivity," a problem that arises because the two person-body-things are separate, each with its own mind, so that the subjectivity of one subject will be different from the subjectivity of the other subject (given that each has its own constructions of reality). Intersubjectivity is defined as "a concept that indicates *shared understanding* among people," and, qua phenomenon, "must be built up gradually through interaction and repaired frequently" (Stahl 2015, 209). However, in the use of the concept, numerous questions remain unanswered, including (a) How is shared understanding built up without shared understanding? (b) How do members to the setting ascertain that *shared* understanding does not exist and therefore that it has to be built or repaired? or (c) How do members to the setting ascertain that they indeed have achieved intersubjectivity? The recognition of a situation as manifesting intersubjectivity itself is based on intersubjectivity.

Words and Things

The traditional problems of (educational) psychology are surreptitiously reproduced in the ways in which documentary evidence of interesting phenomena are collected and used in the production of data and analyses. The reverse is also the case: the reigning epistemology grounded in the self-actional approach and its extension that produces the interactional take are the ground for transcribing video in the way that this is commonly done. Most transcriptions appearing in research journals reduce events – lesson, interviews, or problem-solving sessions – to the transcription of the words said, augmented by ethnographic descriptions of actions and context where necessary. Moreover, the words are not taken for and by themselves but rather as indices pointing to something else not directly present: "meaning," "conception," or "idea." It is precisely these two strategies that lead to the separation of body and mind and lend themselves to neo-Kantianism and other constructivist theories. Transcribing videotapes by using only words flattens the observed events into language. The ancient Greek originally used the term *logos* for language and word; they later also used it to denote reason, a use that has survived to the present day sedimented in the term logic. By transcribing events into words, we obtain a representation thereof where everything that exists is named and, being in the form of words, is reduced to the form of intellect and reason. In the philosophical critique of metaphysics, this tendency to reduce everything to words and reason (i.e. *logos*) has come to be denoted in certain circles by the term *logocentrism*, which is but a synonym for intellectualism. Logocentrism is a way of thinking about the event of *being* that has its origin in the ancient Greek culture and has shaped the Western way of relating to the world. That is, the idea of rational thought apart and independent from the material world, metaphysics, is bound up with the practice of reducing complex situations to words and verbal description.

To produce transcriptions of this first type requires little else than playing a video and noting the words heard, which are then transcribed directly into a word processing program. Where transcribers hear someone speaking but without being able to make out specific words, question marks are used to indicate the approximate number of words (e.g., <??> to indicate two words). Verbal descriptions of actions are inserted where appropriate or necessary (e.g. turn 1 below). Transcribers also tend to insert punctuation following common grammatical practices even though speakers hardly ever make reference to punctuation – unless they "air quote" or says something like "the situation is like this, period." That is, where the transcriber hears a question, a question mark will be inserted at the end of the sentence independent of the fact how participant listeners have heard the current speaker as evidenced in their subsequent turns. When they have trouble ascertaining a phrase in some way, as statement, question, or order, they tend to use what happens later to explain what happened earlier. That is, in placing a question mark even though the speaker has not said "question mark," the transcription not only has already become interpretation but also has come to adopt the self-action approach.

Consider Fragment 1.2 as an example of a transcription, which was produced from a videotape shot in the same second-grade mathematics curriculum from which the preceding fragment derives. The episode is discussed in further depth in Chap. 5, and also features in the proposal for alternative descriptions to be used in a transactional approach presented in Chap. 11. The exchange occurred in a discussion about the shape of a mystery object in a shoebox that could only be perceived by means of the hand entering through a screened opening. The children were tasked to represent the object in the box by means of plasticine. In the episode, Melissa has shaped her plasticine into a cube, but Sylvie and Jane have shaped their plasticine into flat rectangular solids (slabs). Every now and then, the research assistant (Lillian) recording the three girls is also contributing to the exchange.

Fragment 1.2

1 M: ((*after putting her hand in the box for a while*)) I still think it is a cube. ((*The whole group pauses.*))
2 S: Let me check ((*puts her hand into box*)).
3 L: Why do you think it is a cube?
4 M: Because it's the same; it's the same ((*turns her model over in her hands*)).

Characteristic of this form of transcript is the removal of temporality of all dimensions of participants' action, not only regarding the production of their talk but also regarding their physical behavior (e.g. gestures, body position, transactions with physical object/s, and gaze orientation). As readers can see, the transcript presented above is reduced to the order in which words have been pronounced. In fact, the sense-experience is that of sounds, which are heard as certain words unless there are some problems, and transcribers may never figure out what had been said or indeed whether some sound was actually produced by a human. The verbal description of the hand/arm movement no longer renders the temporality of the movement and is not coordinated with the temporal unfolding of the speech. Because temporality has been removed, the forms of thought said to be "behind" the utterance are taken to be relatively constant over the length of a typical lesson or interview. Such a description, by and large static, facilitates making claims about "conceptions" and "conceptualizations" that a student "has" and that can be sampled unproblematically in an interview, where it is read out by means of an objectification into words or other signs. These conceptions or conceptual frameworks may be represented – by the student or by the researcher based on a clinical interview – using concept maps (Fig. 1.3). Concepts and conceptions are stable things that come to be related into structures that again have the character of thing (rather than event). To get there, researchers tend to make no difference between some word used at the beginning, in the middle, or at the end of an interview. If we pushed hard, however, to get at these stable things, "this immobile substrate of mobility … would withdraw to the same extent as we tried approaching it" (Bergson 1911, 34).

Researchers interested in learning tend to take such transcriptions and infer "meanings" and "mental structures" that somehow are in the speakers' minds and

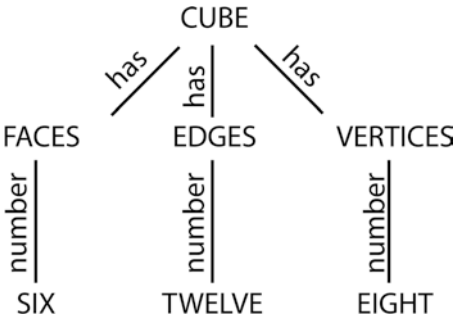

Fig. 1.3 Concept map that a student might produce, or that a researcher creates based on an interview concerned with the identification of student conceptions

that have led them to say what they said. For example, a mathematics educator interested in my work concluded from the fragment: "Melissa (initially) conceptualizes the mystery object as a cube. She bases her conclusion on the tactile observations she makes by turning the object over and 'checking the sizes' of its faces." Here, the verbal articulations and descriptions of movements become indices for something that is not directly available. Melissa is saying, "I still think it is a cube," and on the other the researcher claims, "Melissa (initially) *conceptualizes* the mystery object as a cube." The relation between word and thought (mind) is taken to be as a rather simple one, the former providing access to the latter. Thus, in learning research, verbal transcriptions of interviews and classroom videotapes are regularly used to find out what and how students think, how they solve problems, or how they "construct" their mathematical mental structures (or, conceptions, representations, or even identities). But of course, this requires an inference, for all those theoretical entities are hidden from view and only expressed in the talk that led to the interview and its transcription. These are not just hidden from view but they are inherently mental and thus non-physical. When saying "cube" while pointing to or touching the physical thing Mrs. Winter placed on the floor (offprint in turn 1, Fragment 1.1) makes a link that can be witnessed without requiring special methods, the translation that occurs between witnessable acts of speaking and the non-physical and hidden world of thoughts, meanings, and ideas is tenuous and thus requires a carefully articulated method. That is, researchers have to specify how they get from interview talk to a representation of the conceptual structure such as exemplified in Fig. 1.3. How anyone could learn what a thought, meaning, or idea is, if it is always hidden, remains unspecified.

The transcription lends itself to the extension of the self-action approach to interaction. Each turn is attributed to the person and represents an action of a certain kind – like treating turn 1 as a "claim" and turn 3 as a "question" of which Melissa and Lillian are the respective owners. The fragment presents completed phrases, one after another. It appears as if one action followed another, and the assumption tends to be made that Melissa made a claim (turn 1), Lillian asked Melissa for a reason (turn 3), and Melissa provided a reply (turn 4). That each participant is speaking *for* the other – so that the language has to be such as to be understandable on the part of the other – rarely, if ever, is questioned.

At the end of his life, Vygotsky was on the verge of creating a new theory, where the relation between word and thought no longer was direct. Thus, he wrote that thought is not merely expressed in words so that "the structure of speech is not a simple mirror image of the structure of thought" (Vygotsky 1987, 251). All three – speech, thought, and the relation between the two – are *processes*, that is, events. The key to the theoretical shift proposed here is to understand events *as* events, not as a process where some outside force acting to turn a thing into another thing. With respect to talk as it might occur in an interview setting, we do not see any evidence for a conceptualization, unless simple word use is taken to be synonymous with conceptualizing something. Instead, in my research I have learned that students and adults (teachers, pilots) often talk about phenomena even before they ever have thought about and reflected upon some idea (phenomenon, topic), and, therefore, *could not have formed* (i.e., "constructed") a concept-thing. Thought therefore is the *consequence of* speaking, comes to existence through speech through an abstraction that indicates an event by means of a characteristic, which may be an object-thing. Whereas it might be appropriate to say that Melissa "turned over the cube," the simple description of this action in words may overstate the issue. For Melissa may have turned the cube in the way we walk or scratch an itchy spot: it does not require our conscious intentional thought. We also do not know whether Melissa was *intentionally* "'checking the sizes' of its faces." Rather, we observe her using the thumb and index of the right hand in apparently the same or slightly changing configuration along three different edges of the cube while articulating that some "it" – which we do not know whether it is an edge, a face, her cube, or the mystery object – "is the same." That is, as soon as something is articulated in words, it is moved from the realm of events and Being, presence, and presentations into that of beings, presence of the present, and re-presentations (Dewey 1929). In this realm of words, it is subject to transitive verbs that inherently embody intentionality and causal reasoning. It is precisely in this move that the reduction from transaction within a whole to interaction between parts occurs (Ricœur 1986); and this move is the source of all philosophical errors that come with a thing-centered epistemology versus an event-centered epistemology (Nietzsche 1922). In other words, the epistemological problems begin when we make statements such as "the lightening flashes," for we attribute an event to a self-identical subject-thing (i.e. the lightening) to which we attribute an action by means of a verb (i.e. to flash) that brings something about.

Transcripts of the kind exemplified in Fragment 1.2 are consistent with a constructivist approach, which, at least since Kant, is concerned with abstractions and abstract thought. In Piaget's theory, we find this approach in the development from concrete operations that lead to formal thought as embodied sensorimotor schemas are abstracted and become the pattern for logical thought. Thus, whereas it is evident that we would not characterize a person as *consciously* placing feet in walking, there is a tendency in educational psychology to use an *intentionalist* discourse when it comes to describe what people do in the situations that we observe them: "construct meaning," "develop conceptions," "acquire knowledge," "position themselves," "construct identity," and so on. Interestingly, though, both embodiment and

enactivist camps make use of such transcriptions, thereby retaining the very Cartesianism that they intend to overcome (cf. Sheets-Johnstone 2009).

All of these terms refer to things; even actions are things that are external causes for something else that happens afterward and for the effect. But these things do not connect other than by means of other things that *mediate* between them, including forces external to the things. In our everyday experience, however, there are not disconnected things and forces that make for causal connections but all the events – seeing, hearing, feeling – are "obscurely drawn together and mutually implied in a *unique drama*. Therefore, the body is not an object. For the same reason, the consciousness I have thereof is not a thought" (Merleau-Ponty 1945, 231, emphasis added). The living, animate body therefore cannot be reconstituted after having dissected it into pieces to get a better idea of how it works. It is because of the gathering capacity of the drama that I propose in Chap. 12 a psychology in terms of drama. It will not attempt to reconstitute human conduct and psychology from decontextualized bits and pieces: like I cannot reconstitute life by replaying the photographs on a reel fast enough so that they give the semblance of movement.

Ontology of Permanent Things

Operating in the Greco-Roman tradition, everyday and scientific thought (with the exception of quantum physics) are characterized by ontologies of permanent things (e.g. Bergson 1911; Whitehead 1938). We think about chairs, tables, people, signs, words, or meanings as things that stand in certain relations. All of these things have the characteristic of an enduring self-identity. Even though the newly born infant is different from the 10-year old, the teenager, the adult, or the person on the deathbed, we tend to think of the individual as a thing that is changed by some forces that may have their origins on the inside or on the outside of the skin. The very notions of and opposition between some "inside" and the corresponding "outside" refer us to the ontology of bounded, self-identical things that do have something permanent even if they undergo change. They maintain themselves in the face of the evident flux of the material and social worlds. Self-identical things support qualifications, individual characteristics. In the case of natural things, these might be color, shape, size, taste, or hardness. In the case of human beings, the character might be specified as "type A," "tender," "choleric," "dependent," "aggressive," "vain," "anxious," and so on. Even when we do not observe things but events, most (Western) languages end up describing in terms of entity-things and what they do. Thus, when we look toward the stormy sky and say, "The lightening flashes," then the flashing we observed is posited both as activity of a subject (lightening). But we can understand the lightening only if we approach it as event, and we would "wipe out its nature" if we were to take some instantaneous fragment and "extend this fraction of a minute into a whole process of which it is a fragment" (Mead 1932, 1). The world thus becomes a world of spatially related self-identical entity-things that exist outside of any reference to the passage of life-as-event from which there is no time out. The resulting

conception is one where an otherwise empty space is filled with entity-body-things that occupy regions. In this view, matter-things are the support of enduring or changing qualities in terms of which each entity-body-thing can be characterized. The outcome of this approach is that "we rivet our attention on the eternal realm of forms. In this imagined realm there is no passage, no loss, no gain. It is complete in itself. It is self-sustaining. It is therefore the realm of the 'completely real'" (Whitehead 1938, 68).

In the work of René Descartes, the distinction between matter and space, on the one hand, and non-spatial (non-, meta-physical) mind comes the expressed in its fullest. Mind is very different from matter, for it does not have its spatial qualities. This corresponds to the ways of theorizing common in ancient Greece, where there is contingent matter with its imperfections that is opposed to the eternal nature of (mental) forms and idealizations. To the present day, psychology has not overcome this dichotomy, exclusively focusing on one (physiology) or the other aspect (mind, mental constructions). Those mental things are external to the material things – thus the question how mental things come to be connected (grounded) in the real world of material things that we are made of and experience. But if experienced affect (emotions) is a bodily phenomenon, the question arises as to its relation to thought. Because thought and body are different substances, the relationship can only be external. Moreover, because they do not share anything in common, some form of mediator is required, which, for Descartes, was the pineal gland. That organ allowed the mind (soul) to perceive the movements of the body, including those related to emotions; and through this organ, the mind could also affect and change the emotions.

One way of overcoming the dichotomy was by postulating a single substance that has both material and mental qualities or characteristics, something like a *thinking-body* (Il'enkov 1977). In his writings concerning the teaching of emotions, Vygotsky drew on the works of Baruch Spinoza, a contemporary critic of Descartes. For Spinoza, there are not two substances but precisely one substance, the thinking body, which manifests itself in the contradictory and mutually exclusive body and thought (mind). In the final pages that Vygotsky edited before his death, there are hints that he was moving from his earlier focus on things (e.g. words, thoughts) to the concrete life of the individual. After making a statement about thinking that becomes the thinker of thoughts – a statement almost identical to one made by Nietzsche, the perhaps most vicious critic of all thing-centered philosophies – Vygotsky relates thinking and life:

> Thinking was divorced from the *full vitality of life*, from the motives, interests, and inclinations of the thinking individual. Thinking was transformed either into a useless epiphenomenon, a process that can change nothing in the individual's *life and behavior*, or into an independent and autonomous primeval force that influences the *life of consciousness* and the *life of the personality* through its intervention. (Vygotsky 1987, 50)

In his elaborations, however, he does not go all the way to a process approach where events are thought of by means of evental categories. He never went as far as his contemporary countryman Mikhail Bakhtin did, who, in *Toward a Philosophy of*

the Act (Bakhtin 1993), suggests that we understand the act and its ethical dimensions only when we start thinking in terms of evental categories, including *Being-as-event*, *world-as-event*, and *life-as-event*, such as in the event of once-occurrent Italy, the event of my experiencing (thinking), the event of death, and the event of interpenetration. Vygotsky, on the other hand, in postulating the unity of affective and intellectual processes, isolates these from everything else and he maintains the separation between idea and reality, such as when he notes how "every idea contains some remnant of the individual's affective relationship to that aspect of reality which it represents" (Vygotsky 1987, 50). Throughout his final, posthumously published *Thinking and Speech*, the intellectualism remains, including his focus on the "the word's relationship to the object, its relationship to reality" (285).

In his own words, Vygotsky never got to step into the promised lands that he was seeing on the horizon, the world in flux (of the "*flüssig"* type, as he wrote in a note shortly before his death). However, Evald V. Il'enkov, a Russian philosopher sometimes considered to have provided a philosophical basis for the later Vygotskian thought, showed how the Spinozist take could be developed into a modern theory that no longer dichotomizes body and mind and instead viewed in the thinking body the most fundamental phenomenon to be investigated. Notably, in a discussion of the relevance of Spinoza, Il'enkov focuses on events rather than on a substance-thing. He notes that "thinking is not a *product* of an action but the *action itself*" (Il'enkov 1977, 35) and "*one and the same event*" (36) manifests itself in two ways. Importantly in the context of the remainder of the book, the philosopher notes:

> For to explain the event we call "thinking," to disclose its effective *cause*, it is necessary to include it in the chain of events *within which it arises of necessity and not fortuitously*. The "beginnings" and the "ends" of this chain are clearly not located within the thinking body at all, but far outside it. (Il'enkov 1977, 37)

Despite those beginnings, Il'enkov does not perhaps fully achieve the kind of perspective that is laid out and developed in the remainder of this book, a perspective based on the radical move from things to events required by a transactional approach). Il'enkov still has things side by side with events and does not provide a complete eventual perspective that describes even object-things in terms of events. Whitehead does have object-things, but these are abstractions with permanent characters of events within events and across events. This characterization is apparent in the following quotation from the theory of objects:

> An event, considered as gaining its unity from the continuity of extension and its unique novelty from its inherent character of "passage," contributes one fact to life; and the pattern exhibited within the event, which as self-identical should be a rigid recurrence, contributes the other factor to life. (Whitehead 1919, 198)

The event and recurrent stability need to be theorized together, which leads liveliness to be the characteristic of the relation between event and the object-thing as recurrence. Otherwise we end up with abstractions, for "to say that the object is alive suppresses the necessary reference to the event" whereas "to say that an event is alive suppresses the necessary reference to the object" (Whitehead 1919, 196). An important reason for educational psychology to move to a different ontology exists

in the opposition between theory, which tends to be formulated in the form of things, and practice, which inherently is an event. Teachers never deal with things but with events; and what they name the theory–praxis gap has its origin in the difference between the teachings of educational psychology – concerned with lifeless things and processes – and the real life of the classroom. Once we fashion our theories such that they describe events in terms of events, our hopes will be fulfilled to have overcome the gap. At the same time, we will have overcome the gap between body and mind, for one and the same event has both qualities, body and of mind.

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Part I
Foundations

> The world is a world of events. (Mead 1932, 1)

> To think the event *before anything*: Is this not an impossible challenge? As soon as we attempt to grasp an event as it happens in itself, we are almost *immediately* absorbed by another thing, by "things" precisely, frozen before our eyes by a Medusa's gaze. (Romano 1998, 7)

In Chap. 1, I outline and exemplify the focus of classical (educational) psychology on things and that this very orientation is the source for the body–mind dualism that continues to plague the field. I also refer to the experience of and philosophical discussions about the fact that life means flux, change, and novelty. This means that we are never confronted in a strong sense with *things* but with *events*; and when there appear to be self-identical things then these always are abstractions, for when we seem to perceive the same thing over and over again, the situation has changed, we have changed, and thus the relationship to whatever appears to be recurrent (i.e. things) has changed. If it appears counter-intuitive that things change even though it sometimes does not appear as such, then consider yourself. You are not the same person that you were at the age of two months, two years, or 20 years; and yet you may like most people have the sense that there is something self-same to the present day. As the second introductory quotation suggests, it is hard to think the event – e.g. our lives – as events because as soon as we try grasping the event, we fall back to things. Whereas thinking the world in terms of stable objects may be legitimate and even useful in everyday life, it leads to insurmountable theoretical problems (Bergson 1911). A transactional approach (to situated cognition), however, requires us to take into account time within the fundamental categories of our theory; but virtually all approaches to situated cognition take the self-action and interaction approach (Roth and Jornet 2013). Without time integral to the unit of analysis, the relations between two phases in the development of an individual are external, that is, arbitrary. This is so because external relations do not represent the inner transformations that unfold in the course of an event.

In the course of our lives, we have come so used to be surrounded by (self-identical, permanent) things that it is hard to imagine that we are subject to a belief

in things, that "the 'thing'" is only an abstraction. Yet this is precisely what philosophers who attribute a primacy to events over self-same things are telling us (e.g. Whitehead 1919). In the human evolution, the appearance of things has given an advantage to our species, associated with the ability to control its life conditions. But we know that permanent objects enter our lives only around the age of 8–12 months, a psychological fact referred to as object permanence (see Chap. 4). From then on, the belief in the permanence of the object, the world, and our own selves takes hold. This belief is connected to the belief in the power of logic, which in fact presupposes the belief in the self-same thing (Nietzsche 1922). Both Nietzsche and Whitehead, as others, critique theorizing the world in terms of the self-same thing – Kant's Ding-an-sich [thing-in-itself] – and propose thinking life and world as events. Other philosophers have made the same theoretical turn; this includes Mikhail Bakhtin, who, in the relatively little cited Toward a Theory of the Act (Bakhtin 1993) considers all philosophical questions from the perspective of the world-as-event and Being-as-event. What we usually tend to think of as things or in thing-like fashion, such as a country, is theorized as event; and part of the event is the experiencing (witnessing) of it:

> The experiencing of Italy as event includes, as a necessary constituent moment, the actual unity of Italy in unitary and once-occurrent Being. But this unitary Italy gains body (is invested with flesh and blood) only from within my affirmed participation in once-occurrent Being, in which the once-occurrent Italy is a constituent moment. But this event-context of my unique participation is neither closed nor isolated. (Bakhtin 1993, 71)

In this quotation, Being is not a thing but an event that is occurring; and it never occurs twice in the same way, which is but a paraphrase of the diction attributed to Heraclitus that we never step into the same river twice. Once-occurrent Being is a phase in the entire world-as-event, as Bakhtin notes elsewhere in his little book. In this he agrees with others, who take it that every entity, as part, pervades the whole world, and the whole world can be found in every entity: Any "actual occasion … is the whole universe in process of attainment of a particular satisfaction" (Whitehead 1929/1978, 200). This is a fundamentally Spinozist take with the one significant difference that Spinoza theorized the whole as one substance, whereas philosophers of process focus on the world-as-event. In this world-as-event, for example, "Italy" or the "Castle Rock at Edinburgh" are not things but events that occur together with other events in the current duration of the world-as-event. That is, one and the same "thing" "is different as an event-moment in different value contexts" that have "entered here into the unity of the ongoing event and are alive within that unity … because of the unique place they occupy within the unity of the architectonic" (Bakhtin 1993, 70). Italy is an event, but one that does not repeat itself, and thus occurs only once. Even though it might feel counter-intuitive, we know that Bakhtin is right. All we have to do is return to a place where we lived before – and it tends not to be the same. It is not the same because of apparent changes. But even if the changes are less apparent, we no longer are the same: the experience will be different. Saying that Italy is a constituent moment in once-occurrent Being is the same as saying that it is a cogredient of the duration – i.e. an event among events that

make the present – the current phase of the world-as-event. My participation in the world-as-event is not separate from the world, for any perception, external or internal, is a percipient event that is cogredient, like Italy-as-event, in the present (duration). My unique participation, unique as event in relation to other events – preceding, succeeding, or occurring in/with the present duration plays itself out in a context of other event, in an event-context.

In this book, the transactional approach presents a way of understanding events through evental categories. Although scholarly discussions frequently are about change, recognizing and even insisting that everything changes, there tends to be only talk and little actual walk, for "ordinarily, we really are looking at change but we do not see it" (Bergson 1911, 4). There are but words, whereas reasoning and theorizing remain as if change did not exist. But, Bergson insists, once we are convinced of the reality and primacy of change over a stable world in itself and once we have chosen concepts of change for thinking about the world, many epistemological problems of the past will fall and our theories become simpler. To achieve this, "we would have to make an effort to take hold again of change and duration in their original mobility" (17). The theoretical move from things to events then comes with new opportunities and new ways of approaching theoretical problems that arise in classical educational psychology. For example, when the possible relations between events are considered, the spatial and temporal qualities of human experience result, and any (distant) object anticipated in actions are the result of previous movements (see Chap. 4):

> The relation of extension exhibits events as actual – as matters of fact – by means of its properties which issue in spatial relations; and it exhibits events as involving the becomingness of nature – its passage or creative advance – by means of its properties which issue in temporal relations. (Whitehead 1919, 61)

Objects are specified in terms of their occupancy of geometrical space; and there cannot be two objects occupying the same physical space – the philosophical concept of *partes extra partes* [part as external to another part]. If parts were outside of each other, than the parts would only hold outer relations to one another, and the whole made from all parts would be little more than their sum. Thus, from the transactional perspective, "every actual entity is present in every other actual entity," which has the effect that "the continuum is present in each actual entity, and each actual entity pervades the continuum" (Whitehead 1929/1978, 50, 67). If, on the other hand, one part is outside of another part, the (external) connection between them becomes an issue. Classical, thing-centered approaches have no way of solving this issue:

> How can the other actual entities, each with its own formal existence, also enter objectively into the perceptive constitution of the actual entity in question? This is the problem of the solidarity of the universe. The classical doctrines of universals and particulars, of subject and predicate, of individual substances not present in other individual substances, of the externality of relations, alike render this problem incapable of solution. (Whitehead 1929/1978, 56)

Thinking about psychological issues in terms of the world-at-an-instant leads to separate "states" external to each other like the different photographs in a movie reel, and the relation between these states becomes a problematic issue. Obvious cases of this are studies of learning and development, conceived of as the difference between forms of knowledge expressed or developmental stages, as measured before and after some intervention. An external cause has to be posited to get from the earlier to the later state; and, in (quasi-) experimental research, the intervention is that cause. In the (social-) constructivist case, the construction which is external to the knowledge object constitutes that force; or the augmentation of knowledge may be the result of an internalization, where something previously constructed in the public forum comes to be constructed on the inside.

Events are different. Two events relate when they intersect or when there is a third event common to (intersecting with) both (see Chap. 2). For there to be a temporal relation between two events, there has to overlap to some degree (see Chap. 3). If there is no overlap, then there is no relation and the two instances stand side by side like the points on a line. We can think of this in terms of a chain, where each connection is the equivalent of the overlap between successive events or successive phases of the same event. That overlap is at the heart of sociality, which is defined as "the situation in which the novel event is in both the old order and the new which its advent heralds. Sociality is the capacity for being several things at once" (Mead 1932, 49). Novelty is a fundamental quality of the event, and is important in theories that include time in the fundamental categories of thought, for "change gives meaning to permanence and recurrence makes novelty possible" (Dewey 1929, 47). We no longer have something like a number line, where each point is separate from every other point or like a movie reel where there are separate (frozen) images. Instead, because the phases of events are overlapping, there is a continuous flow that cannot be reduced to things. Novelty is important to the theory, for the future is unknown and even in the most mundane of everyday tasks, the unforeseen may (and often does) happen. Thus, thinking about psychological issues in terms of events means that change and novelty comes to be inherent in the most fundamental and smallest unit, which still has the character of the event. Moreover, we no longer have two human thing-like beings side by side and isolated from one another (*partes extra par*tes) but two individuals-as-events joined in an event common to both – e.g. the phase {speaking | hearing} in communication (Chap. 3). It is precisely that capacity of the same event, {speaking | hearing} to be in two systems (human beings) at once that there is sociality and, consequentially, mind. Thinking the world-as-event, which is physical through and through, gets us straight, and without gap, to sociality and mind (Mead 1932).

If the event is taken to be the fundamental aspect of actuality, then we must move to describe every individual fact or thing in evental terms, that is, in terms of events (Whitehead 1938). Even objects have to be described in terms of the situations where they appear as recurrences and from which they are abstracted. But that move from a primacy of things to a primacy of events does not come easy, and, as the introductory quotation asks, is it not an impossible challenge? This is why Bakhtin modifies Being, world, or Italy by adding the expression "-as-event" or precedes a

term by the expression "the event of x," where x ∈ {Being, life, world, experiencing, meeting, closeness, interpenetration, once-occurrent Italy}. Bakhtin thereby forces us to think differently about the phenomenon (e.g. Italy), just as other philosophers do in asking us to think about the Great Pyramid as event, "meaning thereby all nature within it" (Whitehead 1920, 74), an event of the same character as that of a person run over by a car.

Theorizing pertinent issues in educational psychology by taking the event as the starting point will allows us to solve other problems, such as the learning paradox: how can students *intentionally* orient toward a learning object unless they already know that something to be learned? If they already know it, then they do not have to engage in learning it. When we think about learning in terms of events, then novelty, emergence, the unseen and unexpected (unforeseen), and the unpredictable are integral part of our theory. Until the learning episode has ended, with the arrival of the consciousness of the learned, "meanings given to events are of a sort which constantly evoke a meaning which was not absolutely anticipated or totally predicted: there is expectancy, but also surprise, novelty" (Dewey 1929, 307). If learners do not already know where they are to end up – i.e. knowing the learning object – then they will have a hard time being metacognitive about what they are doing. How can you know whether you are on the right track if you do not know the endpoint of the journey (event)? From this perspective, the perennial student question, "Teacher, am I right so far?" makes complete sense.

The purpose of this book is to present and explicate the transactional perspective on the topics of educational psychology, which means that the *event* – rather than the substantive object – is the fundamental theoretical category and unit of analysis. In this first part of the book, I lay the foundations for this perspective.

In Chap. 2, I provide an outline of the transactional approach in terms of a formal theory of events and their relations. Whereas in an object-oriented approach, two entities, occupying different parts of space, inherently are external to each other (*partes extra partes*), events are unrelated unless they overlap or share an event in common. Related events thus cannot be separated without changing the phenomenon as a whole, whereas in the object-oriented approach the individual (interacting) entities continue to exist in themselves. A perceptual analogy of events that relate like the fibers, strands, and threads in a piece of cloth is provided. The approach leads to a substantial revision in the use of activity theory in the cultural-historical tradition.

In the third chapter, I lay the foundation for and theorize the transactional approach to psychology by using everyday (verbal and non-verbal) exchanges, from a second-grade mathematics curriculum. Each communicative act is social rather than individual, being spread across individual and environment and involving the *joint* actions of multiple people. I show why thinking accompanying some act, too, is and has to be spread across individual and environment. Transaction means that there is a unity/identity of organism and environment, which leads to the fact that neither one can be understood independently of the other). About one month before entering the hospital where he died, Vygotsky gave a lecture on the environment and the category *perezhivanie* [(emotional) experience] in which he presents a sketch of

such a transactional perspective. Indeed, already in a note roughly dating to 1932, Vygotsky gesticulates toward a transactional perspective, which was to overcome the dualism between inside and outside: in the relation between thinking and speech, we find "a continuous transition of the external to the internal and the internal to the external, a real rather than imaginary unity and struggle of opposites" (Vygotsky 2010, 94). For him, it was a beginning. But prior to those efforts, Mead's entire philosophical and (social) psychological program already was based on a transactional approach that is required for a theory that has any hope to overcome all sorts of dualisms. Transaction thus means that we cannot even think of aptitude as something lodged in the head (perhaps body) of the individual but as a characteristic of the {person | environment} unit. It is precisely at the interface of the individual and environment that the educational psychologist Richard E. Snow (1992) would be seeking to locate aptitude, though he tried doing so from a thing-centered perspective. Even the notion {person | environment} that I have been using for a while easily is read and taken in the person-thing and environment-thing approach – I know this because I have been subject to this understanding initially and for many years. This is so because the very way of writing the expression is not so different from what chemists do when, for example, they write carbon dioxide (CO_2) in the form of O = C = O, where each line represents a pair of electrons. Instead, we have to think about person and environment as irreducible intertwined when we think them as ingredient of events. What we need to do instead is to think {person | environment} as unity/identity, which means, there is both unity and identity of the two phases (person, environment) of the overall event.

In traditional educational psychology, including the sociocultural and cultural-historical versions, theories are framed in terms of thing-like, permanent entities, including material objects, words, meanings, individuals, forces, knowledge, conceptions, emotions, identities, attitudes, beliefs, and many other characteristics. But we do know that permanent entities are not what exists for the infant at the beginning, as shown in the phenomenon of *object permanence* that develops after the age of about eight or nine months. Readers will also be familiar with the saying, "Out of sight, out of mind," often applied to animals, but also (in jest) to humans. Moreover, research with kittens conducted in the 1960s demonstrated that edges and steps did not exist for those animals that merely were in visual contact with the physical environment but were not allowed to actually move within it. This shows that the existence of *distant objects* – important in the bottom-up (social) epistemology of George H. Mead – do not exist. But without distant objects, there cannot be permanent objects; and without permanent objects, there cannot be phenomena like pointing. When the permanent object emerges, it inherently is a social object because the distant object already was social (Mead 1938). The permanent object also is a condition for the emergence of the quality of time. In Chap. 4, using materials from the early life of human infants to develop the theory of events and the origin of the world for the individual along the lines that Mead had laid out in his foundations of a psychology in which there is a primacy of the social in the strong sense. I use empirical data from two phases of infant development: prior to the emergence of object permanence (presence of object in distance or out of sight) and following

object permanence when "'true' pointing" has developed but prior to the appearance of standard language. I show why true pointing not only involves the permanent (social) object, but also the social self, and the sign (pointing gesture) as social object. The proto-words (regular but non-standard sounds) work hand in hand with the pointing movement so that the word is not the end of a trajectory that began with the deed – the final aphorism of Vygotsky that we must disagree with (Mikhailov 2001) – but the deed and the word are one from the beginning. The description and theorization takes up on Mead's description, which leads to an account of the birth of signs not only in ontogeny but also in phylogeny of humans and thus the birth of culture.

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Chapter 2
Events Before Anything

> It is nonsense to conceive of Nature as a static fact, even for an instant devoid of duration. There is no Nature apart from transition, and there is no transition apart from temporal duration. This is the reason why the notion of an instant of time, conceived as a primary simple fact, is nonsense. (Whitehead 1938, 152)

> *There are changes, but there are no things that change; change does not need a support. There are movements, but there are not necessarily invariable objects that move; movement does not imply a moving body* [mobile]. … Change is self-sufficient; it is the thing itself. (Bergson 1911, 24, original emphasis, underline added)

In Chap. 1, I show how classical psychological theorizing is ontologically based on the primacy of material and ideal *things*. The material things are located in Cartesian space, which is treated as the substrate for the relationship between material and geometrical bodies. Ideal things, on the other hand, are non-spatial and ephemeral. In cognitive psychology, this eventually has led to the question about how thought and mind are grounded and how concepts (theory, ideals) come to be related to the material world – the *symbol grounding problem* in the cognitive sciences. Interpreters of cultural psychology do not operate differently, so that the thing (object) becomes a Trojan horse by means of which Cartesian thinking enters and comes to dominate even those theories said to be about "(practical) activity." This includes (rightly or wrongly) the theory that Vygotsky developed and also the one by his student A. N. Leont'ev, which today goes under the name of cultural-historical activity theory. As shown in Fig. 2.6 below, a mediational triangle – whether in Vygotsky's original form or that build on the Helsinki interpretation of Leont'ev's work[1] – epitomizes the thinking in terms of objects; and the relations in those triangles also are things. Sign-things and tool-things come to stand between a person-thing and another person-thing or a material object-thing; or a tool stands between subject and object, a subject stands between division of labor and the object

[1] A recent analysis shows that the idea of mediators that stand between people or between people and objects is extraordinarily expanded and becomes a central concept in the Helsinki approach to activity theory (Spinuzzi 2019).

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of activity. All these are things with external relation-things that are such so that other things can come to stand between and thereby mediate them.

In this chapter, I provide an outline of the transactional approach, we exists in the ontological primacy of the *event*. Everything we perceive, experience, can think of, and can affect is of evental nature. This framework is subsequently given flesh, first in the subsequent two chapters, which focus on the extensional qualities of events, and then in the extensions and implications for a transactional perspective on personality (Part II and Part III of this book).

A radical alternative to thinking the world begins with the recognition that nature at an instant cannot be but an abstraction. In thinking of the world at an instant – e.g. in an assessment of IQ, ability, motivation and the likes – our decomposition ends up with entities that have thing-like characteristics. The approach inherently becomes Cartesian, where physical extension in geometrical space is the primary *attribute* (quality) of an entity-*thing* (person). In the transactional perspective, the starting point for theory is the fundamental *relationship* of physical occasions [that] is *extensive connection*" (Whitehead 1929/1978, 288), which leads to a theory based on the relation between whole (e.g. universe) and part (e.g. person, word). The whole (universe) is in flux, a fact articulated in the first introductory quotation. Any *actual* entity cannot be theorized in terms of a morphology of things but is an event; and an object-thing always is an abstraction from events. Consider the example of a molecule: it "is a historic route of actual occasions; and such a route is an 'event' … and the changes in the molecule are the consequential differences in the actual occasions" (80). It is apparent that even the molecule is historicized; and this is even more so in the case of human (cultural) activity, the historical nature of which is amplified by the role that past experiences have in current experience.

The transactional approach recognizes that we never perceive and understand things but always experience nature as passing. Indeed, perception and experience themselves are continuously passing. Without passage, there is no experience. There is no standstill, no possibility for a time-out from life. Time-out is equivalent to death. This is so even for objects that appear to be immediately and constantly present to visual perception. With tactile perception, it is immediately apparent that movement is required to sense what a surface texture is and feels like. Without movement, there is no texture; nor is there something like a line, a circle, or whatever other figure we might think of to exemplify the point. Smell requires the passage of air, taste requires the passage of food over the taste buds, and hearing inherently cannot be at an instant because its objects (e.g. a musical note) are extended in a manner that comes to be known as temporal. Visual perception appears to be an exception, as objects seem to impress themselves. Thus, in cognitive psychology, there are perceptual models treating the retina as a mirror of nature from which the mind extracts features. But this is not consistent in this way with the results of psychological research on visual perception.

When research participants are asked to fixate a stationary point, the eye does not remain stationary (Yarbus 1967). Instead, it moves, among others, left and right. If this movement were to be registered on something like a pen chart recorder, it would leave a trace displaying a back and forth movement (Fig. 2.1a). When

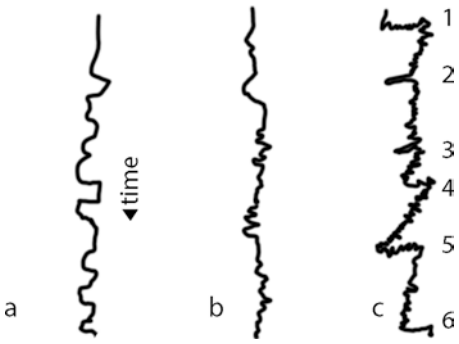

Fig. 2.1 The eye does not stand still when (**a**) looking at a point (as would be registered by a pen-chart recorder), (**b**) following a vertical but stationary line, or (**c**) counting six given horizontal lines

research participants are asked to follow a vertical straight line, the eye does not just move parallel to the line but instead also features tiny horizontal back-and-forth movements as well as larger horizontal movements up to but generally not exceeding 20° (Fig. 2.1b). Finally, asked to count a set of six horizontal lines, researchers recorded both larger movements oriented in the direction of the lines and smaller, saccading movements (Fig. 2.1c). Indeed, if perceptual psychologists fix the image of a figure on the same place on the retina, it fades away into a uniform grey within a short period of time, usually of the order of 1–3 s.

The upshot of such research is that there is a perceptual (percipient) event rather than some recording of a stationary object on one place on the retina from which a stable feature could be extracted. The world that appears in perception also does not sit still; it continues to evolve. The form therefore is an abstraction from this percipient event. With experience, we come to know that there is a specific form in front of us even though we cannot see that form – as shown in the analyses of the perception of a cube (Merleau-Ponty 1945). "Cube" is an abstraction from percipient events, which may vary across situations depending on how we approach the cube. It is better to speak of perceiv*ing*, which we then treat as an event. But the universe does not stand still, nor does anything in the participant stand still. An analogy for this situation is that of two individuals, each of which is on one of two trains moving side by side at the same velocity, that is, speed and direction (Bergson 1911). Each train and the individuals riding them appear immobile (stable) with respect to the other. Movement only is an added feature to this immobility. The problem arises when immobility, and, associated with it, stable things, are taken as the nature of things; and as soon as we theorize the world in terms of stable things, we create insoluble problems. Bergson suggests that the mechanisms of human perception are such as in the analogy of the two trains, where internal and external events run in parallel and appear to be stationary with respect to one another. Perception itself is an event that changes as it unfolds. The perceiving subject and the object perceived appear thing-like rather than evental, which leads to the impression that there are certain states or stages. In the case of educational and psychological research, measures prior to and following interventions precisely lead to the ideas of knowledge state and developmental stage. Learning and development are theorized as changes between states or stages.

Both the surrounding world and the person change while the psychological experiment, itself an event, is unfolding. The person changes biologically and physiologically – as can be seen in the fact of tiring. To understand a person tiring while participating, we need to have associated theoretical categories that make tiring integral to participating. Participation in psychological experiments not only changes participants but also may lead to the sense of having learned. Thus, learning is a form of event associated with participating, and associated with the continuing life of the person as a physical organism and the ongoing evolution of the universe as a whole. The different forms of events that appear in this paragraph are of different order and range. To be able to model human behavior requires us to investigate the different relations events may have to each other. To my knowledge, nobody has done this better than the quintessential philosopher of process A. N. Whitehead. It is to his work that we therefore turn to elucidate the different relations that events have to one another.

Events and Their Relations

In our everyday experience, the world does not stand still. There never is a time-out from life. The preceding sketch of psychological research on perception highlights its evental (processual) nature. Thus, perception is an event within life, itself an event part of the life of the universe as a whole. Events, which have duration, unfold into other events, such as when a greeting leads into a conversing or when selecting grocery store items leads into lining up at the checkout, which leads into weighing and pricing, bagging, paying, and exiting the supermarket. The ending of one event is the beginning of another – the ending of a conversation is the beginning of a parting. Other events in the grocery store run in parallel with little overlap, though all shopping, filling shelves, cleaning isles, checking out, etc. taken together make the life of a supermarket. Indeed, any one activity makes sense as figure against all events taken together as ground. These experiences of the evental nature of shopping for groceries shows that we require a better understanding or theory of how events relate. Without such a framework, there is little that we can say about learning and development specifically and human conduct more generally. But those examples already provide us with a sense that "in immediate experience events are present in a temporal as well as a spatial thickness" (Mead 1938, 364), the temporal part of which has received the name *specious present* (James 1890). This specious present is a duration that extends over the different – i.e. concurrent and successive – relations that (mini-, micro) events can have with respect to each other.

To theorize events and their relations, we begin with the observation that "nature, as we know it, is a continuous stream of happening immediately present and partly dissected by our perceptual awareness into separated events with diverse qualities" (Whitehead 1919, 69). That stream, any event we might isolate, is indivisible – as a melody becomes something different as soon as we stop it or consider it in terms of independent parts, such as notes (Bergson 1908). In that stream, the perceived and

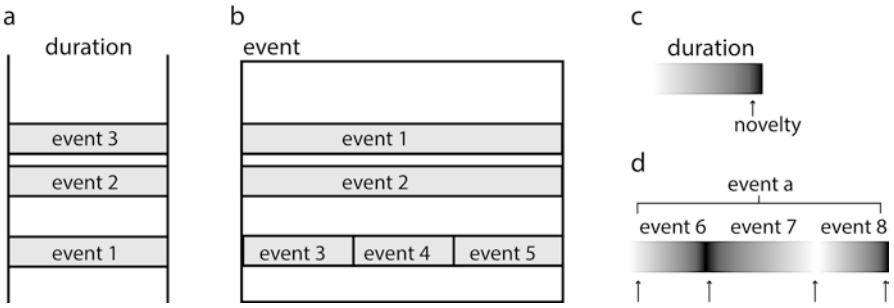

Fig. 2.2 Relations between events. (**a**) A percipient event (event 1) is cogredient with the duration, which may include a number of cogredient events (e.g. event 2, event 3). (**b**) A complex event may be simplified in one of two ways, the first focusing on those cogredient with it, which yields spatial relations, and the other focusing on perduring qualities and apparently constant characters, which yields temporal relation (here the sequence from event 3 through event 5). (**c**) A duration or present always has an end that differs from the beginning with novelty emerges in passage; the earlier and later boundaries are blurred. (**d**) An event may be composed of mini- or micro-events or phases that "bleed" into each other

possible but unperceived events, though not sharply differentiated, stand in a figure | ground relation. Some events stand out against, and make sense because of, a (back-) ground of an infinite number of other events. Because perceiving is an event within some current duration that makes a "slab of nature," we speak of it as *cogredient*. In mathematics, this adjective is used to refer to processes that occur in lockstep with each other, as when two or more variables are changed in the same way when transformed. Here, this adjective also is used to characterize a percipient event that is unequivocally present within the duration associated with it. In contrast with an *ingredient* event that could exist as independent and perduring element (sum of parts), a cogredient event cannot be thought independently of the event that extends over it. An event therefore can be cogredient with a specific duration; but the duration may have many events cogredient with it (Fig. 2.2a). Consider the case of a phase in the life of the supermarket, where any percipient event – your perceiving – is cogredient within a particular duration. Whereas there are many other events occurring within the slab, the next percipient event would be associated with a different duration. This quality, cogredience, immediately yields for us the experience of "here-now" as distinct from "now-there," "here-was," and "here-will-be." That is, cogredience yields those qualities from which classical scientific notions of timeless space (at an instant) and space-less time are abstracted.

Any event in nature and society is of considerable complexity. We obtain greater simplicity in one of two ways (Whitehead 1919). In the first way, greater simplicity is achieved by focusing on events cogredient with the present duration, and specifically on those cogredient events that are either salient or that constitute the necessary ground upon which the salient event occurs. This simplification yields spatial relations, including those of the differently located participants in some event (e.g. a school lesson, a research interview). The second way is achieved when the analysis focuses on certain perduring and permanent characters – e.g. related to an object

that is "here again" and that we know to be there though hidden behind some screen. This approach therefore separates events into smaller segments that bear what we come to know as temporal relations. It is well known that the experience of object permanence is not innate but emerges in the life of an infant around the age of 8–10 months. Indeed, in the life of the infant, the sense of space and time, subject and object, co-emerge (see Chap. 4).

One important aspect of the analysis of some phenomenon in terms of events is that any smallest unit we can think of still has evental quality. That is, even if we were to proceed to the analysis of perduring qualities and permanence, we might identify events of smaller and smaller (temporal, spatial) extension, but we could never reach an "event at an instant," an idea that is excluded by the very conception of the event. But saying event means saying change. Thus, none of the "entities" normally associated with some human activity – individuals, tools, objects, or ideas – are constant but changing, if ever so slowly. Even language, which appears to be stable, actually changes in use together with the social relations within which it is used: there are no other outside forces that change the language, which dies (as Latin did) when it is no longer in use. Even the changes in the literary novel form can be understood only if it is considered in its relation to the ever-changing language of everyday use, where the novel also has its creative source (Bakhtin 1981). Both the idea of a point-like instant in time and that of a singular point in space are the results of abstractions, whereby the analysis identifies characters as limits extracted from the different forms of extension of an event. Both philosophical ideas, space, as the accumulation of distinct points, and time, as the serial order of instantaneous moments, are the result of *extensive abstraction* (Whitehead 1919). Readers interested in how this works are referred to the philosopher's work – but it does require some mathematical background. The characters, abstractions, are not of evental nature and, thus, external to the event.

Relationships between such externalities are incidental and do not reveal the inner nature of the event (see also Hegel 1807). We can create *illusions of change*, such as when playing the photographs of a movie reel fast enough so that the people shown *seem to* move, but we do not thereby get the inner dynamic of that movement. This has been referred to as the cinematographic mechanism of life associated with a mechanistic illusion of life (Bergson 1908). In this illusion, an *external* force is required that turns the reel on the projector to create the illusion of the movement, an illusion created by moving pictures. This external force is the *artificial* link that has to be established between stable states to create the semblance of movement and change. That is, what we see is not an actual movement but a movement that is hidden in the projector. The projector motor is external to the contents of the photographs that are played and that when played fast enough appear to show movement. Any such attempt in reconstituting movement from still images (states) presupposes that movement consists of immobilities.

There are two important qualities to duration: its beginnings and endings are indeterminate, and, because of its creativity, the ending always includes novelty over the beginning (Fig. 2.2c). We intend getting the saltshaker but in fact knock over the wine glass; we intend hammering a nail into the wall but hit the thumb instead; or

we feel saying one thing but will have said something else (as in a "Freudian slip"). Each duration, occasion, situation, passage, or present therefore comes with creativity or emergence so that every next instant comes with some form of novelty over what is now (Mead 1932; Whitehead 1933). Thus, "the real duration is that in which each form flows out of anterior forms while adding to them something new, and is explained by them as much as it explains them" (Bergson 1908, 391).

Passage therefore is nothing like what we might infer from physics, where a self-identical train has simply been displaced by a certain amount on the self-identical tracks in the exact ways that the mathematical equations allowed us to calculate ahead of the movement. In such a world, there is no novelty; and such a world is indifferent with respect to past and future. It does not matter whether the train moves from A to B or B to A. Sadi Carnot's equations of the heat engine also describe reversible processes, whereas we experience our world as irreversible. Creativity and emergence mean that there is something new that could not have been predicted based on the antecedent conditions alone. The idea is familiar to those with some knowledge of chaos or catastrophe theory, where the concept of bifurcation takes a central place. The state of a system following the emergence cannot be predicted based on the known states preceding the emergence. But in the world that we inhabit, each duration constitutes not just a bifurcation but represents a furcation with many even infinite possibilities, only one of which materializes itself in the passage of the once-occurrent nature (Whitehead 1938). Near the beginning of a conversational duration there are an infinite number of possibilities for its evolution only one of which realizes (materializes) itself in the actual saying and is completed when the saying has ended and therefore is an irrevocable fact (Roth 2014). Novelty here is not exceptional. Instead, "the creative urge belongs to the *essential* constitution of each situation" (Whitehead 1933, 249). Thus, we could not ever say what the world at an instant is, because the smallest event still has the quality of creativity, emergence, and novelty so that anything identified within it is different at the end from what it was at the beginning.

In one conception of the relation between events, those with perduring characters were presented as sequences of events with shorter durations that are *adjoined* at hard boundaries – such as event 3 and event 4 or event 4 and event 5 (Fig. 2.2b). However, such a relation between events that are part of a continuity is inconsistent with the idea that novelty is inherent in the passage from past to future that occurs in and constitutes the present. If there were hard boundaries, then one event in a historical continuity could be said to be the cause of a later event – once we know the intervening connection – because the two are separate. But any actual causal attribution is possible only after the fact and after an effect is known (Dewey 1938; Nietzsche 1922b). Because passage comes with novelty, we cannot know the end until after the happening is over (Fig. 2.2c). We model the unfolding of a larger event by means of mini- or micro-events that constitute its phases; and these phases *intersect*, that is, they overlap and thereby are common (Whitehead 1919). In other words, the phases of some event – which we may think in terms of mini- or micro-events depending on the phenomenon investigated – blend into each other (Fig. 2.2d). The novel end of one phase is the factual base of the next phase, which ends with

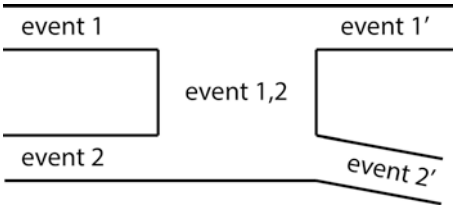

Fig. 2.3 The relation between two events in the same duration is established by means of an event. For example, a rock and a person come to be related by means of a percipient event

the emergence of novelty that becomes the beginning of the subsequent phase. An immediately apparent situation where such an approach turns out to be useful is that of a conversation, where a turn at talk is beginning *while* listening to the preceding speaker to which the turn replies. If the reply were not beginning in listening, the two turns would have no connection – giving rise to a "dialogue of the deaf," which is not a dialogue at all. The implications and relevance of thinking about conversations and the continuity of experience are worked out and exemplified in Chap. 3.

In any duration, there are many (streams of) events that do not share in continuity (Fig. 2.2a) but that still may be joined. Consider the relation between a person and some object in the immediate environment. Both the person and the object are thought and theorized in evental terms, as *life-threads*, *lifelines*, *bundle of lines*, *families of durations, families of events*, or *lines of flight*[2]: the person is to be thought of as a family of events of the type "'active' condition" and the object is an event of the type "'passive' condition" (Whitehead 1919, 86) in the event that extends over (contains) both. Instead of the term family, we may also use that of *nexus* (plural nexūs). When the person (e.g. event 2, Fig. 2.3) perceives the object (e.g. event 1, Fig. 2.3), the two lifelines or families of events come to be joined. How are they joined? Again, they are joined by an (micro-) event, which above is discussed as the *percipient event* (e.g. event 1,2, Fig. 2.3) overlapping with the "transmission" event (e.g. the sound heard as another person's speaking). The object comes to exist as such for the person only *after* the percipient event has come to an end – e.g. the *said* is available only after *saying* and hearing have ended. But in the percipient event they are joined. Some readers may hastily conclude that an object does not "participate" in the percipient event. But reflecting on the preceding description of what the eyes do rapidly allows us to conclude that they eyes would not know where to move unless they *followed* the contours.

In the nexus of two events (Fig. 2.3) is embodied the essentially social nature of the universe. Indeed, the figure visualizes central aspects in the definition of a nexus:

> A nexus enjoys "social order" where (i) there is a common element of form illustrated in the definiteness of each of its included actual entities, and (ii) this common element of form

[2] Whitehead uses the concepts *life-thread* and *family of events.* The notions *line of flight* [ligne de fuite] and *bundle of lines* [paquet de lignes] are used by Deleuze and Guattari (1980), which Ingold (2011), who also uses the term *lifeline,* takes up in his anthropological studies. The notion *family of durations* appears in Mead (1938).

> arises in each member of the nexus by reason of the conditions imposed upon it by its prehensions of some other members of the nexus, and (iii) these prehensions impose that condition of reproduction by reason of their inclusion of positive feelings of that common form. (Whitehead 1929/1978, 34)

The nexus with social form thus designates a society, which allows us to understand a person – an enduring organism – as a "society whose social order has taken the special form of 'personal order'" (Whitehead 1929/1978, 34). Throughout this book, I think with Whitehead when theorizing the person and personality.

The perception of an object is not somehow *constructed*, and it is not simply "extracted" from the retina activated by the light that has come from the object and activated certain cells. Just as the hands of a person who cannot see but only touch an object (because of blindness or because the object is hidden from sight) *follow* the contours – such as edges, surfaces, and corners of a cube – the event has the eyes *follow* the perceptual contours that the object *provides*. As is apparent in the grammatical structure of the preceding phrase, both person and object are actively involved. But each also is passively involved, for the object gives itself to the person who receives the image (e.g. Marion 1996) all the while it is passive with respect to the movements that occur within the person-related nexus of events, including the one that defines the object. The notion of *feeling* –Vygotsky might have translated Whitehead's term using the Russian word perezhivanie – designates the event by means of which some aspect of the social or material environment-as-event comes to be immanent in the becoming of the person. The event is one of concrescence, a coming together of events in the constitution of what will be the subject. Such feelings thus are "creations of their own creature," and thus describe an actual entity like a person "in a state of process during which it is not fully definite, [but] determines its own ultimate definiteness" (Whitehead 1929/1978, 255).

The percipient event does not just bring about the object in the awareness of the person. The object does not exist as such and in itself. Instead, the object is an abstraction from an event that stands against all the other events in the same duration (Whitehead 1919). The duration extends over (encompasses) the percipient event that brings into the accented visible one or more objects (i.e. other events) that stand against everything else over which the present duration extends. Although little headed in mainstream educational psychology, we never perceive objects as such. Instead, objects always are perceived as recurrences in the encompassing event, within which they also obtain their function. Thus, anything on top of my office desk is perceived against the desk upon which they appear, itself located in the office (see also Heidegger 1928/1977). That is, these things are office stuff, unless they do not seem to fit and perceived as foreign. But this foreign quality occurs against a presupposed ground of familiarity with office stuff.

In percipient events of the visual type, the person-as-event clearly is changed – the person has come to know something about the object – whereas the object-as-event tends to be relatively stable. As a result, each event becomes immanent in the other even after they have separated again. When we have a conversation with someone else, we both can refer to it because we have it in common (see Chap. 3). But the conversation is something we have accomplished jointly, so that there is

something of the other in ourselves after we have parted. In other types of percipient events, the sensible event itself may change, such as when the fingers leave a trace on the surface as a result of a touching intended to find out the quality of its feel. The trace is a feature of the surface that marks the immanence of person-related event in the object that is no longer the same; and the change in the person-related event marks the immanence of the object-related event in the person. *Habits* and *habitual experience* precisely point to the immanence of recurrent patterns that arise in one family of events in the course of repeated relational events with other events (e.g. tools) in the same duration. But when the joining event is of the practical type, then the objects at hand clearly are changed as well, that is, together with the person performing the practical action. In the case of a conversation between two people, the two lifelines come to be joined in a common event. The joining occurs in coordinated irreducible pairs of micro-events {speaking | listening} that alternate in their direction such that speaking and listening fall within the lifelines corresponding to each person. In other words, a conversation is happening only if speaking is directly associated with listening, if the two occur together in constituting a phase of the conversation. Moreover, listening involves an irreducible pair of micro-events in the form {attending to | actively receiving}. The details of the approach and their implication for the analysis of teaching and learning are worked out in Chap. 3.

The transactional approach also allows us to appreciate in new ways the relationship between person and event. An event does not exist as such, as something that can be referred to and grasped as a whole, until it is completed (Fig. 2.4). The distinction between an ongoing happening and an event as grasped is reflected in the distinction between "the general stream of experience" and "*an* experience," available only "when the material experienced has run its course" (Dewey 1934/2008, 42). The event is therefore not grasped while it is unfolding, and any percipient during the event (Fig. 2.4) thus has to be thought of as *witnessing*; and it is only after the fact that we can say with any certainty *what* the witnessing has witnessed. This is quite apparent when we use Dewey's own example of "that meal in a Paris restaurant," *an* experience that will have been of a very different kind for philosopher than for those dining in the restaurants *Le Petit Cambodge* and *Le Carillon* (Paris, France) that were stormed by Islamists on the evening of November 13, 2015, leaving 15

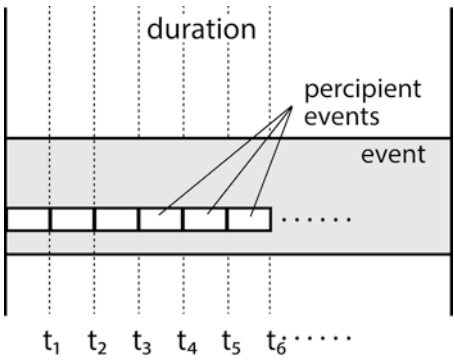

Fig. 2.4 The relation between an extended event, itself part of the duration of the world, and a series of percipient events occurring while it is lasting. The event as a whole can be perceived and grasped only after it has ended

dead. *While* the dinner was happening that will have been an experience of some sort is unfolding, it is extending over all the constitutive percipient events.

Being-as-Event: An Analogy

At the heart of the transactional approach lies the recognition of the primacy of (a) what we might refer to as an open-ended world-as-event, life-as-event, or Being-as-event and (b) the individual life as an event of a moral being. The approach is characterized by the presupposition of "the unity of life-in-process-of-becoming" (Bakhtin 1993, 13), which necessitates theoretical categories and images that are events rather than self-identical things (entities). The hypothesis of the double transactional relation – in space, between person and (social, material) environment; and in time, between consecutive phases of unfinalized and unknown events – can be visualized in terms of corresponding *lines of becoming*. Things and persons no longer are theorized as stable entities but (a) in longitudinal, temporal terms of unfinished lifelines that (b) stand in corresponding relations with other lifelines (i.e. people, things). This result of pragmatic philosophy has an antecedent in the recognition that "duration, identity with itself, Being are inherent neither in that which is called subject nor in that which is called object: they are complexes of events apparently durable in comparison with other complexes" (Nietzsche 1922b, 55). Such a perspective on the transactional nature of life, with its spatial and temporal qualities expressed in the evental notions of *corresponding* and *responding* (see Chap. 3) is captured in an analogy (which, as any analogy, is partial): individual human beings are like strands in the larger thread of societal activities, which, as an ensemble, form the total fabric of a society. This analogy preserves, most importantly, the two forms of extensions typical of events: temporal continuity within a family of events and spatial relations between families of events within the ensemble of all events that make the life process of society, humanity, or nature in their respective entirety.

Consider the analogy of a piece of cloth making a pillow with tassels (Fig. 2.5). In the analogical situation, strands are made of short fibers twined together, their particular forms shaping and giving shape to one another and to the strand as a whole (Fig. 2.5c). The fibers may be thought to stand for very small (nano- or micro-) events, breathing, eating, digesting (including many microbial life forms in the gut constitutive of who and what the person is), thinking, perceiving, attending, moving, and so on. These fibers come together, intertwine, and form strands. In intertwining with each other, each fiber is becoming like and taking a shape corresponding to the ensemble of other fibers in the strand. This coming together and intertwining corresponds to a shared history in the making. One or more fibers may separate again from the strand, or terminate, without nevertheless doing harm to the strand. This thus is an analogy for the many different life processes that together make a living organism, such as a human being. Even though the cells in a human body are all exchanged within a matter of weeks, we have the sense of continuity across much of our lifespan. Fibers (micro- or nanoevents) are shaped in their

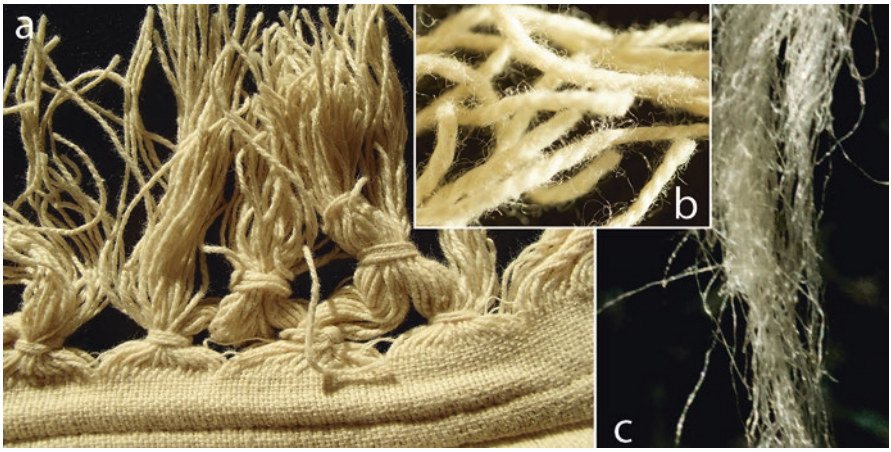

Fig. 2.5 In this analogy, fibers, strands, threads, and textures represent different levels of happening (events), with a factual determination in the past and an indeterminate relation to the future. (**a**) Highly collective forms, such as cloth and tassels are the ensemble results of many threads coming together and relating in specific ways. (**b**) Threads come together to give rise to collective forms, but themselves consist of a number of tightly intertwined strands. (**c**) Strands are made from fibers that take part in constituting, and are shaped by, the collective form. (© Wolff-Michael Roth, used with permission)

encounter with other fibers such that these others are immanent in their form beyond the actual encounter. Being entwined with another fiber leaves traces (markings) in the historical forms that both can take in the course of their evolution. The result is that the shape of individual fibers can be thought only through abstraction from their constitutive relations with others.

From the intertwining of fibers also come *ensemble effects*, some of which may be of a new logical kind. This phenomenon is quite apparent in the analogy of vision (e.g. Bateson 1979). Rather than leading to some form of addition (subtraction, multiplication, etc.) of two individual (monocular) images each coming from a different eye, the conjunction of two eyes leads to a new form: binocular vision, that is, vision in depth. The *conjunction* of the two eyes, this transactional relation, therefore gives rise to a new organ (i.e. binocular vision); and this organ has the functional characteristic of seeing in depth. Strands come together to intertwine to give rise to threads (Fig. 2.5b), each of which we may think of as a human being.

We can use this analogy to think of all the biological processes in the human body as events. When they come together, they do not merely add up but give rise to new organs and new forms of events. Among these are the various perceptual events – seeing, feeling, tasting, smelling, and hearing – and, most importantly, those that we refer to as thinking, remembering, or imagining. In this analogy, therefore, there no longer is a body–mind split. Instead, every higher order event is the result of the *ensemble relation* between constituent biological events; but it constitutes a new logical type. This new type of event therefore is characteristic of the ensemble, the strand, which, in this analogy, was taken to stand for an individual

human being. We can also say that this ensemble relation is an emergent property that cannot be predicted based on the properties of its antecedents.

In this analogy, strands *come together* to yield new collective forms, some of which are based on a few individual threads (Fig. 2.5b), whereas others involve large numbers (Fig. 2.5c). "Coming together" is used synonymous with *concrescence,* a key term for Whitehead (1929/1978) for describing emergence and novelty that are integral aspects of events. Togetherness means there is a nexus, even temporary, of events or nexus, which, in their togetherness, become immanent in each other. These ensembles (nexūs) may be used as analogies for conversations, lessons, village (city) life, life of a society, or the life of the global community. At each level, new ensemble phenomena are created; at each level, new ensemble effects emerge from the relations between the different forms of events that come together. For example, phenomena that tend to be attributed to individuals – dependency, aggressiveness, courage, fatalism, or passive-aggressive behavior – really are characteristic of relationships between people. All these phenomena, the words used to refer to them, "have their roots in what happens between persons, not in some something-or-other inside a person" (Bateson 1979, 133). Talking about any of these phenomena requires us to talk about at least two people in relation. The relation has new qualities (properties) that differ from the qualities of individual parts; we can also say that any relation is a phenomenon sui generis. New phenomena become visible when people come together in groups, such as academic committees or lessons in schools. In our analogy, the tassels of the pillow (Fig. 2.5) may constitute the corresponding level of aggregation. The popular diction of committees or school classes as *having their own dynamics* points to the observation that from the intertwining of life strands arise new ensemble events, including negotiating, discussing, arbitrating, and decision-making. Group conduct and group dynamics cannot be understood in terms of some combination of individual conduct – as can be witnessed in committee decision-making, where the actual outcomes may be (very) different from all the positions that the individual members have had prior to meeting.

As the ensembles get larger, new ensemble effects become apparent. Thus, societal order and society are the results of the life processes of individuals and groups, who themselves are subject and subjected to the collective life process (society and its order) that they contribute to creating. Communicating – making recurrent sounds or gestures – is a form of event that arises from ensembles of individuals. Indeed, language and consciousness are ensemble effects: "Consciousness therefore is a *societal* product from the beginning and remains as such as long as humans exist at all" (Marx and Engels 1978, 31). In other words, consciousness is not the result of the different forms of consciousness of individuals, who get together and construct a collective consciousness. Instead, consciousness is a collective product, characteristic of the collective. Whereas bartering is more typical of small groups and locally restricted exchanges, the practice of monetary exchange based on the abstract notion of value is typical of *societies*. In the analogy, such societal effects are represented by such patterns as the cloth (Fig. 2.5a). The particular object used in the analogy is limiting, as it seems to suggest a highly homogeneous pattern at the

largest level. But there are many weaving techniques that not only produce complex two- and three-dimensional patterns but also introduce different types of materials. This extended form of weaving therefore much better represents an analogy with the complex life forms at the level of society or "global village."

In the analogy, each strand or thread may be understood as standing for an unfolding life accompanied and relating to other unfolding lives – of society, people, animals, plants, and inorganic materials. The individual is understood as a historically unfolding, continuously emerging event as a whole – thus a line – rather than the end product thereof (Nietzsche 1922a). The individual notion of lifeline is consistent with the idea that childhood and adulthood are but phases of a continuity, where the later only exists after the earlier has occurred so that it can make use of specific and accumulated experiences of the earlier phase: "The real existence is the history in its entirety" (Dewey 1929, 275). It thus is better to say *there is development of the child into an adult* rather than to say *the child develops into an adult* (Bergson 1908). The former expression makes the event the subject of inquiry, whereas the latter expression is grounded in the idea of the self-identical person-thing. Even though the individual human life is limited, the life of society is extended, unfolding over the course of decades, centenniums, or millennia.

Once we consider phenomena – individuals, groups, or societies – in terms of evental lifelines, a problem becomes apparent: when two phases of a lifeline are separated into different qualities (childhood, adulthood), the former tends to be taken as a cause for the latter. Childhood experiences are used in causal explanation for adult experiences and conduct. But in the transactional approach, they are interconnected phases of the larger *life-as-event*. Earlier phases then cannot be the causal antecedents of the latter (Dewey 1938). The analogy for the transactional approach thus challenges common practices of approaching the subject (person), for example, in terms of identity, personal qualities (character traits, affective traits, aptitude, or power), and knowledge or conceptual frameworks. All these notions are premised on the classical idea of self-identical things (people, objects) that stay the same even though they are continually changing. The transactional approach instead rests on the acknowledgment of a primacy of life-as-event, the theoretical categories for which have to capture events in terms of events, and, thus, reflect transition. Most importantly, the relations existing within specific material conditions and associated social formations of life-as-event "are not explained by the anthropological constitution of the subjects carrying them" (Mamardašvili 1986, 102). That is, references to the subjects' understanding, intentions, and motivations or the specific material, economic, or social processes cannot be used to build the organic whole of social life-as-event. *Individual* psychological processes and consciousness are inappropriate starting points for the analysis of organic wholes. Nevertheless, all of these are manifestations of the whole, that is, qualities attributed to this or that entity (person, thing) that is itself the result of an a posteriori abstraction.

Re/thinking (Cultural-Historical) Activity Theory

One of the important implications of the present work is the need to rethink other theories as commonly used, such as those that are used in cultural-historical psychology or cultural-historical *activity* theory. These theories originally were grounded in the works of Karl Marx and Friedrich Engels, who focused on processes of different scales rather than on things. There are individual life processes, work processes, historical life processes, thought processes, societal processes, production processes, exchange processes, or processes of property (Marx and Engels 1962). In their approach, what normally are treated as things – life, work history, thought, society, exchange, or property – are but abstractions from processes that constitute the situations of these things. Activities thus have to be thought in process terms: as events. Any (more or less stable) object then has to be thought in terms of the occasion or situation in which it appears and that occasion or situation gives it its characteristics rather than as a thing-in-itself. All those mysteries often attributed to the confusion of the dialectical approach then vanish into thin air. For example, I clearly remember the discussions with a colleague trained in classical philosophy. He characterized as nonsense the notion of the dialectical nature of value, which manifests itself in the form of use-value and exchange-value. My colleague suggested that these different forms of value are the result of different perspectives rather than characteristics of the thing exchanged – e.g. the frock given and received in exchange for a roll of cloth. Approached as an event, exchanging involves two parties, and the things exchanged (the frock and cloth here considered stable and constant), are in the hands of both. Just as there is no one-handed clap, there is no one-person exchange. Just as the clap is the result of the two hands coming together, sharing a little stretch of common history, so the frock is part of an event and thus of transition. Just as the border between two countries is part of both, the frock is part of the common history of seller and buyer. As such, it has the characteristic of use-value and exchange-value simultaneously.[3]

Historically, the category of activity as originally theorized is consistent with the evental take of the transactional theory developed here. The minimum analytic unit is *life of society*, that is, change. Life of society generally and all activity specifically are thought as events and their relations; these relations between events are worked out above. Thus, activities do not consist of things but of parallel and successive phases of encompassing events – e.g. people, things, tools, and materials – that are thought in terms of corresponding lifelines. Accordingly, any thing or organism considered "is not just a structure; it is a characteristic way of interactivity which is not simultaneous, all at once but serial" (Dewey 1929, 292). The transactional perspective on human behavior generally and on the non-causal relations between the

[3] Readers familiar with the popularizations of quantum theory and especially with the discussion of (Erwin) Schrödinger's cat know that the theory is contained in equations in which the cat is both alive and dead. It is only upon looking into the box that one or the other state is realized. Similarly, it is only by taking the position of one or the other participant in an exchange that one of the two values comes to be realized.

earlier and later phases of events addresses the problematic focus on things that historically has emerged in the use of activity theory. The transactional perspective is based on the braiding of micro-events into mini-events, mini-events into events, and events into larger events (World War II) and historical periods, up to the level of life as a whole (e.g. Fig. 2.5). In the non-mechanical take of the transactional perspective, the world (universe) is thought as a singular plural event, a totality of (societal) actions, whereby "*reality* consists precisely in this particular action and reaction of every individual [part] toward the whole" (Nietzsche 1922b, 66).

Activity theory, whether studies are grounded in the works of L. S. Vygotsky or in those of A. N. Leont'ev, generally is not employed in an evental manner. Instead, having arisen from standard psychological and epistemological approaches, such studies have tried to fit aspects of the cultural-historical approach to standard psychology without changing from an object-oriented to an event-based ontology. Thus, standard psychological and epistemological models explain everyday human behavior in terms of things: schemas or mental constructions of individuals, who, when there are others, engage in negotiations of their differing individual positions. Some cultural approaches to human psychology do not advance theory much further – e.g. when they presuppose that humans but not animals have the end result of their actions already in mind (Vygotsky 1997) or when there is a societal object/motive that the participants cooperate in attaining (Leont'ev 1978). Such standard approaches also should be challenged by the simple fact that there are many event forms for which there are no standard practices – Deweyan *habits* – that could have formed and for which there are no societal object/motives: take the police officer killing an African American holding a cell phone while in his grandmother's backyard. Human conduct emerges on the spot, or, rather, there is a phenomenon in the making without that the participants know what it is – other than in some abstract way, for example, as a standoff. Any existing habits may actually get in the way with contributing in manner to deescalate rather than further escalate the situation. The required behavior needs to cut across those existing habits, "hence instability, novelty, emergence of unexpected and unpredictable combinations" (Dewey 1929, 281).

Standard ways of approaching activity in the cultural-historical sciences begin by positing things, which are then brought into relation. Thus, during Vygotsky's lifetime, a common way of thinking about human behavior was in terms of the stimulus-response (S–R) model. This was considered inappropriate, for it did not account for the cultural aspect in human conduct, where new "elements" – e.g. signs (signifiers, to be more accurate) and tools – changed the relationship between individuals and their social and material environment. Signs (signifiers) were presented as intermediaries between subjects or between subjects and their brains (Fig. 2.6a); and tools were deemed to be the intermediaries between subjects and their material objects (e.g. Vygotsky 1989). The depictions feature things – subjects, signs (signifiers), tools, and objects – outside of the events in which they would be constitutive parts and that define their very functions. But does it make sense to theorize activity in this manner? Take the example of a verbal exchange involving words, which are the quintessential signs of human behavior. Words (signifiers), and language more generally, then come to *mediate* between two subjects, allowing them to overcome

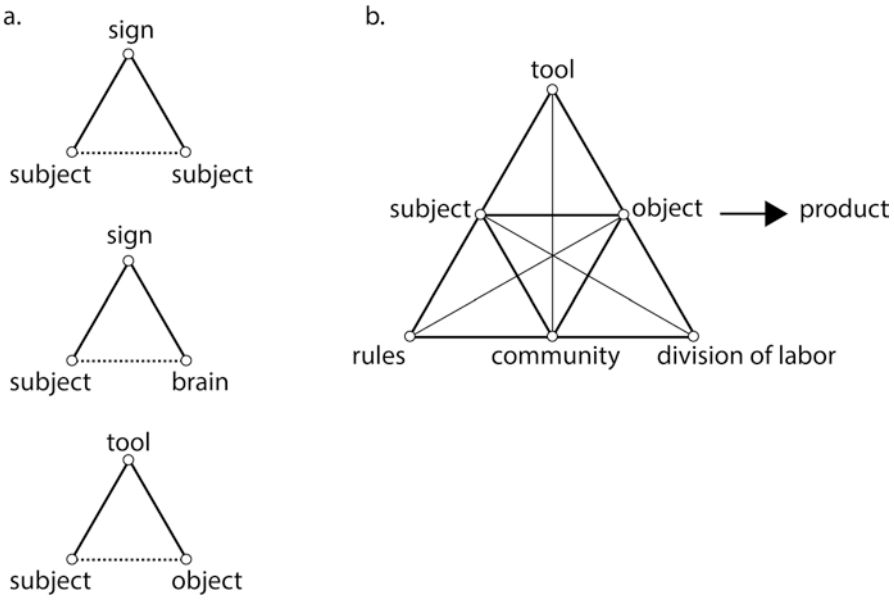

Fig. 2.6 Common examples of "mediational triangles." (**a**) For Vygotsky (1989), signs and tools are things that stand, respectively, (i) between two subjects or between subjects and their brains or (ii) between subject and object. (**b**) For Engeström (1987) he extended triangle characteristic of many studies employing cultural-historical activity theory features seven "elements" that together make for the structure of an activity. Both forms of representation orient toward stable entities, things, rather than toward events

their subjectivities by producing intersubjectivity. The two subjects are thought as different entities, which are brought together into a relation by means of the word (sign) that mediates between them. But is this really what is happening when two people communicate? Do the sound-words not emerge from the mouth of one and ring in the ear of the other? Are these sounds – typical evental phenomena – not common events in the experience of the two persons? Are the two biographies not for a period of time linked in the event of communicating? Are the two subjects things or does it make more sense to think in terms of emergent events that change as their joint history continuously produces novelty? Answers to these questions are provided in greater, case-based detail in Chap. 3.

Other parts of the cultural-historical sciences gather around and identify themselves with cultural-historical activity theory, originally developed by Leont'ev and subsequently popularized in terms suitable for Anglo-Saxon tastes that quite often differ from the theory originally conceived (e.g. Spinuzzi 2019). In the associated literature, it is common to identify the different parts of an activity system – often represented in terms of a mediational triangle with six elements or parts (subject, tool, object, rules, community, and division of labor) and a seventh (outcome) somewhat separate but linked to the object by means of an arrow (Fig. 2.6b). When things go awry, the notion of (primary to quaternary) inner contradiction – exemplified in

conflict, resistance, or breakdown – is invoked to explain trouble. Many studies are based on the identification of the parts (often referred to as the "elements" of the triangle) and are characterized by the attempt to reconstitute the activity based on some forces and processes (e.g. negotiation, scaffolding, mediation).

There is something wrong in the going use of activity theory. This is so because the category of activity really was defined in terms of events rather than in terms of things, as a unit of personal and societal *life*: "activity is not a reaction and not a totality of reactions but a system that has structure, its own internal transitions and transformations, its own development" (Leont'ev 1978, 50). The system is an organization of micro-events ("reactions"), each of which a phase in transitions, transformations, and development. Each activity then is an event that functions as integral and constitutive part of the "life of society," which only exists in and through the relations between its subjects. Just as in transactional approaches in philosophy, subjects are thus presented in terms of the entirety of a historically unfolding activity rather than as an element in or end product of it. The subject is not merely the agent of the activity; it also is the result of activity. All the other aspects of activity theory as represented in the triangle also have to be understood in terms of events. Thus, for example, it is only when we think some tool in terms of an event that we grasp its invention, its changing use, and its evental demise. Take the slide rule. We learned to use it in high school mathematics. When I did my Masters degree in physics, mastery of this tool was an obligatory point of passage. Those who did not pass the slide rule test – something like 30 multiplication/division problems involving up to six numbers to be completed in 30 minutes – were not allowed to continue in the program. Only a few semesters later, the first handheld scientific calculators became available and the slide rule disappeared from use in the physics department. Today, most (young) people do not even know what a slide rule is. Thus, being invented around 1625 it fell out of use in engineering and science during the 1970s to be all but forgotten today.

A critical reader attempting to save cultural-activity theory in the form it is currently used might say that for the purpose of understanding some event in limited time, the tool, as any other "object," does not change. But attempting to build an activity from pieces (i.e. elements) to yield an event makes no sense, which is why activity theorists have moved to *unit analysis* in the first place, as opposed to *analysis in terms of elements* (cf. Vygotsky 1987). The very notion of societal *activity* as the smallest unit that maintains all characteristics of the societal life process was at the heart of proposing what came to be termed cultural-historical activity theory. Objects may thus be understood as *ingredients* in events, that is, as things that enter (Lat. *ingredī*, to enter) events; and it is because of theses slowly changing ingredients that events become comparable (Whitehead 1920). The particular ways in which objects enter in an event – i.e. its *modes of ingression* – has to be determined through analysis. We know that objects are ingredient in the neighborhoods of their occurrences, but this neighborhood is indefinite. Indeed, any object is an aspect of the occurrence of life on earth specifically and the entire universe more generally.

In the triangular representation of activity theory (Fig. 2.6b), the *subject* appears in the same manner as the *object*. Yet, as living organisms, human beings are not

constant. We have to understand the individual in terms of a family (society, nexus) of events, the relation of which allows us to understand the relationship between feelings (affect) and thinking (intellect), two forms of events that most apparently mark the modes of our participation in everyday life. We thus theorize a person as "a society of the 'personal' type," which then allows us to view a person as the continuously emergent result of "a linear succession of actual occasions forming a historical route in which some defining characteristic is inherited by each occasion from its predecessors. A society of this sort is an enduring object'" (Whitehead 1929/1978, 198). This then also allows us to understand that even intellectual work is associated with to physical fatigue, something difficult to impossible to theorize in traditional theories of cognition that have currency not only in educational psychology generally but also in educational psychology with a cultural-historical bent. Thus, the individual or collective subject is continuously changing in the course of any concrete activity (Marx and Engels 1983). But the object also is not constant, for in the course of the activity it changes from what it initially was, a collection of materials, into the product. This is why Marx and Engels speak of the *objective* and *subjective* consumption that occurs during production. The fundamental idea underlying the original conception of activity theory is to make the entire process of production part of the same conceptual category: productive *activity*, which is an event. The event of the changing object to the completion of the product is intertwined with the event of the changing subject.

An activity is a recurrent form of event. Recurrence is recognized because of all the things that ingress in an event. But this must not lead us to think activity in terms of the triangular structure of things. This structure is like a cross-section through an event at a particular instant in time – an abstraction as shown above – can be thought of as a family of events (Fig. 2.7). Analyzing the cross-sectional structure does not allow us to understand the whole event or any one of the evental strands that are integral and constitutive part of it (Whitehead 1920). Moreover, looking at the initial

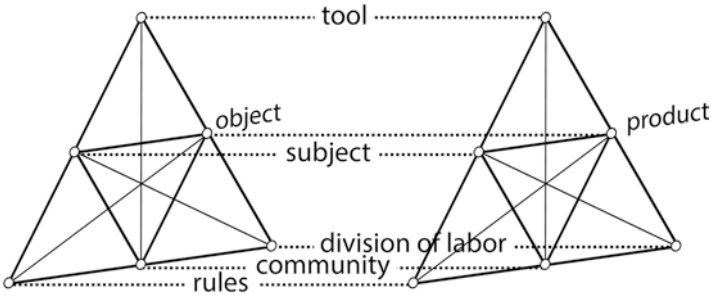

Fig. 2.7 This revised version of the minimum (fundamental) unit and category of activity orients analysts toward the various constitutive events that make activity as a whole. Because subject, object, tool, division of labor, community, and rules are *ingredients* in the event (i.e. activity) they and their modes of ingression change while the activity happens. Thinking these ingredients as things constitutes pure and mere abstraction that has nothing to do with the ways in which they actually enter experience. An activity thus is a family of ingredient events

and endpoints to derive the forces that get us from beginning to end is like going from the first to the last image in a film (video) reel thinking in the belief that we could get the event back. We would then seek the forces that somehow get us from one point in time (B) to another point in time (E). This way of thinking is fundamentally Newtonian, which fails to explain why there is any connection between bodies and the changes they undergo (Bergson 1908). To explain motion, Newton required stresses, forces, as factors that somehow acted on material things; but the connection between those things that appeared in his theory remained "detached facts devoid of any reason for their compresence" (Whitehead 1938, 135). Not only are there no reasons for change in the Newtonian view, but also this approach fundamentally left us without life. Newton's nature is dead, and a dead nature cannot provide reasons.

The revised version of the smallest unit to be used in analysis (Fig. 2.7) still is deceiving, for it may lead to the belief that there are precise beginnings and ends to the activity. As suggested above, the beginnings and endings of events are blurred (see Fig. 2.4d), the former having arisen in and from an antecedent event and the latter constituting the beginning of a consequent event. Instead of thinking in terms of precise beginnings and endpoints, those events (dotted lines) need to be seen as reaching into the past as much as projecting themselves into the future. Beginnings and endings are inherently indeterminate, for the beginning of any event only is the termination of some preceding event (see above); and the endpoint of the specific activity is only the beginning of another event – e.g. related to the activity of exchange (sale) and the subsequent activity of consumption (use) on the part of the buyer of the product. Indeed, the productive activity already is oriented toward the future activities (events), both in terms of the returns for their investment that the producer will reap and of the ultimate use. Products are made in ways specifically designed for the user; and this ultimate purpose already enters as ingredient in the activity.

One educational psychologist whose work shows a step toward the present conception was Richard E. Snow. Attempting to theorize the concept of aptitude, he ultimately thought he had stated it in transactional terms without nevertheless taking the final step to conceive of it in evental terms. He suggested that an understanding of the effect that personal characteristics have on performance requires knowing the environmental characteristics at work, in which we have to include characteristics of the task (Snow 1992). But understanding the effect of environmental characteristics on performance requires knowing the characteristics of the person. Thus, in performance-as-event, person and (task) environment cannot be separated. That is, the performative event and its product cannot be predicted on the basis of some abstract characteristics identified prior to the event. Whereas Snow did not conceive of performance or its ingredients in evental terms, he did emphasize the relational nature of the (external) characters of subject and its object. But his project would have ultimately failed, because the relations are external – between thingified subject and thingified object – rather than relations internal to the event, of which subject and object are but abstractions.

Inseparability of Transactional Theory and Method

In the preceding description of the transactional approach, it is apparent that a distinction between theory and method no longer is possible. As soon as analysts accept the evental thus transactional nature of the world and life that are continuous flowing (theory), they can no longer treat persons, things, and situations as stable (self-identical) entities (method). The term *transaction* refers to (a) what is *known, named,* and scientifically investigated and (b) the naming, that is, the language scientists use in their descriptions. When the whole system considered includes the observer and the observed, the naming and the named, the notion of cause-and-effect no longer is useful. The analytic method operates with categories that reflect the holistic nature of the theory, the connectedness of all worldly phenomena, and the continuity of life. Most importantly for present purposes, this continuity gets destroyed as soon as analysts assume stable phenomena (phenomena-as-things), which requires them to introduce external forces or things (mediators) to connect them. Indeed, it can be shown that objects are abstractions that index real events – such as a "line" that is the result of a moving. This also leads to the disappearance (and impossibility to adequately model) of the phenomenon of emergence, where the new is precisely defined as *the excess of succeeding over the preceding* (but interlocking) phases.

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Chapter 3
Unity/Identity of Individual and Environment

In standard approaches to psychology – whether researchers adhere to the biological model generally associated with the experimental research method or the interpretive model generally taken up in many of the fields concerned with learning, development, and teaching – the individual is the unit of analysis. Near the end of his life, Vygotsky began to challenge the idea that the individual could be understood independently from its relation to the environment. In a lecture about one month prior to entering the hospital where he died, he proposed a new category, *perezhivanie* [(emotional) experience]. The Russian term he used is equivalent to the German *Erleben* and *Erlebnis*, which is the noun form of a verb that translates "to go through and experiencing something" while being (absorbed) in an event. The Russian category was proposed to stand for "the unity/identity [edinstvo] of personal and environmental moments" (Vygotskij 2001, 77). The term "moment" designates parts of a whole, which means that perezhivanie refers to an irreducible unit that has person and environment as its parts. In a part-whole relation, the relation always is more than the collection of elements arising from disjunctive abstractions (Whitehead 1929/1978). Identity then is not ascribed to the person but to the unit that forms the unity, which means that any characteristic also is that of the person–environment *relation,* which itself has (temporal, spatial) extension rather than thing-like character. Much later, the anthropologist and philosopher Gregory Bateson would emphasize precisely this latter aspect. Thus, for example, he noted that dependency, aggressiveness, and pride are not characteristics of individual persons but that "all such words have their roots in what happens *between* persons, not in some something-or-other inside a person" (Bateson 1979, 133, emphasis added). A similar move leads to the ascription of feelings to occasions, and an angry person would then be described as a continuity of feeling of the same subjective form (experience) across successive occasions (Whitehead 1933).

The term *perezhivanie* sometimes is translated as "(emotional) experience." But this translation does not do justice to the term, because an experience, like the German *Erfahrung*, tends to stand for something that one can grasp after some event has come to a close. In pragmatic philosophy, the latter term has been captured in

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the notion of "*an* experience" as distinct from the continuity of experience (Dewey 1934/2008). *An* experience is completed and therefore forms a whole with a beginning and ending. It is thus used as a counterpoint to what we actually are and can be aware off when we are in the midst of something currently happening the very nature of which we can firmly grasp only after this happening has ended. The continuity of experience inherently is confronted with an open and uncertain future. Thus, although *Erleben* (*Erlebnis*) and *perezhivanie* are often rendered by means of the English *experience*, such a translation does not do full justice to the original words.[1] Replacing the term by "lived experience" also allows suggests a view of experience in the past tense, something that has been lived rather than something that we are currently living.

There are two key aspects that we need to retain and make salient about the category of perezhivanie (Erleben). First, it denotes what we are aware of and feel while going through and undergoing some occasion. As such, both thinking and feeling are events that accompany the concurrent doing and perceiving that are also cogredient in the overall event. *Perezhivanie* thus is used to capture an entire slab of presence in the sense of an event described in Chap. 2 – and not in the sense of a thing that one could have or have had, like "*an* experience." Second, *perezhivanie* captures a unity/identity that includes personal and environmental *moments*. Vygotsky's term *moment* [moment] in the definition of *perezhivanie* is not the same as the "feature" that appears in the English translation of Vygotsky's lecture. The term *feature* marks something that stands out; it refers to the manifestation of a unit in some characteristic of a part and thus constitutes an abstraction. The term moment, as pointed out above, is used to denote an irreducible part of a process, that is, as an event cogredient in a more encompassing event. Thus, for example, in the concrete event of an economic exchange, "relative value form and equivalent form are mutually constitutive, *inseparable moments* that belong to each other but simultaneously are mutually exclusive or contradictory extremes, that is, poles of the same value expression" (Marx and Engels 1962, 63). *Perezhivanie* thus orients educational psychologists to understanding and theorizing human conduct as something that is spread across a situation in its entirety, the person and the environment as it is perceived and acted upon.

There is another difficult issue concerning the Russian word *edinstvo* that Vygotsky used in the preceding definition of *perezhivanie*. The Russian term translates both unity and identity. The problem arises when the unity of individual and environment is thought as the rapprochement of separate things. But person and environment do not add up much in the same way as apples and oranges do not add up. This is also why, for all its positive contributions to an understanding of how people and organisms more generally relate to the environment, many *ecological approaches* have to fail. This is so because these conceive of the environment in terms of stable features – called *affordances* – that provide opportunities to the organism for doing things: "*making* shelters, nests, mounds, huts, … swimming,

[1] There are many other Vygotskian terms that have been taken up inappropriately in the relevant Western literature (Yasnitsky 2019).

crawling, walking, climbing, flying" (Gibson 2015, 121). The organism is said to take advantage of an offering that the environment makes. That is, the environmental feature is thought of as enabling (making possible) the doing. The theory does begin with an abstraction to explain a form of event, which is an attempt at reverse engineering, for the very identification of the abstraction requires knowledge of how the doing has ended. If we were to think the individual (organism) and environment as *things*, we can get something like a unity, such as when apples and oranges are thought of as fruit. As things are abstractions, the subsumption of things occurs under an even more encompassing abstraction where concrete details are and have to be dropped. But how can there by an *identity* of these different things? Apples and oranges do not add up! How can they be identical if they are different? Chap. 2 gives us the essential hint: the organismic life is not separate from environmental life, but, as shown for the percipient event, there is but one event that extends over multiple cogredient events. The percipient event is not separate from those events perceived but contributes to constituting the identity of the organism and the environment (Fig. 2.3, middle part).

A key problem with current scholarship concerning Vygotsky's notion *perezhivanie* appears to have its origin in the same thing-oriented ontology that attempts to reconstruct events from the abstracted characteristics entities involved. Because of the exclusionary nature of the ingredients, mediators are required that make the connection between the opposing terms. In contrast, Vygotsky proposed investigating human conduct in terms of the category of perezhivanie understood as the unity/identity of personal and environmental moments. But that step can be realized only if we use an ontology in which the fundamental units are events – which then leads to an evental approach in the way this is outlined in Chap. 2. However, currently available discussions are based on ontologies of things (see Chap. 1). Operating within such ontologies, investigators attempt to reconstitute the unity from its manifestations that are external to each other, personal and environmental features. Such *features*, as seen in Chap. 2, always are abstractions because they stand for characteristics of events in the limit where it does not have temporal or spatial extension. Any co-variation between external features will be coincidental, a deceiving appearance, rather than a reflection of the inner unity/identity of the eventmental phenomenon (Marx and Engels 1962). That is, the relation between external manifestations (expressions) of a phenomenon cannot teach us anything about the *inner* relation of the different cogredients of an event, and, thus, cannot explain the latter. This is why even the most radical departure from conventional educational psychology – which approaches phenomena such as aptitude through the notion of transaction based in the above referenced theory of James J. Gibson (e.g. Corno et al. 2002) – ultimately has to fail if it attempts to begin with personal and environmental characteristic to explain performance. The evental approach presented here begins with the event as a whole within which other events are identified together with their relations. Any characteristics analytically worked out will be abstractions of and from the irrecoverable, only ever once-occurring happening as it was unfolding originally and without any timeout. To work out a process-based (evental) approach to the phenomenon of the unity/identity of individual and environment, I return to the same fragment from classroom life that is used in Chap. 1.

Fragment from a Second-Grade Mathematics Lesson

In the transactional approach, which takes events rather than things (objects or their characteristics) as its basic units, events have to be considered in their entirety. Its parts are phases, themselves (mini-, micro-) events. Each phase has their origin in the conditions that preceding events created. Thus, an event cannot really be separated but needs to be understood in terms of their blurred boundaries with those that precede and succeed them (Fig. 2.2d). An event thus may be isolated from the continuous stream of the world (life) as a whole for some specific purpose, such as when there seem to be what participants take to be breaks in the stream of life. For example, a lesson may be said to constitute such an event. But such an abstraction always comes with dangers of falsely attributing causes to events to be able to make someone responsible, such as in the cases of airplane crashes or police shootings (Roth 2018a, b). For example, as soon as we understand participants as families of events, then it is apparent that the lesson constitutes an abstraction from the continuity of events in which a specific family of events is a part. This lesson is only one of many that make this phase of life in this school. Preceding this lesson is a ringing bell that is both ending the preceding lesson and marking the beginning of the one that follows. On the other end of the temporal scale, and relevant to cultural conceptions, schooling itself has a history, which the transactional (evental) approach requires us to take into account.[2] Whatever might be attributed to the teacher in terms of curriculum design are the most current forms of events in and to which the teacher responds. The lesson itself does not just begin, and it does not just begin a new curricular focus on geometry (e.g. Roth and Radford 2011). Indeed, at the beginning of what comes to be a lesson in categorizing objects in a way typical for what is known to be mathematics (from which the fragment has been taken), a reference occurs with respect to what has been said before: "We are going to start a brand new unit in math today … we are, and we talked about this a little bit last week already, about some of the things that we already knew about geometry." That is, the conversation makes reference to another conversation that is said to have happened the week before. What was said during the preceding lesson when the first talk about the geometry unit begins itself has events that preceded it, including the conversations between the mathematics education professor who is coteaching the unit, which in turn were preceded by the conversations between the latter and myself concerning a study to be conducted on the role of the body in children's learning. The classroom conversations are only later phases of a multitude of events that preceded them, including the (a) emergence of academia and the role of doing research and publishing results have in professors' career trajectory and the (b) topics in the ongoing scholarly discussions concerning the latest state in the theoretical advancement of theorizing learning in educational settings. Wherever we seek to locate the

[2] In a hunt, rabbit, hunter, and gun entering as separate entities are *causally* related in any object-oriented approach. "If, however, we take enough of the earth and enough thousands of years, and watch the identification of rabbit gradually taking place, arising first in the subnaming processes of gesture, cry, and attentive movement … we shall soon seethe transaction account as the one that best covers the ground" (Dewey and Bentley 1949/1999, 141).

beginning of the lesson, it always already has begun. There always are antecedent events out of which whatever event we currently consider has arisen.

Fragment 3.1

0 W: okay so gina, without looking I want you to put your hand in and pick out another shape
(1.0)
and then I want you to decide
(1.3)
does it get its ow:n:
(1.4)
category or can it fit in with the category that's there.

> 1 G: 6.8 ((*Waits, moves forward*))
(0.2) ((*places object.*))
2 (0.8) ((*Retreats to seat.*))
> 3 W: now can you tell us what you're thinking?
> 4 G: (3.5) ((*scratches her ear and brings her hand to her chin as culture associates with thinking.*))
5 W: there must be something different ((*gesticulates towards objects on the floor*)) because you gave it its new, its own category; can you tell us what you thought was different between the two ((*points to the cube and cylinder*))
6 (0.8)
> 7 G: they're different shapes? ((*Changes gaze and body from being oriented towards objects to face of Mrs. Winter.*))
8 W: in what way.
9 (2.3)

10 G: that one (.) the square one s a little bit shorter and that one ((*points to the cylinder closer to her*)) is a tiny bit taller.
11 (1.6)
12 W: okay.
(0.6)
u:m °what were the two:: things we said we weren't going to sort by.°

In the fragment shown – already only part of Gina's entire turn of retrieving a mystery object, placing it on an existent or new mat, and providing an explanation – turn 1 is not a "true" beginning. Here I added to the version presented in Chap. 1 the immediately preceding turn, in which Gina comes to be named as the first student to pull a mystery object from the black plastic bag and to place it together with the sole currently existing object or on its own, currently empty mat. If we sectioned off and presented the "entire episode" from the naming of Gina and the instruction what is to be done to the naming of the next student and the reiteration of the instruction, we would be making hard boundaries where these do not exist and, therefore, we would be abstracting from the lesson-as-event. Thus, any first turn in a conversation or other form of joint action has its beginning in the antecedent conditions. This situation can be captured aphoristically: *no identifiable event ever begins because it always already has begun* – which is a verbal extension of what can be seen in Fig. 2.2d. This approach to the data is important because in Chap. 7 we consider the emergence of abstractions, using the category system that is emerging in this lesson as an example. That is, we consider the entire emergence as event so that each student's turn is only a phase in this larger event and thus needs to be theorized as such.

After the occurrence represented in the fragment, there were a few more turns at talk before the next student was named and got a turn at pulling an object from the bag to be placed in the emergent category system (yet unknown on the part of the children). Among others, students were invited to "help" Gina in producing an answer to the invitation to state two things that were not to be used in sorting: color and size; and there were accepted invitations to comment.

Extensions of Duration

In Chap. 1 I present the ways in which such fragments from the life of a classroom are normally analyzed. In part, these analytic forms are constrained by the linguistic forms of Western languages: subject-predicate and subject-verb-object. Although it is well documented and experienced daily that what we exactly we are doing is not known until some time after the doing has ended, most analysts, in the same way as mundane folk, attribute actions to agents. The latter are then said to be the causes of whatever effect the action has produced. That is, we know whether we have actually followed a recipe or instruction only after we have perceived the effect, such as shown in studies of engineers operating an "intelligent" photocopy machine (Suchman 2007) and scientists while collecting data (Roth 2009). Yet most scholars steadfastly hold to what has been called the myth of human agents whose thoughts are causes of actions and effects (Nietzsche 1922). In the transactional approach, will and intentions do not cause events but are phases of events that accompany and are included in other events. The myth of thought (plan) as direct cause of action thus implodes when events are treated as events. The subject-predicate nature of many languages embodies the mythical belief in causality, in other words the belief that effecting is a form of activity and every activity is the result of an actor. There

are lightening and developmental events; but the associated flash-thing and the child-thing are but aspects of the former events. Our language, having evolved from the object-centered approaches in the Greco-Roman tradition, is an integral part of the theoretical difficulties we face. In the verbal rendering of events, the transactional and translocutional world comes to be reduced to self-action and interactional perspectives (e.g. Ricœur 1986). This happens even though in language, or rather in speaking (or writing), we live in emergent and unfinished events. The crucial point is to think the event (the Saying) as event rather than as thing (the Said); and here "language is the most delicate, but also the most susceptible, everything-containing vibration in the suspended structure of the event" (Heidegger 2006, 47). It thus makes sense to think human conduct by following the example of *communicating-as-event*.

After many years of analyzing verbal data in the traditional manner, I began focusing on communicating as *event*, which consists not only of speaking but also of listening, hearing, and comprehending. I was becoming suspicious when realizing that the normal ways of transcribing were missing something essential: the actions of others *concurrent* with the present speaker and constitutive of the effect of the saying. After grappling for a couple of years with new forms of representation and associated analyses, I came to read the works of Alfred North Whitehead only to realize that he actually had articulated the theoretical basis both for my analytic approach and the notion of transaction associated with the work of John Dewey. The work of Whitehead also informed the writings of the social psychologist and philosopher George Herbert Mead, who not only was aware of his contemporary but also included in his philosophy of the act the evental approach of the former. In the following, I use materials from the preceding lesson fragment to (a) articulate transaction through the evental lens and (b) exemplify appropriate forms of analysis that are consistent with the theory (i.e. do not reduce transaction to self-action and interaction).

Corresponding

In normal transcriptions, only the sound-words from the act of speaking – i.e. producing sounds that are heard as words – are transcribed. In such transcription, a mentalist orientation toward meaning may be observed that is inconsistent with a transactional approach. In the latter, we take a word as "a species of sounds, with specific identity and individual differences" (Whitehead 1929/1978, 182). Sounds are events rather than objects pointing to metaphysical meanings, which makes "it is a mistake to think of words as primarily the vehicle of thoughts" (182). As events, they are subject to perceptual events prior to any conceptual (intellectual) processes on which conscious awareness is built. In the analysis of conversation, we therefore come to focus not only on the act of speaking but also on the act of listening and receiving because a conversation could not exist unless another person actively orients toward the speaker and receives the sound-words. Indeed, the first

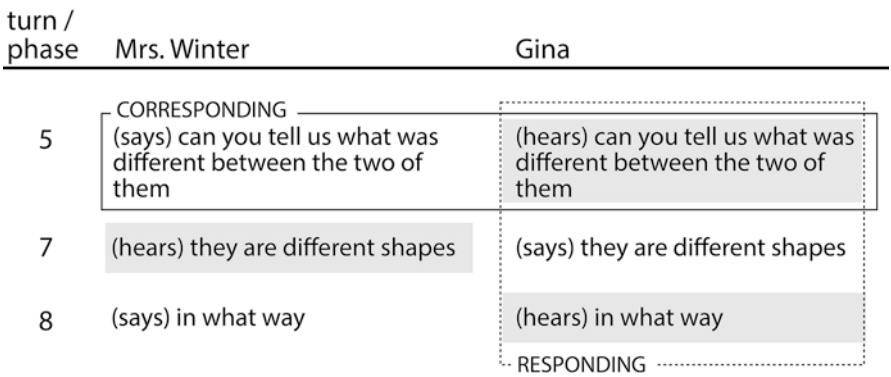

Fig. 3.1 This revised transcription of a small part of Fragment 3.1 includes the fact that not only producers of words are active but so are the recipients; together, speakers and recipients produce an instant of conversation as transactional unit, *corresponding*. Because attending to and receiving are forms of event in and out of which replying evolves, and because what speaking does is known only from its effect (the said and the reaction), *responding* constitutes a transactional category capturing the entire act from its beginning to its end

conceptualizations of language as event arose during Romanticism when language theorists began to conceive of the reality of the word arising in and from listening (Bertau 2014). This fact is included in a revised transcription of a part of Fragment 3.1, which constitutes a first expansion of the conventional methods for transcribing and analyzing (Fig. 3.1). While the words of turn 5 emerge from the resonating vocal cords and mouth movements of Mrs. Winter, they simultaneously ring in Gina's ears. If they were not, Gina would not be able to reply. There would not be a conversation. To have a *con*versation – from Lat. *conversāre*, to turn around, to turn *back and fro* (middle voice), to live and communicate with – it takes two in the same way that it takes two hands to make a handclap.

The upshot of the preceding considerations is that in the transcription, the sound-words exist for two (or more) people or they are not words in a conversation – which can be seen as the truth underlying the aphorism in the last paragraphs of his *Thinking and Speech*: "In consciousness the word is what … is absolutely impossible for one person but possible for two" (Vygotsky 1987, 285). Each turn at talk, thus, is not to be treated as an emanation from the mind of the speaker, to whom intentions and meanings are attributed, but as a phase (mini-event) in the event of communicating, which here is taking place within the event of the mathematics lesson of a second-grade classroom. We refer to this phase as *corresponding*. Corresponding includes the micro-events of *speaking* on the part of the speaker and *attending to* and *receiving* on the part of the recipient. That is, it is a joint action accomplished together by speaker and recipient. Moreover, only implicit in the figure is the fact that on the part of the speaker, there also is a micro-event affecting the recipient – which is especially apparent when speakers realize that what they have said is not at all what they had intended to say or that they have said something that they have not known before.

The transactional category *corresponding* at a minimum consists of a family of coordinated micro-events and phases. This family of micro-events may be thought of as an ensemble (or nexus) of two families of events, each corresponding to a participant, and the event of the sounding words that intersects both (moving air). That is, we may think about a (verbal) exchange in terms of two historic routes (biographies) that intersect in and on this occasion. It is for this reason that theorists of events have suggested mind to make its "appearance in the form of agitated layers of air, sounds, in short of language" (Marx and Engels 1978, 30). This movement is the event that links two evental families, each of which constitutes a participant. This is the situation featured in Fig. 2.3. In the theory of organism, the event, as seen from the perspective of the recipient, is understood as a prehension that "reproduces in itself the general characteristics of an actual entity: it is referent to an external world, and in this sense will be said to have a 'vector character'; it involves emotion, and purpose, and valuation, and causation" (Whitehead 1929/1978, 19). All the relevant micro-events are cogredient in the same duration, thus manifesting the spatial dimension of events. Each turn is considered as a durational slab that extends over all the mini- and micro-events currently considered.

Corresponding constitutes a form of coupling between speaking and listening participants – a fact that has been integral to some philosophies of language and communication (e.g. Bateson 1979; Nietzsche 1989; Vološinov 1930) and most recent neurolinguistic studies (e.g. Berger 2018). Indeed, all "primary experience is of a corresponding type" (Dewey 1929, 23). My own studies show that unless they are in conflict, participants in a verbal exchange tend to speak with pitch levels that begin at the level where preceding speech has ended and displaying the same rhythms (Roth 2011). That is, participants in an exchange are analogous to two clocks fixed not too far from one another on a wall, as a result of which their different periods come to be aligned and their phases coupled – a phenomenon that physicists call *entrainment*. The frequency and phase of two pendulum clocks on the wall come to correspond, as a result of corresponding (exchanging) as parts of the larger system that includes the wall on which they are fixed. The participants in the classroom exchange, Mrs. Winter and Gina, also are part-events cogredient with, and standing against other parts (e.g. the physical environment and other people in the room), the larger occurrence.

The term *corresponding* can be heard and read in two ways that are of theoretical importance. First, corresponding denotes an event of communicating. Communication requires some phenomenon that allows participants to intersect. Corresponding includes two people and a common intersecting event – e.g. a collection of (sound-) words with semantic and syntactic characteristics. It therefore has an evental nature that cannot be reduced to individual actor-things, all of whom are required to do something to make the event happen. Second, corresponding has the sense of being congruous or agreeing (thus being in harmony) with. In other words, corresponding captures the fact that the participants in a conversation also come to be a little like the other, each person (family of events) becoming immanent in the other: like Mrs. Winter is addressing Gina rather than the researchers or the coteacher present at the time. The words, even though they are in Mrs. Winter's mouth,

already express an attitude of the other (Gina), whom she invites to act in a particular way, which constrains the form and content the invitation can take. In the anticipation of one rather than many other forms of replies, the attitude of the other is taken into account (Mead 1938) – which is why characteristics of Gina are already present in the word that issue from Mrs. Winter's mouth. This is expressed in our everyday sense of knowing someone else a little more about the other, allowing us to anticipate what the other will do and say in future situations. This sense is built over a lifetime, and it was suggested elsewhere that during the researched lesson sequence, Mrs. Winter actually was observed learning to formulate invitations that led up to intended student replies (Roth and Radford 2010).

Responding

In the preceding subsection we note that *replying* requires having attended to and received the sound-words coming from the other. We also note above that the recipient does not take time out, waiting until the end of the transmission, before beginning to "interpret" the Said – i.e. content abstracted from the Saying – deciding how to reply, and then producing the reply. In most everyday exchanges, there never is time enough to do an interpretation prior to producing the reply. If we actually acted in this manner then we would appear to be too slow, perhaps event too deliberate, and, as a result, we would appear to be socially inept. Even in such extreme cases, where people take a lot of time to reply, recipients begin orienting to the Saying in its unfolding and prior to the Said being available. That is, the conversational phase of *replying* is born in the phase (micro-event) that precedes it, actively attending to and receiving from the other. But what the respondent really is saying – from the perspective of the conversation – is available only from the effect. This effect – or the perceived effects – is the result of the percipient event on the part of the respondent concerning the changes the speaking has brought about in the environment (e.g. in the original speaker who now is the listener). Thus, the words "they are different shapes" emerging from Gina's mouth have their origin in the environment-as-event and the cogredient percipient event that preceded her saying; and the effect of her words-as-events on the environment-as-event are available in the succeeding sound-words issuing from the teacher's mouth. We denote the resulting mini-event by the term *responding*, and we understand it to involve the phases (a) *attending to* and *receiving*, (b) *speaking*, and (c) *monitoring* (Fig. 3.1). These phases correspond to those phases in the event of *feeling* (Whitehead 1929/1978), where the middle phase augments what has been, while *passing* it *on*, that is, while giving rise to something new, bringing something forth, begetting novelty.

It is apparent that monitoring consists of attending to and receiving – which are but *phases* of the social act. In the transactional perspective, an act is social because it inherently involves others (thought as events) and the material environment-as-event. The successive phases intersect. They have to intersect or continuity would be lost, for a group of "instantaneous events can have no inner

durational connection with one another, such as that of whole and parts since each event has ceased to exist before the next arises" (Mead 1938, 364). *Responding* thereby is a true transactional category that cannot be reduced to the individual or the environment. It represents a unit in which there are combined events of coming and going. Responding truly is an act in the transactional sense of the term, that is, it "is an ongoing event that consists of stimulation and responses and the results of the response" (364). Stimulation, reply, and result are the different intersecting phases of the same event, relating to the whole as irreducible and constitutive parts. Take away any one and the whole event will be of a different kind.

The different phases of an event constitute a sequence of overlapping micro-events that not only follow each other but also arise one out of the other. Replying has been solicited in and by what is received; and it in turn solicits the next turn. The phases are not sharply separate from each other because they originate in and from the phases that precede and succeed them (see Fig. 2.2d). In turn, each act of responding is a phase in the conversation-as-event. In each event of responding, novelty appears twice – first in the relation between the preceding and coordinated phases of attending to and receiving from and replying and second in the relation between the phase of replying and the unknowable-before effect(s) that result. Novelty is continuously produced, which is why the outcomes of exchanges are unpredictable. This is also why the teacher cannot ever be in control over the form and content of classroom talk – in the way that standard textbooks in educational psychology present the matters to future teachers.

An important aspect of the transactional approach outlined here are the micro-events that are part of the recipient. We note that the recipient-related phases of the conversation include *actively attending* to the sound-words in the environment and *receiving*. But before speaking has ended, the recipient cannot know *what* she receives; she cannot grasp the meaning of the statement. Indeed, the recipient is opening up to receive something the nature (content) of which is knowable as such – i.e. in the form of the graspable Said – only when the Saying has ended. We do know that this happens, for we would never actively attend and listen to others who are insulting or hurting us. It is precisely because we are opening up to receive something unknown that we are feeling hurt or insulted – events involving bodily affective and intellectual qualities. That is, while we are attending to the Saying of another, we do not know it as a cause of our feelings only seconds hence.

Each micro-event of responding – listening (actively attending and receiving), speaking, and monitoring (actively attending and receiving) – has three qualities when we consider the event of speaking as its center. From this perspective, speaking (Gina, turn 7), occurring in the present, directly relates to something in the immediate past (Mrs. Winter, turn 5), and is oriented toward the immediately impending future (Mrs. Winter, turn 8). In this present, the immediate past and impending future thereby are immanent. The immediate present is not like a point but extended: it is a *specious present*. The event of responding thus is equivalent to the specious present, which exists in transition from an immediate factual past into an impending but indeterminate (unknown, unforeseen) future. The concept of the specious present takes account of the fat that "the practically cognized present is no

knife-edge but a saddle-back, with a certain breadth of its own on which we sit perched, and from which we look in two directions into time" (James 1890, 609). This is also the basis for choosing the idea of *duration* as a fundamental starting point in theorizing, and the event as our main theoretical category. The specious present has no hard boundaries but needs to be thought in terms of backward and forward vanishing fringes, a fact that underlies the above-noted absence of hard boundaries in events (Fig. 2.2d). The same results of an extended present were derived from an analysis of internal time consciousness (Husserl 1928). Such an analysis suggests that we could never have a sense of a melody unless the preceding note also was part of the present. We observe this fact when Gina replies (turn 7), which presupposes Mrs. Winter's request (turn 5) continuously receding into the past while turn 7 projects itself into the future. The analysis of internal time consciousness also reveals that the perception of duration *presupposes* the duration of the perceptive event.

Readers familiar with discursive approaches may be reminded of a particular routine that is typical of classrooms. The routine is known under such acronyms as IRE, which stands for *i*nitiation, *r*eply, and *e*valuation. In schools, teachers tend to take the first turn initiating an exchange, a student replies, and the teacher evaluates. That literature focuses on *inter*action routines, whereby different participants are said to take their place in the orderly production of the successive *elements* that make the routine. Analysts may even surreptitiously slip in some interpretation done on the part of students before they reply, and another interpretation before the teacher evaluates. This interpretation *mediates* between the initiation-as-thing and the reply-as-thing. Otherwise the two parts would not be connected. What such analyses tend to miss completely is the fact that psychologically, the entire exchange exists for all participants (as apparent in Fig. 3.1), who contributing to the joint conversational work that makes the exchange an aspect of reality that all of them orient to.

While the micro-event of responding is unfolding, the physical brain and body are active. In the transactional approach, we take there to be micro-events of physical nature the ensemble effects of which include hearing, speaking, thinking, and emoting. Thus, for example, when we consider the mini-event of thinking associated with responding then we understand it to have beginning and ending points in the environment-as-event as given in the relevant percipient event. What happens in the brain is only a phase of a larger event that has its origin and ending (effect) in the environment. Thinking thus no longer is attributable to the self-identical person, for whatever micro-events are occurring within the evental family clustered around the brain physically are connected to those occurring within the evental family clustered around the happenings in and of the environment. This is therefore the same result as the one that can be derived from a Marxian reading of Spinoza's work. In this reading, thinking is a phenomenon involving events within and outside those evental families normally attributed to person and environment. Thus,

> to explain the event we call "thinking," to disclose its effective *cause*, it is necessary to include it in the chain of events *within which it arises of necessity and not fortuitously*. The "beginnings" and the "ends" of this chain are clearly not located within the thinking body at all but far outside it. (Il'enkov 1977, 37, original emphasis, underline added)

We note here the demarcation of thinking as an event in a chain of events, where the "*effective* cause" is to be understood in terms of events that condition the micro-event of interest. The philosopher does not suggest that thinking either is *caused by* something that distinctly precedes it or *causes* effects that succeed it. Instead, consistent with the transactional approach presented here, thinking is an event relating to other events within the same occurrence or within a line of events out of which it arises and in which it constitutes an accomplished continuation. Thinking consists of phases only some of which are exclusively occurring in the brain. That same Marxian reading of Spinoza also recognizes the relation between the different material events and the ensemble effects to which they give rise. There is then no causal relation between thinking and bodily action because the body is the organ of which thinking is the function. As a result, "thinking and the body are not two different things at all … but *one and the same thing*, only expressed by two different modes or considered in two different aspects" (Il'enkov 1977, 34). The very activity of the physical brain – event within the family of events making the body as a whole – is thinking. Only the abstracted "content" available after the end of thinking is thought.

Two Forms of Extension

In the preceding two subsections, we observe two types of extension characterizing events. The first form is the relation of (micro-) events cogredient in the same duration. This is the spatial dimension of the event, where each duration of the world-as-event comes to be subdivided into parallel events, some of which relate to others, some of which constitute the immediate ground for percipient events, and most of which are more distant (without nevertheless losing their quality as ground). This is the quality at least gestured toward in the research on situated cognition, especially when it is formulated by expressions such as *person-acting-in-environment*. The problem even with this formulation is the possibility to treat this unit in an interactional fashion, whereby predefined and self-identical persons (subjects) and environment come to be related via actions. These actions are considered in this take to be emanations from the individual, who may be taking up some objectively existing affordance, and whose actions have their causes in thinking that precedes them. In the transactional approach, neither person nor environment are theorized as things but considered to be cogredient families of events within an encompassing event that extends over both and over the percipient and agential events that are the two families have in common. They are different manifestations of the same phenomenon so that any characteristic one may identify is that of the unity/identity.

The second type of extension arises from the particular relation of a specific micro-event associated with the asymmetrical nature of each micro-event of corresponding. The two families of events corresponding to Mrs. Winter and Gina are not identical, even though the all the words of their exchange are in common. Within the conversation, what is the center of the event of responding for one (e.g. turn 7 for Gina) is the beginning of an event of responding for another (Fig. 3.2).

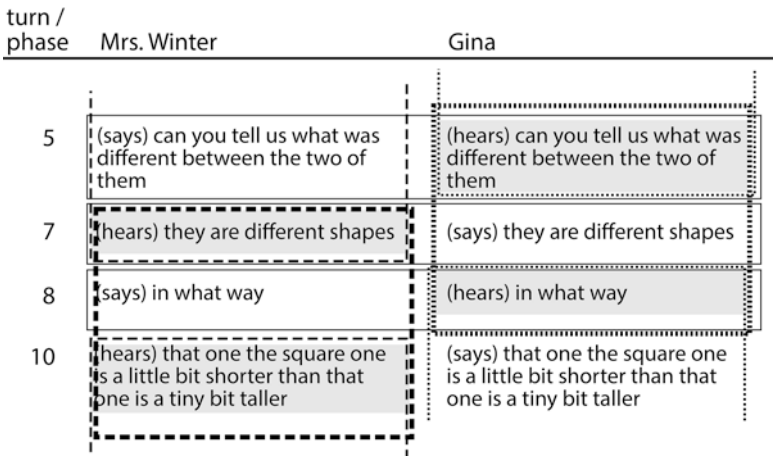

Fig. 3.2 This expansion of the analytic framework presented in Fig. 3.1 shows how two adjacent conversational phases of responding are shifted with respect to each other but overlap in two micro-events of corresponding. Within each family of events, an event of responding (bold) arises from and ends in another event of responding, thereby providing for the continuity of the family – which is the theoretical foundation of Dewey's continuity of experience

Each such event has a directional quality, extending from the immediate factual past toward the imminent, indeterminate future. This event manifests itself in our sense of the present, which is one of passage: the world never stands still and there never is a time out from Being. Our sense of time arises from the difference between an event in its unfinished unfolding (happening) and the event as a definite, sectioned off and abstracted aspect of what has passed. Thus, for example, it is only after our fingers have been crossing a surface, we characterize its quality as something smooth, rough, even, corrugated, etc. (see Chap. 2). The characteristic is an abstraction referring us to but never replacing the event of crossing the surface. That is, the said, like the perceived, is an effect available after the saying, like the percipient event, has ended. The delay between these two – Saying and Said, perceiving-as-event and thing-perceived – is the origin of time, a topic investigated in Chap. 4.

When we take the transactional approach, two forms of extension characterize any duration experienced as the present. The event of speaking is oriented toward and taking into account the other (e.g. whether it is a child, colleague, or partner), using language that has come from the other to whom it returns (cf. Bertau 2011). The others are cogredients in the same duration that are not part of the same family of events that give rise to a sense of self. In speaking, we find embedded a spatial experience of co-existent events. In every micro-event of speaking, there is also a temporal quality based on the presence of the past out of which speaking arises and to which it replies while being oriented toward the future that reveals its effect on the other and the world. Temporal and spatial qualities of experience thus exist in every instant of a speaking event. The two forms of extensions have been described as two forms of fluency (Whitehead 1929/1978). The first constitutes a form of

transition, here from person to person; and the second constitutes the becoming of the organism (here each person), which is the novelty resulting from the coming together ("concrescence") of a particular life history of events (person) and something new. We may also speak of the transitive (between, spatial terms) and intransitive dimensions of events (within, temporal terms).

Enfolding, Shaping, Unfolding

In the preceding three subsections, I use the specific case of communication to lay out the basic framework for the analysis and theory of human actions in terms of cogredient and succeeding (mini-, micro-) events. We are now ready to expand the analysis by applying the framework to every turn. Thus, the words coming from Gina's mouth in turn 7 simultaneously are ringing in Mrs. Winter's ears, where the micro-event of actively attending and receiving the words from Gina are the first part of an event of responding (Fig. 3.2, box in bold broken lines). We now observe two events of responding in adjacent families, phase-shifted by one turn. The two families are held together by successive events of corresponding (Fig. 3.2). In and because of the exchange, the two families are constitutive parts, each word being a micro-event common to both. The two families are joined because (a) there is a third event – here the sound-words-as-event – that intersects the event families – here corresponding to Mrs. Winter and Gina; and (b) every member of this third event is part of both event families (Whitehead 1919). Because of the micro-event of *receiving*, a family takes up something from the other family, which therefore comes to be immanent in the former. Every word being common to both, each person is becoming a little like the other, though generally not apparent at the time. However, it has been shown that when people work together for a while, such as two teachers coteaching for a few months, they are becoming like the other, exhibiting similar patterns and intonations of speech, moving in corresponding ways, and following the same rhythms (see Chap. 10). While doing that research on teachers becoming like the other, I was not yet at the point of taking an evental approach, which led to the fact that the phenomenon appeared a little mysterious to me. Why should two people working together, constructing their respective worlds in their own minds, each *become* (a little) like the other? Why do two consecutive events of speaking by different individuals have the same verbal pitch levels and rhythms when other observations remark on the solidarity existing between them?

The answer to the preceding questions is that in the exchange, the lifelines corresponding to Mrs. Winter and Gina come to be intertwined and indeed, their lifelines come to have something in common. In the encounter, both are changed, each becoming a little immanent in the other. Mrs. Winter is developing as teacher in and through teaching, and Gina is developing as a person classifying objects in mathematical ways. Their mutual becoming in the event of the exchange is the primary phenomenon rather than the identities and individualities of the two persons. Consider Mrs. Winter for a moment. In teaching, she becomes a better teacher. Her

questioning changes, making these more productive in the sense that children's replies are more elaborate or allow children to more deeply engage with mathematics. I show elsewhere how Mrs. Winter might take three or four attempts at finding a way of phrasing a question before it leads a particular child to respond in the way that she then accepts as appropriate (Roth and Radford 2010). As the exchange between them unfolds, Mrs. Winter-as-event, who is part of the exchange event, comes to be transformed, evolving together with the event as a whole.

Both corresponding and responding involve movements of coming and going, toing and froing, or, as physiologists might term it, efferent and afferent processes. In actively orienting *toward* the other, there is a movement away from the self, a toing; and in receiving the words *from* the other there is a *froing,* that is, a coming a movement *fromward*. In speaking *to* the other, there is a movement away, and in perceiving one's own speech, there is a coming. In monitoring, there again is an orientation to the other, from whom information is perceived concerning the effect that the speech has had. One account of where the later Vygotsky was heading theoretically provides a description congenial with my account. Thus,

> [t]here is nothing *other* for us from the outset that would not be our *own. For the very existence of mind is possible only at the borderline where there is a continual coming and going of one into the other*, at their dynamic interface, as it were, an interface that is defined not by the fact of their difference (in other words, not by a difference in outward [discernible by the subject] states between what is psychologically *self* and what is *other*, the stuff of natural sciences, as it were), but by the single process of their mutual generation and mutual determination. (Mikhailov 2001, 20–21, original emphasis)

Readers immediately note the equivalence of this quotation with the description developed here on different philosophical grounds. The account still comments on a borderline, an interface; but it also notes that this interface is dynamic, in movement, and thus a moving phenomenon that needs to be considered in evental terms. The language developed here centering on events provides a way of overcoming the one-way street of thinking in terms of closed and self-identical entities, whether this is done at the level of the individual (e.g. in terms of *identity*) or at the level of an "element" of thought (e.g. the meaning of a word, *word-meaning*). The analyses presented above can thus be understood as exemplifying the theoretical take expressed in the quotation. The quotation furthermore mentions an issue that requires deeper analysis: the mutual generation of self and other (see Chaps. 4 and 9).

Practical Action as Cogredient Event

Up to this point in our analysis, I only considered the event of speaking. But we do not merely live in an intellectual world thought in terms of abstract words representing ideas and meanings. Instead, the words are the result of physical events; and there are other physical events cogredient in any duration to which participants in an exchange orient. The physical events are not limited to those generally considered when analysts focus on "non-verbal" communication, which tends to include hand,

arm, and body (e.g. head) movements taken as sign-things with accompanying meaning-things. Even though an action is a form of event oriented to bringing about changes in the environment-as-event, when part of a percipient event, both communicate about the environment and are taken to be a manifestation of the actor's thinking. For the purpose of elaborating this aspect, I return to the opening of the lesson fragment. We observe that following turn 0, the event has Gina (a) turning to pull an object (cylinder) from the black plastic bag that Mrs. Winter is holding, (b) orienting toward the configuration on the floor in the center of the circle, (c) outwardly not doing anything for a little while, and (b) finally moving forward to place the object (turn 1). The next turn at talk can be heard after Gina has returned to her seating position.

Fragment 3.2

0 W: okay so gina, without looking I want you to put your hand in and pick out another shape (1.0) and then I want you to decide (1.3) does it get its ow:n: (1.4) category or can it fit in with the category that's there.

> 1 G: 6.8 ((*Waits, moves forward*))
(0.2) ((*places object.*))

2 (0.8) ((*Retreats to seat.*))

> 3 W: now can you tell us what you're thinking?

We observe a three-turn sequence of the above-noted IRE type, in which the teacher and student take the places typical for this routine. But the middle term here does not consist in the form of sound-words. Instead, there are physical actions: the events of pulling, resting, moving forward, placing, and retreating. In this sequence of events, turn 0 will have received the function of an invitation from turn 1, which will have accepted what the preceding turn formulated by acting in ways corresponding to what the words describe. Out of these actions emerges the next event of replying, which also constitutes a form of evaluating. In inviting to make a statement about the thinking – presumably the one that goes with the preceding event of placing the object on its own mat – turn 2 de facto accepts the placement at least provisionally but also characterizes that what has happened as yet insufficient: it lacks an expression of thinking. The statement may even be heard as an elaboration of "I want you to decide," which does not make explicit that a public criterion was to be made. That is, turn 3 treats the result of the preceding event (placing of the object on a map) as reply to the event that occurred before, but with the qualification of the reply as being insufficient.

In the transactional approach, actions are treated no different than words. They are theorized as events that relate to other events, including sound-words. The event of placing the object arises in and out of the preceding event and makes for the con-

ditions from which the next micro-event emerges. The particular form of this next event is important, for in many other classroom situations, the placement may have been de facto accepted with an invitation issued to another student for taking a turn at taking and placing an object. There are many teachers accepting words and actions that are deemed correct or acceptable as replies, whereas experienced and knowledgeable teachers tend to ask questions that invite students to state reasons for or explanations of their (verbal, practical) reply.

This part of the lesson fragment also shows that other events cogredient in the duration are presupposed. The placing occurs against events that can be perceived on the floor, here an instant in an emerging classification of objects place on mats of different color and associated with different verbal labels (Fig. 3.3). This classification is alive, as there are an increasing number of objects and mats. To understand the aliveness of the classification requires the transactional approach in which events, as things, are treated as events. The smallest unit of event still is an event, the qualities of which cannot be recovered from the consideration and analysis of photographs even if they have been taken in intervals of 1/30th of a second as in a traditional video). In the present chapter, I analyze the micro-events that are constitutive parts of this evolution. When the event has Gina have a turn at talk, there are two mats, one of which is empty, the other one already having an object (yellow cube) on it. Turn 0 consists in part of the query whether the new object gets its own category (mat) or whether it fits with what is already there. The action attributes to the object (cylinder) a quality different from the existing object (cube). But with each added object and mat, the concrete task changes because of the increasing complexity of the family of events to be considered as a whole. Indeed, the family is extended with each placement, augmenting either a particular subfamily (more objects on a particular mat) or the family as a whole by adding a new subfamily. Each classifying action is cogredient in the present duration, which is a phase of the emerging classification-as-event as a whole (see Chap. 7).

Above, we only consider actions, part of the person-related family of events that constitute the relation with the salient evental families making the environment. But anything emerging from a percipient event as a perduring thing does so against the remainder of the duration in which it is a cogredient event, that is, all the other cogredient events with which it constitutes the specious present. The classification-as-event unfolds as ingredient of the lesson-as-event while presupposing other events as stable ground. Although the floor changes in the course of the day, preceding the arrival of the children to the passing of the janitor, it is not something participants consciously attend to during this lesson. The floor is never explicit as event but presupposed in the very actions of sitting on the floor and the placing of the mats and objects.

Visibilization of Cogredient Events

In the preceding section, I investigate the events at the beginning of Gina's turn at taking an unknown object from a bag and adding it to the emerging configuration on the floor. The wordless placing of the object arises finds a reply in an invitation to

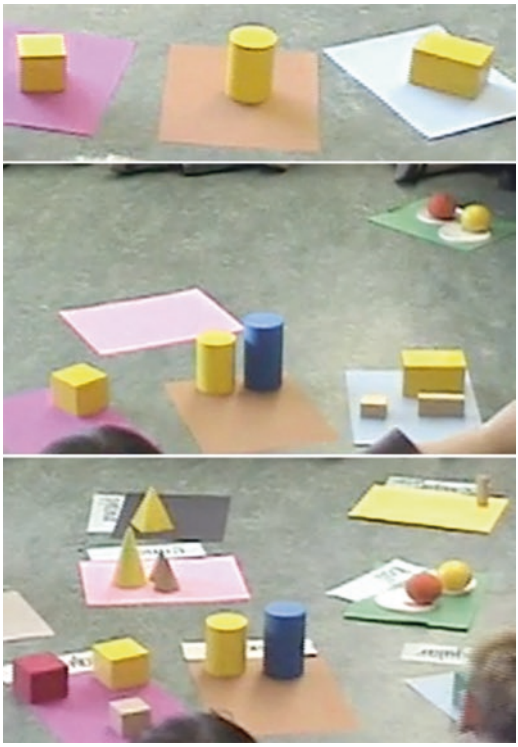

Fig. 3.3 The configuration on the floor is not stable but continuously changes as more and more objects and mats are added, moved about, etc. To understand this emergence requires a transactional approach, where the minimum unit is itself an event rather than a state at a fixed point in time

tell those witnessing the action ("us") what the agent (Gina) is thinking (turn 4). The statement presupposes that there is an event called thinking that has occurred or is occurring and that has an implied relationship with the placing of the object. The invitation to state the thinking also implies that the thinking has not been available but somehow requires being told. It is in the telling that the thinking can become a cogredient event for everyone (i.e. every person-as-event family). This is so whether anything that we denote by thinking (i.e. what we are aware of in our minds) has occurred or not. Most of the cogredient events in any duration do not include thinking in the way we commonly experience and denote it. We do walk without giving any consideration to this micro-event cogredient with our being; and we do not have to devote any thinking ("interpretation") prior to replying "I am fine" when the situation has the neighbor initiate an exchange by saying, "How are you today?" That is, there may be an event of (private) thinking, which, being an ensemble effect of all other events cogredient in the event of personal being, will not affect other aspects of the duration, such as the exchanges with other people. But whatever event from the person-as-event family is visible can become part of a percipient event – including the event of a flushing face, the movements of the body falsely[3] termed to be elements of "body language," and the actions that bring about changes in the

[3] A language is characterized by specific its semantics and syntax, neither of which exists for body movements.

world. Percipient events are part of other percipient events, especially if there are signs that the former are absent – such as when a speaker orients to an intended recipient saying, "Are you listening?"

It lies in the nature of percipient events that while unfolding, there cannot be an object, which is the abstracted result from the percipient event as a whole. It is only when the percipient event is completed that it – or rather, an abstracted form of it – can become the content of another event, this time of the reflecting and thinking type. It is only when the eyes have finished moving that we can become aware of form (see Chap. 2); and it is only when the Saying has ended that we can know and grasp the Said. This has consequences for a transactional social psychology: "in immediate experience there is no mind, in the sense of reflection" (Mead 1938, 361). Although perceiving occurs along with all the other evental forms within the duration – some of which are associated with the individual and others with the environment – a *grasp* of any one of the events cogredient in and extended over by the duration can occur only when that duration has ended. It is in that sense that there is no mind in immediate experience, though the percipient processes are understood in terms of habitual and recurrent events that reproduce the sense of "this object again." These recurrent patterns in the percipient events have been shaped in the past, which included reflection. It is only in this sense that one can think of perception as "theory-laden." How past events are present in the current duration is the content of Chap. 8. Let it be said that the percipient event is not grasped until after it has come to a conclusion. We therefore experience objects as given in perception. We cannot intend seeing what we do not already know. This also means that visibilization of otherwise hidden cogredient events can occur only after the duration and its cogredient percipient event have come to a conclusion.

Theorizing in this manner, that is, focusing on events rather than things, allows some of Vygotsky's writings come to make sense. Thus, for example, he noted in a text from the final months of his life that "thought does not immediately coincide with verbal expression" (Vygotsky 1987, 280). This statement does not make sense in traditional educational psychology, which makes the assumptions that concepts are encoded in the structure of the brain, and thoughts are assembled from the things and schema stored in long-term memory. Thoughts are theorized as the causes of words and actions emanating from the person. In this traditional psychological approach, thought and (content of) speech do not coincide when there is some defect that interferes with moving the thought into speech. Vygotsky's statement immediately makes sense from the transactional perspective that takes thinking as an event, for the content of the event can be known only after the event has come to a conclusion. But thinking does not stop while speaking unfolds. Instead, speaking shapes the environment-as-event – sound-words are associated with percipient events cogredient in the same duration – and these environmental changes are associated with changes in thinking, again cogredient in the present duration. Thought is not something stable, Vygotsky writes, but is something in movement: it is "an unfolding" (279). Thinking unfolds with speaking, both of which unfold with the all the other events (including those of percipient type) in the duration, which unfolds into another duration and another and so on. Thinking becomes aware of a previous

self in its objective products, sound-words, which inherently lie in the past. Thinking, in this way, can know itself as a finished thing, as a thought, only when speaking has ended: which is the conclusion that many philosophers also have come to, including Mead, Merleau-Ponty, and Dewey. Thus, for example, the latter suggested: "the heart of language is not 'expression' of something antecedent, much less expression of antecedent thought" (Dewey 1929, 179). The real function of language is communication, which is an occasion (event) where two or more individuals-as-events intersect and share a common historical present.

The Ensemble of Cogredient Events

The idea of duration, which always is the duration of the world-as-event, forces us to consider other mini- and micro-events that are cogredient in the same duration but that are not currently represented in transcriptions even though they may be important to the patterns of those evental phenomena in which we are interested. Thus, for example, the lesson consists of more than just Mrs. Winter and Gina exchanging. Whatever they are doing and the family of physical events of which the doings are ensemble effects also are cogredient; and so are all the other families of events against which the Mrs. Winter–Gina exchange makes sense, including the other students (and researchers) present in the lesson, all the other lessons that make the life of this school, all the other schools that make the provincial system of schooling, and so forth. Any action-as-event is cogredient in a duration that is or constitutes a part of other events. What Gina, Mrs. Winter, and the remaining students are doing make sense because of all the other cogredient events against which they occur or which they presuppose. How and what they perceive is itself an integral part of the current duration (specious present). Any action arises from the preceding events that constitute its conditions and is shaped by the layered families of events in which it is a constitutive (non-additive) part. The mini-event represented in the fragment used here constitutes an excerpt from the lesson-as-event, which constitutes a small slab of the school-as-event, and so on right up to the most encompassing world-as-event (if there were an ice age, life would not be what it is right now, in this place and at this time).

Any duration contains an extremely large number of cogredient events clustered and nested in families, some of which are implied in the individual, which experiences itself. But in our experience, we do not perceive an infinite number of objects and characters. When Mrs. Winter and Gina are talking and acting, they may not be consciously aware of every classmate, and they most likely are not aware of events beyond the immediate circle of students on the floor and the category scheme evolving from the changing configuration of objects and mats. So what kinds of things come to stand out in percipient events? The answer is: those that are pertinent to the unfolding activity (event), where the motives and goals are associated with particular evental families. For the events in the second-grade classroom under consideration, the goal was projected beforehand: to pull an object/shape from the black

plastic bag, which is to be placed on mat with one or more existing objects previously placed by other students or on its own mat. For the explanation of an act of grouping, color and size were excluded as criteria. Any talking and doing makes sense because of this goal; and when talking and doing were inconsistent with the previously stated goal, it or rather the exclusion of color and size as grouping criteria was repeated. Percipient events and the events with which they are correlated all are cogredient in the same duration. In their form and ultimate content (i.e. the thing perceived) they "depend to a considerable degree upon the individual as acting, as an agent" (Mead 1938, 363). It is precisely in this sense that environment and individual come to be complementary, a fact captured in the preceding talk-related notion of *corresponding*.

In the theory of the social psychologist and philosopher George Herbert Mead, the evental qualities of a transactional approach are notable everywhere. With respect to the relationship between the individual and the environment, he accepts two pragmatic doctrines that bear on the question of this relation (Mead 1938). First, there are no mental *states* in the relation but perceptions that make for the immediate experience of the individual. Second, any reflecting and thinking is but *a phase of conduct*; and these evental forms work out conflicts that arise in the relation. Any dividing line that one may draw between individual and environment is functional. Thus, rather than seeing the cane of a blind individual as a tool that is a separate entity between and connecting the two – in other words, which "mediates" between the two – in the present perspective the cane-as-event has become part of the family of events making the {individual | environment} unit. This therefore accounts for the fact that for blind persons the point of contact with the environment is at the end of the cane. The cane has become part of them. The same kind of phenomenon has been reported for cyclists, whose bicycle becomes part of them (Masciotra et al. 2007). This allows cyclists (a) to feel where something is wrong in the bicycle itself in the way they know from pain in which part of the body there is a problem; and (b) to have a sense of a boundary with the environment at the point where the wheels touch the road, allowing them to feel the quality of the road surface and the presence of small stones as if directly touching them.

For human beings, the environment includes other human beings. The transactional approach allows us to remain aware of the fact that the social environment is not like a box into which the individual is placed. Instead, the individual qua event is integral part of the social environment qua event. We cannot therefore separate the individual from the social environment, for as soon as we do, both individual and environment have disappeared. Thus, "social conduct presupposes a group of animals whose life-processes are determined in considerable part by the actions and the consequences of these actions on the part of one another" (Mead 1938, 362). Perhaps even more important – and entirely contrary to the claims found in constructivist psychologies – is the fact that reflective experience and awareness of social conduct follows the social conduct. This is so because "spatiotemporal intervals are judged and criticized in reflective experience, but, in order that they may be judged, they must exist *immediately* and in the organization centered about the here and now of the individual implied in the experience" (362, emphasis added). In this

quotation, the "spatiotemporal intervals" name what I here call duration; and durations are the objects for the reflective experience, which again is a form of event. The judging and criticizing that occurs are again events, in which antecedent events are present but now in an at least temporary form.

Continuity of Experience

In experience (perezhivanie) there is a unity/identity of individual and environment. A substantial amount of current literature focuses on the concepts of boundaries and boundary crossing as markers of special experiences; and these markers are used in reifying the usual ontology of things (individuals, their identities, distinct communities, etc.). Any such boundary and discontinuity becomes what it is against the continuity of experience. Thus, for example, even though electrician apprentices experience schooling and working-on-site in different ways, these ways, their very understanding of what an electrician is depends on these different experiences (Roth 2014). School and workplace could not be felt and experienced as different unless there was already a sense of continuity that was breeched as the apprentices moved from on to the other location. Being an electrician involves having a sense of the difference and being able to talk about it to other, more recent members in the profession. Thus, the conduct and talk of electricians is the result of a historical process. Although history is a central aspect of cultural-historical approaches to (educational) psychology, continuities arising from a historical perspective tend to remain in the background in that research. But in the transactional approach to educational psychology presented here, a historical perspective is unavoidable. This is so because events are embedded in events the most encompassing of which is nature as a whole from its beginning. Thus, "when nature is viewed as consisting of events rather than substances, it is characterized by *histories*, that is, continuity of change proceeding from beginnings to endings" (Dewey 1929, iv–v). At the same time, when nature is viewed as event, language becomes one of those events by means of which the relationships between events in the social sphere related to the natural sphere come about. In this way, "continuity is established between natural events (animal sound, cries, etc.) and the origin and development of meanings" (vi). As a result, "mind is seen to be a function of social interactions, and to be a genuine character of natural events when these attain the stage of widest and most complex interaction with one another" (vi). Here, mind is not a thing, not a state, but *a genuine character or natural event* that has specific functions in and of social relations, again to be viewed as events.

Dewey's reflections allow us to understand experience as a continuity, which has an extensional quality not only with respect to time but also with respect to space. Whitehead, as shown in Chap. 2, provides us with a language and conceptualization of the relationship between different forms of events, which give rise to the two distinct qualities of events that also underlie our sense of presence and experience: extension in time and space. Theorizing in this way gives us access to understanding

many otherwise often puzzling results from the literature on the situated nature of cognition. Percipient events are not located in the organism (individual) but are intersectional events in which events lying on both sides of any individual–environment divide. Whereas psychologists often speak about external memory, memories can be experienced even when reflective action fails to recover anything. The most famous and celebrated analysis of such memory was provided in the novel *À la recherche du temps perdu* ["In Search of Lost Time" or "Remembrance of Things Past"] (Proust 1919), where the protagonist, having tried but failed to remember as hard as he could some past events, all of a sudden does remember while having a piece of cake (madeleine) dissolved in a spoon of tea. In transactional terms, the memories are an ensemble effect arising from the intersection of evental families, those associated with the individual and those with the ingredients of tea and cake. The intersection exists in the percipient event, here not involving seeing or touching but smelling and tasting. In these events aroused the new event of remembering. That is, the percipient event made for the conditions – prepared the grounds – in which remembering became possible. Remembering is an ensemble effect spread across the situation as a whole, that is, across the unity/identity of individual and environment, which gives rise to the experience and sense of continuity between present and the past.

The preceding analyses of the classroom episode note how speaking and thinking associated with one individual arises in and from events located in the environment, that is, in events outside its own horizon of continuity. A pragmatist analysis comes to the same conclusions. In such an analysis, brain and nervous system are recognized to be organs (i.e. biological events) with the functions of acting and undergoing. Unless we analytically institute a breech from the historical and spatial continuity, "cognitive experience must originate within that of a non-cognitive sort" (Dewey 1929, 23). These relevant kinds of experience of non-cognitive type include the natural ones occurring across the unity/identity of individual and environment, which manifests itself in those events that are intersections of both: doing and perceiving, acting and undergoing.

The idea of continuity also challenges the notion of causality, including that said to exist between thought (mental constructions) and actions that follow and that between any type pair of events that stand in a temporal relation. This is so because the "notion of causal explanation … implies a breach in the continuity of historic process" (Dewey 1929, 273). If thinking and doing, mind and matter, are of different kind and therefore separate, "while the evidence forces one to see that they are connected, on has no option save to attribute the power to make the connection … to one or the other of the two things involved" (273–274) or to something else that (mysteriously) makes the connection. These mysterious connecting things are called "mediators." This therefore throws further light on the non-identity of thinking and the thoughts that manifest themselves in finished speech ("the Said"). Causality of any kind – whether between two "natural" events or between "thinking" and speech – is the result of "the breaking up of a continuity of historical change into two separate parts, together with the necessity which follows from the breaking-in-two for some device by which to bring them together again" (275).

Sociality

> Every actual entity is in its nature essentially social; and this in two ways. First, the outlines of its own character are determined by the data which its environment provides for its process of feeling. Secondly, these data are not extrinsic to the entity; they constitute that display of the universe which is inherent in the entity. (Whitehead 1929/1978, 203)

In this book, I use the notion of transaction in the sense that Dewey articulated it; and I develop it here, based on Whitehead, in terms of the relation of events. This leads us to a theory in which, as the opening quotation points out, every actual entity – inherently of evental type – is in its nature essentially social. Yet another name for dealing with the same phenomenon is used by Mead, who, in the six books that contain his works, uses the term *transaction* only once. In that one occasion – which pertains to the fact that individual subjects can enter their own experiences only as a objects, i.e. "only by means of his experiential transactions with other individuals in an organized social environment" (Mead 1972, 225) – it may be read as synonymous with "exchange." But another term is used to denote a phenomenon that has the very same quality as transaction: *sociality*. He denotes it to be a principle:

> [T]he principle of sociality that I am attempting to enunciate is that in the present within which emergent change takes place the emergent object belongs to different systems in its passage from the old to the new because of its systematic relationship with other structures, and possesses the characters it has because of its membership in these different systems. (Mead 1932, 65)

In this statement are apparent both qualities of transaction that arise from the relations that events can have. First, sociality pertains to the present, which is the passage from the past to the future. The specious present is past and future simultaneously and, thus, any object, any individual, is simultaneously part of the past and future. Indeed, the "temporal dimension of sociality is essential to its existence" (Mead 1932, 82). An entity-as-event belongs to two different systems because of systematic relations with other events ("other structures"). Any thing "can be a member of two divergent systems only in passage, in which its nature in one system leads to the transformation which its passing into another system carries with it" (77). The term *passage* is used in two ways: first as the passage from past to future that happens in the present and second as the passage from one perspective on the world (e.g. a moving train) to another (e.g. the landscape with its trees).

In the exchange involving Mrs. Winter and Gina, we note that neither did just externalize and thereby make available something utterly subjective but that the sound-words were *for* the specific other in this specific event (i.e. a mathematics lesson in this school). But when the words "that one, the square, is a little bit shorter" came from Gina's mouth, the Said – i.e. the content of the event of Saying – also (thus simultaneously) represented something of herself. Other students present might have said something different, and as the events revealed, Mrs. Winter anticipated and worked toward another form of statement that did not include color or size. The words were a manifestation of sociality, of mind, because in it are present

both Gina (as event), from whom the words come, and Mrs. Winter (as event), to whom the words are destined. The words were different phenomena at once for at least three reasons: because (a) there are two people for whom they exist, (b) already for Gina, they manifest something of herself for the other, and (c) the words, the Saying, have evental, thus emergent quality. Emergence is a manifestation of sociality, and mind is a manifestation of the sociality of nature. It thus exists in nature; and it is its temporal dimension of sociality that it passes from one person to another. But any "minded organism has the other dimension of sociality as well, so that what appears now as in one system and now within another, lies … in a system in the world answering to this character of the minded organism" (Mead 1932, 80–81). Mind is simply an expression of the emergent nature of life, that is, life-as-event.

In each (sound-) word-as-event, there is a double passage: from past to future and from one person to another. Any object is present in both dimensions of that passage, and that double presence is the essence of sociality or, as preferentially used in this book, of transaction. The present, as shown above and in Chap. 2, considered as event, has temporal and spatial qualities. This is why "the sociality of the present is the very structure of mind" (Mead 1932, 90). Mind is but the latest manifestation of the "fundamental organic relationship whereby the physical world is properly described as a community" (Whitehead 1929/1978, 288); and that organic relationship – existing between people and things and between multiple people – is the reason why evolution, history, events, and occasions are creative, characterized by novelty that cannot be derived from what has been immediately before.

In the transactional approach, the arrival of novelty within the event, that is, its emergent character, is fundamentally social and sociality is the character of the evolution that itself has emergent character. The social, rather than being constructed, is not merely the condition for anything of higher psychological nature, as Vygotsky and Leont'ev presumed in their conception of human behavior as social in the strong sense. More so, it is the very quality of an emergent nature. That is, sociality is a quality of the event. Mind, one of the topics of educational psychology, thereby comes to receive the deserved recognition "as an evolution in nature, in which it culminates that sociality which is the principle and form of emergence" (Mead 1932, 85).

In the mathematical description, the evolution of complex systems includes the generation of new forms. In the Bénard effect, for example, water between two metal plates at the same temperature moves randomly. But when the temperature difference between the two plates reaches a particular value, the water all of a sudden moves in regular columns. That effect cannot be predicted on the basis of the behavior of water or the plates prior to reaching the point. In biological systems, such generations of new forms is the norm and constitutes the essence of evolution. In evolution, new forms emerge. The point where new forms emerge actually is the same where the old forms disappear. The point is like a boundary between two countries, which is thus part of both. That is, at the point of emergence, "there is a plurality of 'systems,' that is to say of distinct standpoints, and we have the consequence that the 'same' object must be in different systems at once" (Mead 1932, xxx). Sociality is precisely this capacity to be in multiple systems at once, that is, to

be several things at once; and it is the origin of the social nature of everything humans do. The sound-word, as shown above, is such an event that is in multiple systems at once; and, thus, it is an inherently social object. In the same way, an object that intersects with multiple percipient events is social – as intuited on the part of the German philosopher Feuerbach referenced in Chap. 2. That is, sociality and the social world are not constructed. Instead, the sociality of nature is the condition for the social in animals generally and in humans specifically.

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Chapter 4
Events and the Origin of the World

One of the key observations in Chap. 3 is that objects, including sound-words, are social through and through. This is apparent from the fact that an object is itself a regularity of an event that intersects with those families of events that are associated with and make a living person (i.e. person-as-event). In other words, "an object is an ingredient in the *character* of an event" (Whitehead 1920, 143, emphasis added), where the character itself is an abstraction. We could also say that the object is social because it is a character of the unity/identity that we denote by the term {person | environment}. If an object were to exist for one person only, then this would mean that it could not be expressed in some way through an actional event and others would thus never be able to ascertain its existence. But even our most intimate, personal, perhaps even secretive thoughts are expressed in verbal and other forms to be understood by others. But why are all objects social? In Chaps. 2 and 3 it is shown that objects-as-things are abstractions from and shorthand forms for percipient events after these have come to a conclusion. How and when do these abstractions emerge – on ontogenetic and phylogenetic scales? We know, for example, that in the animal world, the organism behaves as if the object did not continue to exist after the percipient event has ended: dogs stop barking when passersby are out of sight (and no smell is apparent). Most tool-using chimpanzees fashion twigs and other things on the spot but do not carry them around, or pick them up to be used in some other site (though some chimpanzees reportedly do, carrying stones over large distances for the purpose of cracking nuts). Things and the world are as they appear in the present but do not exist beyond the current percipient event.

The existence of the object beyond its perceptual presence generally is an unquestioned fact. This is so even though we know that object permanence is something that develops in the course of the second part of an infant's first year of life; and scientists have very specific processes for ascertaining the presence of an object and of its signature in their recordings. Take the first case, which consists in Jean Piaget's classical experiment concerning object permanence (e.g. Piaget and Inhelder 1966). Consider a child holding ("playing") some toy-thing (Figs. 4.1a and 4.2a). The experimenter takes the toy away from the infant and hides it under

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Fig. 4.1 The classical Piagetian experiment testing for object permanence with a 7-months-old infant. (**a**) The infant holds ("plays with") the object (toy). (**b**) The experimenter takes the object away and hides it under a blanket. (**c**, **d**) The infant no longer attends to the object, as in the adage, "Out of sight, out of mind" (https://www.youtube.com/watch?v=rVqJacvywAQ)

Fig. 4.2 The same Piagetian experiment but with a 12-months-old infant, who, in the third frame, can be seen to have searched for and found the object (toy). (https://www.youtube.com/watch?v=wQyEB_yNHnU)

a blanket (Figs. 4.1b and 4.2b). When the child is younger than about 9 months of age, it will stop attending to the toy as soon as it has disappeared underneath a cover (Fig. 4.1c, d). However, when the infant is only a little older – generally around the age of 9–10 months – it will lift the cover without hesitation and get the toy (Fig. 4.2c). In the first instance, the toy-thing does not appear to exist once it disappears from sight, whereas in the second instance, the infant is actively looking for and getting the toy-thing even though it cannot be perceived. That is, the regularity continues to exist in the experience of the infant even though it is not present. This, therefore, is "an awareness of perception of the object as related to certain other definite events separate from the specious present" (Whitehead 1919, 82). That is, next to sense-awareness, there is another event of awareness in which are recognized earlier events of sense-awareness. Remembering thus becomes part of the percipient event in the present. The object has existed in the past, and this exis-

tence carries over into the present, is part of the character of the present even when it is not part of the percipient event. But prior to the appearance of the object as such, there is sense awareness associated with sense objects – e.g. a color, smell, and hardness.

Related to the object, the emergence of two qualities therefore has to be shown: (a) the object-as-permanence that exists beyond the immediacy of the percipient event and (b) the social nature of this object. Tied to the second quality, therefore, is the challenge to the constructivist idea that the individual mind is a closed system that makes up its own world – a version that is continuously refined to make it adequate to the individual's experience – including the social world that it constitutes with others. These others are constructions of the individual mind, which comes about when the internal model of the natural world and self are externalized to become things among things (Piaget and Inhelder 1966). In the process of socialization, the individual – implicitly or explicitly assumed to be wild and untamed – comes to be social. The situation is not much different in the literature taking sociocultural or social constructivist perspective, where any object (including "meaning") is first constructed in the public arena and then internalized (by means of individual construction) to become an aspect of the self and the individual mind. The *self* is something that the individual constructs and then externalizes, and which is a model for its constructions of the other (self).

In the preceding sketch, it is apparent that the individual is one manifestation of theoretical approaches that work with things rather than with events *as* events. The conception of the individual as thing (self) is a counterpart and correlate of the conception of a thing-in-itself. The ontology of things is present everywhere even in much of Vygotsky's work, such as when he ties particular concepts and their meaning to the mind of individual child. Both the concept and the meaning are theorized in thing-like fashion, and they are somehow the property or characteristic of the individual. This individualism is present when meaning is attributed to a specific person, as Vygotsky does in his earlier work – e.g. the "word meaning characteristic of the child" (Vygotskij 1934, 119 [134]).[1] This is the very position that pragmatist philosopher have critiqued as an instance of a primitive (scientific) discourses, because it supposes that "individual words in language name objects" and that "every word has a meaning. This meaning is correlated with the word. It is the object for which the word stands" (Wittgenstein 1953/1997, 2). This individualism leads straight to intellectualism. Characteristic of the earlier work are statements such as: "The child establishes social interaction with adults through words that have meaning" (Vygotskij 1934, 119 [134]). This is a very reductionist description of a social relation as the result of the child's efforts and words that have pre-existing "meanings." The child as an individual entity (self) is presupposed much in the same way that are the word and the meaning associated with it.

[1] The numbers in square brackets refer to the page in one of the available English translations (Vygotsky 1987).

Near the end of his life, Vygotsky recognized the intellectualist bias in his earlier work, which is associated with a psychophysical problem that he indicated to be addressing in his future work that he never came to realize. At that time, his emphasis shifted to sense, which is a more important phenomenon than meaning and exists already before language appears – e.g. a sense of how the world works. Meaning is only one of the phases of sense; and the sense of the word is a function of the world as a whole. But sense is a function of the world; and unless such a world exists, there cannot be sense and even less meaning of words. One of the key problems with intellectualism is that it is based on a split of body and mind, which Vygotsky refers to in his notes as the *psychophysical problem*. In the attempt to overcome this problem, he became interested in the work of the Dutch philosopher Baruch Spinoza, for whom there is only one substance. This one substance, though inaccessible directly, manifests itself as body and as thought. But theorizing in terms of substance, body and thought still deal in things rather than process. This is where the process-oriented, evental take of transactional psychology makes a decisive advance. Beginning with the event as the fundamental unit allows us theorists to move away from the reduction of life to things. But that leaves us with the task to explain how the object emerges as a recurrent form across different events.

For the later Vygotsky language was an integral aspect of a *sense-giving field*. But we would not make any advance if we considered it to be a thing, employed as a tool by people to construct whatever analysts are interested in – including knowledge, meaning, identity, and intersubjectivity. It is only if language itself is thought as event that we get to a dynamic perspective of an interconnected world, a perspective that had emerged during the Romantic period in Germany, which the later Vygotsky was taking up (Bertau 2014). Rather than thinking the sense-giving field in terms of forces acting between things (e.g. people), we are better of thinking about them in terms of electromagnetism (Mead 1938; Whitehead 1919). This allows understanding time and space – which Immanuel Kant assumed to be the a priori of experience – not as things but as abstractions from more fundamental phenomena of the natural and social world: events. The "meaningful action" and "meaningful language," which are the objects of our science, are abstractions from a transactional and translocutional world of process that becomes thingified in self-identical actors and objects (cf. Ricœur 1986). The sense-giving field thus consists of all the events cogredient within the same duration or "slab of nature." Objects are abstractions from this evental field in the same way as observed objects (e.g. electrons, photons) are abstractions from the quantum field.

Even before Vygotsky made his shift from meaning to sense, from intellectualism to a Spinozist unity of body and mind, there existed in the scholarly literature the notion of an objective field that orients the conduct of individuals and groups. This objective field is realized in the threefold relation (gesture to first person, second person, and future phases of activity) of a (vocal and non-vocal) gesture between two people in *one and the same* given social act (Mead 1972). The sense of something exists in the form of those logical relations of the parts of a situational whole

that participants indicate to one another. The word, and thus its sense and meaning are objective, social characteristics because it is in consciousness "absolutely impossible for one person, but possible for two" (Vygotskij 1934, 318 [285]). In making this statement, Vygotsky draws on the German philosopher Ludwig Feuerbach, who whose aphorism extended to any thing: "but only that exists, which exists for me and the other at the same time, wherein I and the other agree, which is not only mine [mein] – which is general [allgemein = common to all]" (Feuerbach 1846, 308). The philosopher argued that some object could not be said to exist unless there are at least two persons for which the thing objectively exists, that is, for whom the thing exists as object. This proof cannot be produced from thought alone, for the being of the object requires that it be different from thought. It is only when something also exists for another that we know it is not a mere figment of our mind. In this case, the object can be referred to. Among the earliest form of referring to an object is pointing. True pointing, however, presupposes the object pointed to. True pointing thus presupposes both the object pointed to and the associated gesture that allows the object to be seen.

We are thus confronted with a complex of phenomena that are distinct in object-oriented theoretical approaches to psychology but that come to be closely related in an event-oriented transactional psychology of education. Here, the individual as self in the face of the other is a manifestation of the relation between subject and object. It turns out that the relation between subject and object also is a manifestation of the human relation that emerges into the relation between self and other in the course of the development of an infant (which, as research shows, that not experience itself as distinct from its mother during the earliest phases of its life). The question of the other in the self inherently confers to the transactional approach its cultural and historical characters. In object-oriented approaches, the two members of each pair are approached as separate things, whereas they are constitutive parts of one phenomenon – the unity/identity of {individual | environment} (see Chap. 3) – in the transactional take. The emergence of the object and thus the emergence of the world is articulated and discussed below in an investigation of pointing and the original relations from which this evental phenomenon emerges.

Pointing

Pointing requires an object that is the target of the pointing gesture, some bodily configuration itself understood as a recurrent form. The consequence of this is that in pointing two evental phenomena are related. There is no sense speaking about a finger pointing if there is no recognizable object in situation to be pointed at. In the same way, it makes no sense to speak of a sign (i.e. a signifier) if there is no signified; and it makes no sense to speak of a word if it does not also imply some "meaning." The problem of the "construction of meaning" arises from the object-oriented

ontology, which takes the existence of a word as thing-for-granted and then searches for a meaning-thing or meaning-as-character of the thing. The relation of the pointing-thing to the object is of the same kind as the relationship between some sound-word (a thing) and its "meaning." To distinguish a reaching movement oriented toward an aspect of the perceived environment from pointing that has an object, the notion of "'pure' pointing" (Bruner 1983, 75) is used. This "object" may be a character of a material thing, such as the particular shape or position of a curve in the example below. In the usual object-oriented approach, it consists of a pointing gesture (one thing), serving as signifier, and the object (another thing), serving as the signified. Thus, pure pointing would not be observed prior to the existence of the permanent object. It may therefore come as little surprise that both object permanence and true pointing emerge some time between 8 and 11 months into the life of the infant.

True Pointing

In a pointing event, the presence of an object is presupposed. Consider the following exchange in an advanced biology laboratory where a professor (P) and his technician (T) are gazing at the computer monitor on which a curve is visible. In this fragment from laboratory life, we observe two movements toward the monitor with the index finger pointing where there is actually nothing displayed associated with the sound-word "baseline." Twice we observe the sound-word "baseline" occurring alongside a finger movement toward a part of the monitor where there is but ground against which a figure – the curve – appears.

Fragment 4.1

1	P:	baseline right;
2		(1.2)
3		WELL
4		(0.9)
5	T:	looks like a blue altogether.
6	P:	yea
7	T:	it's a blue right up in here ((*points to left peak*))
6		(1.0)
7	P:	this looks like baseline right here
8	T:	yea (all that?)
9	P:	that is baseline.

In this instance, a finger is moving to monitor, but at the point the index finger is touching, there actually is nothing. Yet in this particular situation, there does not appear to be trouble in the exchange event. Associated with the finger movement in both cases (turn 1, turns 7–9), there is the sound-word "baseline." Those familiar with the work in the laboratory know that the professor is pointing to the "baseline" even though there is nothing material to be seen. Those present, including the researcher, can "see" the baseline, as shown for example in an acceptance turn (turn 8). The baseline is an imaginary line that some real curve is "sitting on" giving rise to what is seen. The scientists are interested only in the curve, which is somehow hidden in the present display, thought to be a composite of the "baseline" and the curve. That is, the event has the finger paired with this invisible baseline, an object of thought rather than an object in the world – but nevertheless real. We can easily imagine a situation where the professor says, "See this?" and a new graduate student in the lab offers one of two replies: "What are you pointing to?" or "Are you pointing to something?" In the first question, an object is presupposed but its nature is uncertain. In the second case, the very nature of the finger movement and configuration as an act of pointing is questioned. If there is no object, the index finger does not point and makes but an occasional, situationally irrelevant movement.

There are other forms of pointing occurring in the fragment. In this laboratory, the statement "looks like a blue altogether" brings the left of the two humps in the graph into the saliently visible. This is so because the hump appears in a region of the display historically associated with blue light; the right hump is associated with red light. "The blue" is shorthand for a kind of object they are investigating (i.e. photoreceptors) that maximally absorbs in the blue part of the spectrum. Thus, the sound-words "the blue" actually is taken to be a pointing event associated with one part of the curve. It allows that part of the display to show itself to anyone present. But there is a second kind of pointing, this time associated with some uncertainty. The professor had visually identified an object for measurement on the slide at which he was looking through the microscope. But there are different kinds of objects, distinguished by the type of light they absorb. Thus, knowing what the professor sees under the microscope depends on what the graph shows; and what the graph shows depends on what the professor sees. It is only based on their past experience that there is agreement at the time of the fragment that the object on the slide is more likely an object absorbing in the blue region rather than one of the two possible objects absorbing in the red part of the spectrum corresponding to the second hump that can be seen in the offprints (Fragment 4.1). There is therefore an interdependence between two percipient events, one related to the contents of the computer display, the other related to the contents of the materials on the slide as seen through the microscope. In this case, the two shapes are abstractions (signifier and signified) from a unity/identity: a true signing event.

The present analysis exemplifies pointing as a phenomenon transactional in nature: it exists in the pairing and mutual constitution of two phenomena, one of which functions as signifier and the other one as signified. The relationship goes

both ways, and each phenomenon can take either position. The example from the laboratory where the two images – what shows itself on the microscopic slide and what shows itself on the monitor – can serve as signifier relative to the other. Even in the case of a pointing event, though initially perhaps not as intuitive, object and gesture point to each other. In the exchange event involving two or more people, the index finger movement is pointing because there is an object, and there is an object (salient) because the finger movement is pointing. Take one of the two phenomena away and the pointing disappears much as the clapping sound disappears with the removal of one of the two hands.

Pointing does not exist in and for itself. A finger, arm, or other body configuration or movement is not a signifier (often falsely named sign) as object-in-itself. Within an event-oriented transactional approach, we investigate pointing as an event. This event is understood in terms of the intersection of several events. In the same duration that extends over the pointing event we also find one or more cogredient percipient events. The hand and finger movements also are events, which, here clearly seen, related to the changing screen display (curves), where the changing lines are events against, for example, changing coordinates. Though pointing generally is observed in groups of individuals, it does in some occasions occur one only one person is present, such as when readers move a finger along the row of words simultaneously read (silently or aloud). Even though it might be observed when there is only one person in the current situation, the nature of pointing is social through and through. It, as the objects it implies – what is pointed to and the finger (word) doing the pointing – first is a social relation with another person (cf. Vygotsky 1989). But this relation is an event, where at least two person-as-events are intersected by one and the same evental phenomenon. In Chap. 3, this phenomenon is treated in terms of the group of coordinated micro-events {speaking | attending to and receiving}. Pointing is thus a joint – not merely jointly achieved – and thus inherently social event rather than something that could be attributed to one or another individual. In other words, it is a characteristic of a {person | environment} relation, generally also involving another person. Social event means that the two or more person-events come to be related when they are intersecting in a third event common to both. Pointing is a manifestation of the fact that the individual takes the attitude (not to be thought of in mental terms) of the other to the movement for the purpose of initiating a form of action (an event) that the individual already has taken toward the phenomenon in the environment (Mead 1972). In pointing, the visibility and existence of the object for the other is presupposed. Pointing thus also means that individuals have been and are taking the attitude of the generalized other towards their own actions.

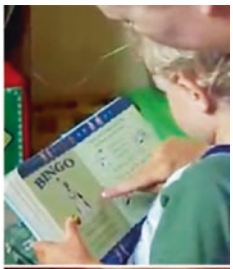
The Joint Work of Pointing

A pointing event – existing, for example, in the form of an index finger oriented in a particular direction where something shows itself – often is analyzed and theorized in terms (indexical) signs, that is, as a thing, a gestural index. Educational psychologists have treated it as "a part of a primitive marking system for singling out the noteworthy" (Bruner 1983, 75). In this approach, the infant at some point in its early development comprehends an adult point, a signifier, and about one or two months later begins to point. The approach is similar to language, which commonly is treated as something like a toolkit containing many words (Bertau 2014), that is, again a thing or collection of things, that the child learns to use as it participates with others to produce culture. A transactional approach, on the other hand, rethinks pointing and speaking in process terms: events for which the subject-as-event is not merely an "'active' condition" (Whitehead 1919, 86) but where events that are cogredient in a duration that also include other people and events against which speaking and pointing stand out (as figure against ground). Pointing, as speaking, is an event; and it takes joint work (event) to make it happen and to perceive. That work often is hidden because pointing tends to be successful; and when it is not, we deal with it quickly and in such mundane ways that we do not become aware of the work that we are doing. To see and understand that work of pointing, we therefore need to look at situations where it is no longer invisible. For this, we turn to an event of reading in the early life of an infant boy (I) sitting in the lap of his mother (M). As the fragment shows, the infant does not yet speak recognizable words but the sounds coming from his mouth and vocal cords, after some work, come to be treated as specific words.

The fragment begins with an apparent offer to begin orienting toward a doggy bone (turns 1–4). Though the offer is acknowledged in the turning of the gaze toward the left page, it is also not accepted when the gaze is returning toward the right page (turn 5). That event – which has the gaze move from the right page to the left and back to the right – comes to be treated as manifesting an orientation toward a particular feature, the precise nature of which is not apparent in the public sphere at that point (turn 6). The thumb of the infant's right hand rests or is moving back and fort over a ball on the dog's head, though the fact that the two are to be associated is itself an aspect of the joint work that the two participants are accomplishing. A variety of possible objects and characters are offered up in speaking: "doggy," "doggy do tricks," and "a ball on his (the doggy's) head."

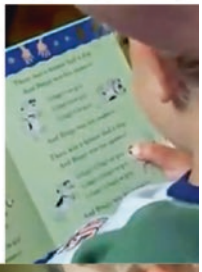
Fragment 4.2

1 M: isthat doggy bone?
2 (1.3) ((*taps 5 times*))
3 s there doggy bone?
4 (1.9)
5 I: ((*moves head left, then the right*))



6 M: whatcha looking at.
7 (1.22)
8 doggy?
9 (0.88)
10 doggy do tricks
11 (0.53)

12 I: oong gue da dis (0.45) po poo:::
13 (0.15)
14 M: a ball on his (head?
15 I: guee) guee::neen
16 (0.44)
17 M: oueee
18 (0.36)
19 I: guee:::::::aaaee:n



20 (0.18)
21 M: oueee
22 I: a guee (n
23 M: a) ao green
okay. you telling me the colors hu.
24 I: ((*turns gaze toward left page*))

The offerings apparently are not resonating, but instead a sound is produced by the infant boy "po poo," which comes to be heard and treated as a ball on the head of the dog (turn 14), a treatment that does not find resonance when another sound form rings out (turn 14). The sound form comes to be repeated in this or similar form on the part of both participants, until one of the repetitions becomes the condition from which a specific English sound-word emerges: green (turn 23). A

formulation[2] of the event that has just happened follows: "you are telling me the colors." The infant boy's turning of the gaze toward the left page then initiates another phase in this reading episode, and thereby also constitutes a positive affirmation of what the saying in turn 23 will have said.

It is quite apparent that in the exchange, the movement of the head and the direction of gazing are taken as a manifestation of the orientation toward a specific object. But the nature of this object is not apparent to the second participant. We observe a series of {offering | rejecting} sequences until success is manifested by means of an {offering | accepting} pair (turn 23 | turn 24). The naming of the characters presupposes their objective existence in the public forum of their joint work and the possibility for the character to be identified on the part of the infant. Thus, the joint work also includes percipient events, the results of which are manifested in naming. The event pairs such as {offering | rejecting} are to be considered in the same way as the verbal exchanges in Chap. 3, for the event of rejecting implies the events of having attended to and received an offering. Naming, which in one case occurs through recognizable English words and in the other through what we might take to be proto-words that already have the ring of real words to them. They are already social through and through, for they have a function in their joint work to assist another in the identifying a specific object of orientation presupposed to exist for the other in the same way that it exists for the self. These "proto-words" are sound events that establish a double relation: between mother and infant and between the pair and the features on the book page. In each instance, the infant-produced sound and his thumb on the ball is but the initial phase in the completion of a social act of pointing that it initiates.

The very fact that the work is conducted makes evident that there is something missing on the part of the doings associated with the infant that would have made the object apparent. Possible ways of making the object of interest apparent are first offered on the part of the parent, followed by the offerings on the part of the infant boy. That is, we now observe events on the part of the "'active' conditioning" family of infant-related events that are part of the work of achieving successful pointing, which will have arrived only with turn 23. Here, it takes a number of exchange events until the mutual alignment of the pair to a specific character – the color of the ball on the dog's head – comes to be successfully achieved. At that point, reading continues concerning other features on another page.

Genesis of the Object

> The earliest objects are social objects, and all objects are at first social objects. Later experience differentiates the social from the physical objects, but the mechanism of the experience of things over against a self as an object is the social mechanism. (Mead 1938, 429)

[2] *Formulation* is a technical term from conversation analysis to denote situations where participants tell each other just what is, was, or will be happening. An example of this is when a speaker says, "Let me ask you a questions," and then articulates something that is treated as a question.

Prior to the emergence of object permanence, the universe of the infant is without objects that exist even though they cannot be seen. (There also cannot be a self as object.) The world of the infant consists of moving and inconsistent scenes that appear only to disappear again (Piaget and Inhelder 1966). Whereas infants do take things and toys into their hands, studies of congenitally blind and deaf children show that they do not grasp these things *as* objects or try exploring them through their sense of touch to find out any characteristics (Meshcheryakov 1974). They do not *have* a world. These children do not show signs of recognizing toys or of understanding what these are. Indeed, they show no inclination of wanting to explore their surrounding world. When given material things, they tend to drop them without ever trying to feel them out. Therefore, and unlike this tends to be presupposed in constructivist paradigms, such children do not come to have or know a world on their own. They do not appear to have such a need. Whatever attempts educators in these studies might have made, deaf-blind children did not exhibit the conduct required for orienting them to selfsame objects over and against them. Objects as such exist only for the tutored deaf-blind children. Before, they did not exist other than in the form of resistances encountered as a child bumps into them. They do not exist as recurrent characters with particular functions. Objects become the selfsame things that they are in common use when they are part of directed, purposeful human activities, characterized by the relationships with others and the material world. The orientation toward an object as a thing-in-itself arises in the relationship with others oriented toward the satisfaction of a need:

> Orientative-investigatory activity [deyatel'nost'] emerges as a vital activity [aktivnost'] directed toward recognizing an object [predmet] that previously figured in a "practical" activity [deyatel'nost']. The result of such vital activity [activnost'] is the actualization of the image of the thing, with the help of which some organic need of the child was previously satisfied. (Meshcheryakov 1974, 79)

In the quotation, two forms of events are marked as distinct, though in English (in contrast to Russian and German), there is only one term: *activity*. In this description, the object emerges from vital activity – e.g. a percipient event, seeing or feeling without a specific intent – after it has figured in a practical, purpose- or motive-oriented activity (e.g. feeding that satisfies hunger). What is referred to as the "image of the thing," of course, is required for object permanence: the image allows the object to be (virtually) present even if it is absent. A past percipient event (or its results) is alive in the present and recognized in a form that object-oriented approaches name memory; it is an event of the form of non-sensuous perception (Whitehead 1920). From this perspective, therefore, the image is an emergent, eventual phenomenon, arising only from inherently joint, societally motivated activity [deyatel'nost'].[3] Typical sequences in the life of an infant include eating with a spoon, which begins with the parent feeding the child, the child holding the spoon without and before using the spoon, and eventually using the spoon to eat (satisfy a need). Percipient events thereby come to be subordinated to more encompassing

[3] This is the form of activity theorized by means of the triangle in Fig. 2.6.

events in which the former are integral parts. Without such orientation characteristic of (social) activity, the image associated with object permanence does not emerge even though some form of image of the object may have appeared on the retina many times before. The research with the congenitally deaf-blind children shows that their world of things is related to their world of people, where these things have particular functions in the relations to other people. The experiments thus exemplify the results of an earlier analysis, whereby the relation to the world (objects) characterizes the relations between people, and the relationships with other people characterizes their relation to the world (objects) (Marx and Engels 1978). As presented in Chap. 3, the relation is not a thing, some state between two things, but an event. In an event such as pointing, these multiple relations between people and between people and recurrent evental features in the environment are quite apparent.

When an Object Is Not Yet an Object

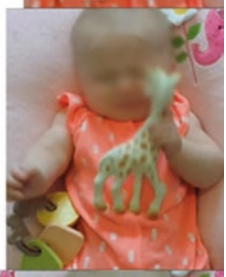
The preceding review of the empirical evidence in early infant life and in the lives of genitally deaf-blind children shows that there is no world filled with and built up of objects. A stable thing that exists even if it is not seen because hidden or not part of the situation is an emergent phenomenon in the life of a human being. This does not mean that prior to a stable world of things, the infant is one event among others in passage. Normally overlooked is the fact that parents and their infants relate in different forms of events scattered throughout the day. In these relations, there are some micro-events that lead to specific other micro-events; and both the preceding conditioning and succeeding conditioned events are phases of one and the same encompassing, inherently social event. The following examples show that there are relations, involving things that are not yet permanent objects.

The fragment is part of a video from a day in the earliest phase of the life of an infant (https://www.youtube.com/watch?v=wUT3k7wDQNI). In this fragment, the infant lies with its back on a pillow holding onto a rubber giraffe and the mother is providing a running commentary. Even though the infant barely is old enough to hold her head in a specific position, we observe a relation that manifests itself in conduct. More specifically, behavior that might be associated with discontent or displeasure on the part of the infant is followed by conduct on the part of the mother that is recognizable as the expression of a her intent to return the situation to what it was before and from which the manifestation of discontent/displeasure had disappeared. Even here, the infant's (vital) activity – we do not see any evidence in support of a claim that she does have conscious goals – initiates acts of social exchange that are already indicated in those vital activity.

Fragment 4.3

1 M: but sophie's probably her absolute favorite toy right now (0.1) she::: (1.2) lo:ves

2 I: sophie hu hu ha ((*drops toy*))
3 M: ↑W*HAt*? (0.9) W*HAt*?
4 (1.2)



5 xi xi xi xi xi ((*M does 5 squeals with giraffe*))
6 (1.9) ((*hands doll back*; *pushes to produce a squeel, child stops crying, doll again in its mouth*))
7 I: uh ha
8 (0.3)

9 M: what are you doin (0.3) ↓ crazy girl?
10 (1.3)
11 I: uh han ((*sounds calmed*))
12 (0.6)
13 M: ny yea
14 I: ha

The fragment begins with events of mutual gazing, which develop into an exchange where in which a sign of discontent or displeasure – the "cry" transcribed as "hu hu ha" – leads into the dropping of the toy from the infant's hand, which initiate an exchange completed by the query for the reason: What? What? (turn 3). Obviously, the infant is too young to reply in language. But the turn offers up sounds that may constitute the event intersecting both the mother- and child-related evental strands. The sound waves bring the two into resonance. The mother picks up the toy, presses it repeatedly thus producing a squeaking sound, accompanied by a change in the facial expression of the infant (turn 5). The toy is offered up to the infant, who

is accepting the offer in and by grabbing hold of it. We then observe again a movement into a new phase marked by the facial expression of contentment (turn 11), a movement already commented upon by turn 9. What we therefore see here is the emergence of an evental sequence that constitutes a field that gives sense to particular actions or expressions. Already in this phase of the life of the infant, its vital activities initiate what come to recurrent sequential events that find in speaking only their apotheosis – i.e. the sequentially ordered pairs phases of a social act. It is in such sequences that the dispositions are awakened in the individual "not simply the tendency to the response which it calls forth in the other … but primarily the social rôle which the other plays in the coöperative act" (Mead 1932, 168). Readers will have many examples of their own, where an infant's crying is initiating other events that are affecting the infant's sensations (rocking, on shoulder or in crib, feeding, caressing, etc.). Indeed, it will turn out that this sequencing is the reason for the individual to become an other to itself – as in the French poet Arthur Rimbaud's famous exclamation *Je est un autre* [I is an other] – even before it is becoming a self. As a result, the sense of self will emerge in experience, that is, when the individual is addressing herself as another.

In this event, we observe vital activities on the part of the infant that come to take their place in identifiable consequences of parent forms. The fragment is an illustration of such relations: "the stimulating cry, the answering tone on the part of the parent-form, and the consequent change in the cry of the infant-form" (Mead 1972, 44). The two evental forms evolve to be part of a social event, which becomes a frame within which the evental forms adjust themselves in the way the fibers and threads do in the analogy provided in Chap. 2. There is therefore a transactional relation, where the whole shapes the constitutive parts that give shape to the whole. The social act is evolving out of the "adjustment of the two forms carrying out a common social act involved in the care of the child" (44). We note that the mother is continuously talking, and directly responding to the (vital) actions of the infant, its crying, moving, and dropping of the toy. These are the kind of stimuli that a hearing infant typically encounters from early on in its life and to which it responds – in the sense developed in Chap. 3, whereby its own vital activity-as-event arises in and from the immediately preceding situation-as-event. The infant's cries are conditioning events, the mother is responding in speaking (turn 3), in picking up and squeaking (turn 5), and returning the toy into the hands of the infant (turn 6) who is grabbing hold of it (as seen in the image related to turn 11). It is precisely such kinds of events that led to the conclusion that "the earliest behavior of the human infant is social, that is, it is called out by behavior of other organisms in answer to inner impulses … and especially to the movement of these other organisms" (Mead 1938, 199). It is an emergent association between the infant-initiated own sounds that the parent-related events in and of the situation. In those earliest phases of the infant's life, there is neither a permanent social object nor a (social) self: "The two appear together, and they emerge from a behavior that antedates them" (200).

In the fragment, the infant holds – or perhaps more accurately, it is holding onto – the toy. There is no evidence that it acts toward the toy in ways that anticipate future experiences. "Surfaces are, in the experience of the infant, the experiences

out of which the outsides and insides of things arise" (Mead 1932, 119). That sense of its own bodily surface can only emerge in contact experiences arising in events involving things that ultimately will lie outside the self. Anticipating contact experience means anticipating how the object will act back: the stove will burn it, the ball will roll, the furniture will be stable to hold onto, and the giraffe will squeak in the event of pressing its surface. In such events emerges a sense (not initially consciousness) of the infant's own body, so that development describes a movement from the infant's periphery (things) to its own body, which in some later phase of life will become a thing against another thing. The sense-experience associated with the resistance an object provides to the infant's own movement is a condition for the evolution of a bodily sense.

When infants grab onto a toy, the latter does not give way but in a sense pushes back thus providing the very substance in the hand. Paraphrasing Mead for the purpose of the present analysis, we may say that the object arouses in the infant the action of the object upon the infant. In the particular case considered here, the infant is grabbing hold of something rather than ending up empty handed when the fingers are curling. The toy ultimately comes to be endowed with an inner nature, the pressure against the grabbing hand. It is this experience that in the end constitutes the inside of the toy as a physical thing – the thing offers resistance. We notice in the fragment that the event has the mother place the toy in the hands of the infant. Although toys may lie in close proximity (Fig. 4.3a), the infant does not reach out (Fig. 4.3b); and when the toys have been brought close and within reach, the hand may move over them without treating them as things to be held, brought closer, etc. The infant's sense can identify an effort as coming from within itself only with or after placing resistance within the object: "the grasping of his hands have to localize things from an inside attitude, and he finally reaches himself as a thing through the action of other things upon him" (Mead 1938, 122). The infant does not only push against a thing, but also has experiences in which it pushes against its own hand in the way that it pushes against the thing. Thus, again paraphrasing Mead with respect to the present context, the toy arouses in the infant the disposition to respond as the toy responds to the infant. As a result, the "embodiment of the object in the responses

Fig. 4.3 The *distant* object first exists as social relation, making the emergent object an irreducible social object. (**a**) The infant's gaze moves over the scene. (**b**) The infant looks at the mother, who brings the future objects (toys) within the reach of the infant. (**c**) The infant touches the future object, and then gazes back at the mother

of the organism is the essential factor in the emergence of the physical thing" (Mead 1932, 125).

Sense and the meanings that develop later in life are not additions to some (social) act. Instead, from the earliest phases of the life of the person (i.e. as infant), we observe the emergence of sense-giving fields. Any object that eventually emerges is a recurrent feature across different situation specific events (e.g. those preceding and those succeeding the mother's covering of a toy in Figs. 4.1 and Fig. 4.2). Objects, as recurrences in perception, index and mark commonalities among events, commonalities or rather recurrences that manifest themselves in object permanence. This emergence is conditioned by (becomes possible in) some form of gesture on the part of the infant, here the manifestation of a change in affect (from turn 1 to turn 3). The resultant of the conduct will be a joint social act (as event) in which the infant's gesture was an early phase that led into the reply to the gesture on the part of the mother. These phases "are the relata in a triple or threefold relationship of gesture to first organism, of gesture to second organism, and of gesture to subsequent phases of the social act" (Mead 1972, 76). The sense of the partial act derives from its relationship to the social act as a whole, which gives a specific place to the different phases that unfold and stand against concurrent surrounding events that form the relevant ground. There is no figure without ground, and no ground without figure. A social act makes sense precisely when its different phases unfold and lead into each other in specific patterned ways against a background of other events that are part of the conditions of the event as a whole (Schütz 1932). Whatever the infant is feeling as the situation unfolds – in other words, the subjective form of the feeling experienced by the occasion (Whitehead 1933) – itself becomes part of a generally nonthematic ground that sets up the conditions for specific social acts (events) to follow. The fits of older children – e.g. at the supermarket checkout next to the candy shelf – display the same kind of pattern observed here, though in these older children the fits are associated with some deliberation and experience-based anticipation. Important here is that even prior to the appearance of deliberately conduct that is understood as having produced a sign, there is an affectively charged, sense-giving occasion in which the relation as a whole – existing by means of an event that intersects both infant and mother – constitutes the context for its phases.

From Initiating Social Events to Pointing

The two episodes from the early phase in the life of a child exemplify how parents hand toys in situations when the child does not reach for them but "in response" to other aspects of the occasion (the doll having fallen from the hands, a doll being too far away and the child's repeated change of gaze toward the parent). The seed of the pointing gesture has been said to exist in the child's attempt to grasp a distant "object"; and when this movement ends, the fingers hang in the air and thus indicate the object (Vygotsky 1997b). This description fails to differentiate between two situations: (a) one in which the object does not exist separate from the situation and

thus is an integral part of the field and (b) one in which the object exists permanently. Research shows that the first kind of movement, which is also observed in primates, is different from the second kind of movement, which only exists in humans (Masataka 2003). For "pure" pointing (i.e. symbolic activity) to emerge, the object is presupposed and indeed has to exist as something that can be attained by the other and the self. This is not the case prior to the arrival of object permanence in the life of the child, with an associated sense of the permanent self and the permanence of others even when they are out of view. This latter may also be the reason why index finger pointing is observed very infrequently in chimpanzees, and if it is, then it always appears in relations with humans rather than with congeneric individuals. Pointing emerges from movements where the arm is stretched out and the finger touches something merely within reach. As such finger extensions decrease around the ages of 11–12 months, and the number of pointing movements increases all the while the reaching movements remain constant.

Studies suggest that (wild) chimpanzees do not point in the way that humans do, essentially because they are said to lack the forms of cognition typical of humans, including an appreciation of the required joint-attentional orientation. But there are observations of what we may call events of proto-pointing, whereby an infant form (the holding of a position that is part of a pick up) initiates a social event completed by a parent form (picking up the infant). This was observed among bonobo chimpanzee (Hutchins and Johnson 2009). The specific case described how bonobo infants use movements to invite their mothers to a particular event, such as a pick up and carry. A pick up and carry event involves the joint work of mothers and infants, who both are moving in ways so that a pick up is enabled and can be completed. When such movement trajectories have become part of routines, the infants may solicit a pick up by doing a fragment of the pick up movement frozen into a position (body configuration). The fragment always will be a part from the infant's contribution to the joint activity. This behavioral form is associated with other attention-grabbing behaviors (e.g. touching the mother) that together produce a form of communication in a more complex field of activity.

Hutchins and Johnson do not write about the bifurcation that has to occur with the appearance of capacities for the appearance of object permanence and the associated distinction between the subject and object and the associated distinction between self and other. Existing research shows that human (true) pointing has something that is not found in animal behavior, whereas the pattern present in animal behavior can be found in humans as a less important function. The emergence of such functions constitutes the emergence of something qualitatively new, that is, a neoformation or morphogenesis in which new (behavioral) forms are created. In some models, the behavioral forms are taken to be part of earlier social behavior that remain present when the organism (species) has evolved the competency to distinguish others (understand others in mentalistic terms). The ancient behaviors, without changing their forms, take on different significance with the emergence of at least some basic understanding of other individuals.

Contact Experience and Distance Experience

The observations among congenitally deaf-blind children show that contact experience alone does not make for objects, which have social and distant character. The experiments with the kitten described below show that objects and features of the world (characters) that are anticipated in behavior do not exist unless there has been contact experience before. In the same way, mind in society exists in and as the event of Saying (Levinas 1978), which in fact is the contact of two events in the sense developed in Chap. 2.

The appearance of a self-identical recurrence (object) in experience – in the face of the different (secondary) characters it may display – depends on *contact experience* and two types of relation the contact-event has to other events (Mead 1938). In contact experience, there is no distinction between the percipient event (touching) and the situation; in contact experience, not only the object but also the situation as a whole is present. Contact experience plays a central role in the emergence of awareness (consciousness), consistent with the conclusions from other, very different fields. In the natural sciences, an experiment with kittens showed that those passive ones that had been carried around with only visual access to the environment (P) failed to develop the competencies that their active partners had (A), who were moving about while pulling the cart in which the former were held (Held and Hein 1963). When tested, all kittens A reacted when brought close to an edge, chose the shallow over the steep side of a cliff for descending it, and blinked when confronted with a fast approaching hand. None of the kittens P displayed that conduct. The experimenters interpreted these results as supporting their hypothesis of visually guided nature of behavior. These results also show that the passive kittens did not develop a sense of the behaviorally relevant object. The active kittens did develop such a sense, which may be understood to be the results of the relation between a perceptual experience of something at a distance, which provokes forms of activity that lead to a contact experience. Moving about is a condition for the appearance of the edge, different slopes, and fast approaching object (experimenter's hand). This then is what a transactional, event-oriented philosophical analysis yields: the "event that is the common situation of these associations of sense-objects, recognised or recognisable, is an active condition for these recognitions" (Whitehead 1919, 89). Here, the event as a whole is the active condition. The current duration, which constitutes the situation of the percipient event, is the generative condition that provokes sense objects and associated percipient events. These conditioning events may be co-occurring or preceding.

The experiment with the kittens provides further evidence that visual access to an environment alone does not lead to the identification of features; we might even say that the environment is not an environment at all unless the organism moves about. We may even say in much stronger terms: the passive kittens *did not have a world at all*, as there were neither objects nor a sense of space. To be able to have an object requires corporeal experiences against an unmoving ground, which also is the

reference for all experiences of movement and rest (Husserl 1940). The experiment thus confirms an insight developed decades before, according to which the nature of an object, "'what a perceptual thing is' is found in contact experience alone, but it is a contact experience which is the last term in an act which originates with an experience of something distant" (Mead 1938, 13). It turns out that this "'what' of the object is, then, the expression of the whole of which both environment and organism are essential part" (16), where organism, environment, and object are to be thought and thought of as events. That is, the object is but an abstraction (character) from a synecdoche – part or phase of event standing for the event as a whole in the way that the Said is standing in for the Saying – in and of the passing durational whole.

Long before recent neuroscientific advances, it had been suggested that object recognition implies the readiness of the organism to act when the object comes within manipulatory distance (Mead 1938). This readiness for future action toward the distant object manifests itself in the innervation of manipulatory events that will unfold when the distance has been reduced to nothing. Neuroscientific research shows that there is a particular class of neurons that fire when a monkey does something even though these neurons are not actually involved in bringing about the doing (Rizzolatti et al. 2006). These neurons were subsequently named *mirror neurons*. It turns out that the same neurons fire when the monkey sees someone else perform some object-oriented action, such as grabbing a fruit or cup. Even though in those phases of phylogenetic evolution and ontogenetic development, objects are integral to situational events rather than things-in-themselves (self-sufficient objects), these eventually emerge in humans and some other animal forms. The recurrent and thus stable forms that appear across experiences and that are present even in their absence, overpower any sense of life in flux. Thus, "in perceiving an unchanging cliff the recognition of permanence, i.e. of the object, overwhelms all other perception, the flux of events becoming a vague background owning to the absence of their demarcation in our perceptual experience" (Whitehead 1919, 91).

The distant experience is not limited to the sense of vision, smell, or hearing but is found, as the observations with the Russian deaf-blind children show, also in the sensorial events related to the sense of touch. Indeed, Mead himself had used the example of a person in a dark room stretching out the arm so not to run into the furniture. The deaf-blind children, after having had opportunities to explore the spoons they were eating with rather than only feeding themselves with them – or touch the clothes of a doll and their own clothes – developed a similar sense for spoon and clothes as distinct things (Meshcheryakov 1974). But at that time, the thing has become a *distant object,* something that the organism anticipates in its behavior as it comes closer or moves away. This does not mean that it already is a permanent object, which implies the recurrent presence of past experience. Things first and foremost are part of *immediate experience*, seen and felt in the here-and-now of the forever-changing situation. But initially, the presence of the distant object does not imply contact terms even though the reality of the object may be experienced or tested in the completion of the action that the percipient event had invited. The permanent object is the result of a development that leads to the point of a "break in the act which begins with an impulse seeking a stimulus at a distance

and ends in the completion of the food, or sex, or parental process, or in escape, or rest and sleep, or a like physiological state" (Mead 1938, 326). The object is an abstraction emerging from the final phases of the event. Before it comes to that point the object (e.g. the giraffe, the green-faced doll in the preceding examples) plays an integral part in social events. It subsequently becomes an index to the "permanences recognised in events" that "are recognised as self-identical amid different circumstances" (Whitehead 1919, 62–63).

The self as thing over against another thing is a further abstraction, this one from social experiences such as the ones observed in this chapter. Its origin exists in the fact that "it is primarily in social conduct that we stimulate ourselves to act toward ourselves as others act toward us and thus identify ourselves with others and become objects to ourselves" (Mead 1938, 428). The self as object implies that the child indicates something to a caregiver in anticipation of a particular reply so that in its action the action of the other already is implied. Its action functions as the first phase of a jointly achieved social event (phenomenon) already is implied and subsequently completed in the subsequent phases. A material object is social in the sense that the relation to it is patterned on relations to other people that manifest themselves in particular evental sequences. Thus, when a child begins to anticipate the resistance of the object to its own anticipated actions, then the thing exists as a distant object-in-itself; when a child anticipates getting burned if it were to touch a stove, then the latter exists over against the self, which then does not actually touch.

Object as Condition for the Emergence of Time

The world in our experience has both spatial and temporal quality. For Kant, space and time could not have been derived from experience because they are the conditions of experience: space and time are a priori to experience. Thus, "time is a necessary representation that grounds all intuition" (Kant 1787/1956, 78). Underlying this conceptualization is the acceptance of the Cartesian division of body and mind, where the former has spatial attributes. In the preceding sections, I show – herein following the transactional approaches of Mead and Whitehead – that the distant object and the physical object persisting in time emerge from and are qualities of occasions that also have subjective form (experience). This is an immediate result of the extended nature of events, whereby events are actual because of properties that manifest themselves as spatial relations (Whitehead 1919). The very notion of object permanence, which is permanence over time, signals that the question of time in experience is related to the permanent object in and of experience.

In the genetic epistemology underlying Piagetian psychology, some aspects of the Kantian and Cartesian presuppositions are retained, creating logical contradictions internal to the theory. Most fundamentally, this psychology presupposes space even though conceptions thereof are the results of experience. Thus, the notion of space is said to be the result of a "coordination of changes of positions" (Piaget 1970, 59). But positions can only change if space is presupposed. Similarly, time is

the result of a "coordination of movements or speeds" (59), which is a conception that presupposes a permanent object that remains the same in displacement and thus has speed as a quality. Piaget follows Isaac Newton and Immanuel Kant in accepting that space can be considered independently of the objects it contains, and, thereby accepting Cartesian notions: pure geometry as the science of independent space. He differs in taking up from science the idea of the irreversibility of time. Time, because of its ties to speed, is a function of its contents, which implies that it is "not only a physical reality but also a psychological reality" (60). Piaget distinguishes his approach from Newton and Kant in a third point, which has consequences for his psychology, but consequences that turn out to be fallacious. He assumes that humans apperceive a whole geometric figure in an instant and as a whole, but that we cannot apperceive duration because at its end, the beginning cannot be perceived. The first part of this assumption was shown to be false in Chap. 2, where the notion of the percipient event is introduced; and the second part, which presupposes a point-like approach to time, makes no sense in the context of the social quality of sequential phases of events that include the infant's initiations that have consequences for how it feels (e.g. crying and well being when the giraffe-toy is returned to its hands). It is false in the face of the analyses that show how we experience passage from immanent past to immanent future, a phenomenon referred to as *specious present*.

As soon as we move from the ontology of things to the ontology of events, our conclusions are different. This is so because "the relation of extension … exhibits events as involving the becomingness of nature – its passage or creative advance – by means of its properties which issue in temporal relations" (Whitehead 1919, 61). The break in the act that leads to the permanent object, as seen in the preceding section, is the same break that also leads to the sense of time. If there is no permanent object, then there cannot be a Newtonian-Cartesian sense of *motion*, which presupposes a permanent object that is displaced or displaces itself in a fixed space. Even *change*, as we commonly understand it, requires the sense of a permanent object – most fundamentally, the earth as unmoving ground (Husserl 1940) – that appears differently in situations related by succession.

In Chap. 3, a description is provided for the relation between antecedent phases of events that make for the conditions of those phases events that succeed them. The event is a social phenomenon, involving different individuals doing their parts to make the event happen. In this chapter, for example, I show how infants participate in producing social acts as their part of the joint work initiates other phases in recurrently occurring successions of evental phases. Thus, the infant cries or drops the toy, and the mother returns it into the hands of the child; or the infant gazes in the direction of the mother, gazes at the distant objects, and the mother pushes the objects up close (which does not change their nature as distant objects). The active kittens developed a sense of the distant object, which manifests itself in their choice of the less-steep incline for a descent or a blinking in the eyes when a fist quickly approaches their face. Passive kittens did not exhibit this behavior, which supports the hypothesis that the distant object does not exist for them. But even though we observe recurrent behavior in the {organism | environment} unit, we must not think

that participating in the recurrent production of evental succession means that there is a sense of time. Before that, and although "one specious present or duration merges in another through absence of change and effort, and balanced attitudes answer to these situations, the pulses of existence will succeed one another *without* permanence, identity, or thinghood" (Mead 1938, 329, emphasis added). Motion cannot be the passage of things until the thing is recognized as permanent object.

We note above that object permanence is the result of perceived recurrences of successive occasions – i.e. (micro-, phases of) events. Such recurrences are characteristics, recognition that precisely is the object. Thus, "the awareness of an object as some factor not sharing in the passage of nature is what I call 'recognition'" (Whitehead 1920, 143). The permanent object is an abstraction (character) that serves as link between different events (situations). Although the active kitten's motion bring it into contact with the edge or the lesser slope, it will not have a merging of the remembered contents of a percipient event before approaching the feature with the contents of the current percipient event; it will not have the sense of an object in or feature of the environment as having permanent character in the face of its own changing experiences as a consequence of its motion. Instead, in the case of the animal or the infant described above, there is an adjustment to distances and to successive phases of the social act, which, to the reflective observer (i.e. scientist) precisely constitutes such a permanent object. Prior to the permanent object or permanent character (e.g. color), there cannot be sameness even though there are habitual adjustments in different situations. Such characters and objects, before being permanent, pass; they are "happening, coming into being and going out" (Mead 1938, 331) but do not presuppose the passage of permanent objects.

Important for thinking about learning environments is the sense of time that we have in and as part of experience. When wrapped up in something very interesting, like the fourth- and fifth-grade students I studied during their participation in an engineering curriculum, the sense of time is gone. It is not just that time flies: all sense of time may disappear. The phenomenon also exists during meditation and Zen experience, both of which are characterized by the absence of a making present again – i.e. representing – the present. We have related experiences when we are wrapped up in an intense conversation while driving along on a trip only to come to a sudden realization that we do not remember anything about the environment, whether we passed other vehicles, pedestrians, or cyclists, whether there were any special features in the environment, and so on. In such situations, we are but events among other events without conscious awareness as a cogredient. Here, too, the absence of the permanent object and the absence of time go together.

This last point has consequences for how cultural psychologists of education think about their phenomena, such as about learning from reflection in/on action or learning in/from experience. To learn from some experience, this experience has to be present even though it is past. It has to have the form of "*an* experience" (Dewey 1934/2008), which has a definite beginning and ending. For this reason, *an* experience can be *had* only after the fact. *An* experience, which is the presence of a past experience as an object of current reflective experience, implies the temporal delay between "Being" (-as-event) [Ger. *Sein*] and the reflective object, a thing, which

(phenomenological) philosophers designate by the term "beings" [Ger. *Seiendes*]. Conscious awareness thus implies the existence of a distant object permanent across time. Near the end of his life, Vygotsky had come to see in consciousness a more pressing topic for psychology than that of thinking. In his own work, he only got "to the threshold of a problem that is broader, more profound, and still more extraordinary than the problem of thinking … to consciousness" (Vygotsky 1987, 285). In an event-oriented transactional approach, consciousness has to be theorized as event rather than as a thing or as the presence of things in awareness. We do not know where the investigation of the problem would have led Vygotsky, but we do know – from the quotations on the last page of his book – that he was taking up some ideas from Karl Marx and Friedrich Engels. These authors defined consciousness in eventual terms: "Consciousness never can be anything else but conscious Being, and the Being of humans is their real life process" (Marx and Engels 1978, 26). Although *Being* is an event, it tends to be treated as a thing. To prevent such treatment, we may resort to the expression Being-event or being-as-event [bytie-sobytie], thereby manifesting the need to mark the nature of Being as something alive (Bakhtin 1993). Thus, consciousness being conscious Being, Being-as-event, we arrive at consciousness itself as event. Consciousness is not a thing, not a state, but an event cogredient in the passage that it co-constitutes. It is part of, and reflects, the *real life process* of human beings.

The Emergence of Consciousness

> The appearance of mind is only the culmination of that sociality which is found throughout the universe, its culmination lying in the fact that the organism, by occupying the attitudes of others, can occupy its own attitude in the rôle of the other. (Mead 1932, 86)

We can only *have* a world in consciousness, where an object may be present even if it is not present in sensation. Object permanence – that is, the presence of the object in its absence – constitutes the essential characteristic of the phenomenon of consciousness. Something that was present in a past experience continues to be present in current experience even when it is materially absent. This undergirds the definition of consciousness as the experience of experience: "to be conscious of one's experience is nothing other than to have them as object (stimulus) for other experiences" (Vygotsky 1997a, 71). In the case of the hidden object, the presence of the object in its absence allows the older infant to look for it (Fig. 4.2). Consciousness then "is the experience of experiences just like experiences are simply experiences of objects" (71–72). On the last page of *Myšlenie i reč'* [Thinking and speech] (Vygotskij 1934), the psychologist quotes from a work describing the common origin of language and consciousness (Marx and Engels 1978).[4] These authors suggested language to be (a) as old as consciousness and (b) the practical, thus really

[4] The German version of *The German Ideology* was first published in 1932 in Moscow, and was followed by the Russian version in 1933, that is, one year before Vygotsky died.

existing consciousness for other people and the self. But if object permanence arises around the age of 8–9 months, which is considerably prior to the emergence of language around the age of 2, then the origins of consciousness historically are situated before spoken language appears. But with the object arises true pointing, which, as shown above, consists of the relation between two families of events – one related to the object, the other one related to the subject – that are both intersected in and by the transmitting event taken up in the percipient event. Already in the body of the last chapter, Vygotsky initiated a shift from the previously predominant concern for word-meaning to a recognition of sense, which is a phenomenon both more encompassing than that of meaning and of greater relevance in the early life of the infant.

In the preceding analyses, I show how "'true' pointing" constitutes an event involving two social objects: the thing that serves as vehicle (signifier) and the thing serving as its content (signified). Indeed, that relation is based on a much more fundamental phenomenon according to which there is a duplication of sense objects, which leads to an association of the hardness or heaviness in the environment and amount of force required from within the organism (Mead 1938; Whitehead 1919). Both, the body configuration serving as the vehicle and the thing to which the pointing is directed, have to exist for the participants in the relation. For a communicative act to exist, a double relation has to hold: between two people (as events) and between two material things (as events). The relation between the two things does not exist independent of the relation between the two people, for it is *from* one *to* and *for the purpose of* another. The relationship is motivated, taking form and content that (as a matter of speaking) are *intended* for the other person all the while making available or indicating something that is novel. There is therefore a reflexive relation, whereby the relationship between people motivates the relationship of things (finger, object), and the relationship between things shapes the relationship between people. Neither relationship is a thing but an event, for, as seen in Chap. 3, pointing toward the configuration on the floor during the lesson does not have one and the same object. Even pointing in the direction of the same mat does not have the same content, as the number of objects on each mat changes, and thus, the sense of the category that the group of objects stands for.

Pointing-as-event in which multiple individuals are involved not only involves another person but also some form of awareness that the material relation will have an effect on the other person. That is, pointing requires the pointing subject to take into account the perspective of the other, who, in a percipient event identifies the social object (existing for two). More so, the person is not doing pointing for its own sake, but pointing is only a phase of a more encompassing event, which might be "playing a game" or "having a conversation," or "teaching seeing a blue cone in a biology lab." In his work on pointing, Vygotsky says nothing about the triple emergence described here. Objects initially are not permanent because there is no event making it present in its absence. Passage is not subdivided, and the disappearance of a percipient means it no longer exists – even though adults know that they do (e.g. Fig. 4.1). Similarly, the object does not reappear as such but constitutes a new percipient event of the type "here again" but not reappearance of the same. The disappearance and reappearance of some self-same object requires the event of being

present in absence. When it eventually does appear, the object is social through and through. Simultaneously emerges the self as social, for in pointing, the other is implied as recipient and as agent of an event of replying, which satisfies some need for the infant that initiates pointing by producing its first phase.

True pointing involves (requires) an object. This object is not something that shows itself from itself. Instead, the object as thing over against the infant emerges in course of its life and following many exchanges where some of its vital activities initiate recurrences in what will be jointly achieved social acts. This understanding arises when we take an event-oriented transactional take, which approaches individual and social life as families of events rather than structures of things. The same kind of understanding arises in a phenomenological analysis that takes the same starting point as Mead had taken in giving primacy to role of contact experience. Contact experience is based on sensation and immediacy that precedes acts of orienting to and seeing from a distance (Levinas 1978). Objects as permanent things emerge in activity with others so that before an object can be true or false for the individual, it was already possessed by another. The object specifically and the whole world-as-event generally is human, objective, and intersubjective before it is something for the individual self. This is particularly apparent in the case of congenitally deaf-blind children, where vision does not blur our investigation. Just as for Mead, the qualities of space, time, and spatiotemporal experience arises for Levinas in contact experience.

Contact experience can be thought only in evental terms, avoiding the fallacious acceptance of instantaneous apperception of objects that characterize object-oriented approaches. Distance experience – in the form of seeing, hearing, and smelling – "is the promise of contact experience" (Mead 1932, 37). In other words, "in every vision contact is announced: sight and hearing caress the visible and the audible" (Levinas 1978, 128). We do not feel surface characteristics by simply touching but we have to move and caress the surface. Contact experience thus is not an opening onto Being but constitutes an exposure and manifestation of Being. Contact as caress is an event that is possible only in proximity; contact and caress are *events* of proximity rather than the *contents* of experiences of proximity. As the example of the research with kittens shows, contact and movement is the prerequisite for distant objects in and characters of the world. The object and the subject are not independent elements of experience but are cogredient events in the same duration. Experience is the quality of an event that includes organism and environment among its mutually constitutive parts.

In the opening part of this section, I note that consciousness emerges when preceding experience becomes an object of new experience. When a present thing also is experienced as having been experienced before that a persistent (permanent) object becomes possible. That possibility emerges in and from joint activity. In a first phase, contact experience is associated with percipient events such that the former becomes part of the imagery while gazing at a distant object. As the above-cited research with the kittens shows, this object or character does not arise unless the organism is in contact with the world, that is, unless there is a unity/identity of

organism and the world in which the organisms is integral and constitutive part.[5] That is, there is not just a visual experience arising from something from a percipient event that involves light falling on specific spots of the retina. Rather, distance experience is associated with contact experience: seeing an object is associated with what the organism will experience as subjective form once close and feeling out the object. These events are part of the active kittens' sensuous experience, for which the feeling of their own actions is correlated with the changes in the percipient events that arise in and from these actions. As a result of "the various contact experiences we have had of such objects," these "enter in our perception to make the physical thing what it is in experience" (Mead 1938, 431).

In the case of humans (and likely of some other organisms as well, as evidenced in the use of "tools" on the part of chimpanzees and Caledonian crows), there are further developments. The physical object becomes an object of consciousness when, in social conduct, an individual comes to act toward itself in the same way as the physical object acts on (e.g. by offering resistance). Thus, when an infant attempts to push or pull some thing, the latter may offer resistance. That resistance cannot be be perceived until it is felt in response to some action. This gives to the thing an inside that is hidden beneath its surface; and this experience also is the origin of the distinction between inside and outside for the individual (Mead 1938). The reality of the thing derives from the resistance that it offers to the initial vital activities of the infant. The object and the infant are not separate, as there is a cooperative relation in which pushing or pulling are correlated with opposing forces. Simultaneously, in those events the individual eventually becomes aware of its own body as physical thing over against physical things. Thus, "external perception and the perception of one's own body vary in conjunction because they are the two facets of one and the same act" (Merleau-Ponty 1945, 237). That is, the capacity to take the position of the physical thing or its own physical body *is* what generally is called consciousness – of the thing and of the bodily self. There is then the origin of the individual act as a phase of the social act that it initiates; but as phase of the social act it is itself social through and through. The above-noted threefold relationship – gesture to first person, second person, and future phases of collective activity – gives rise to sense. Initially, as in the life of chimpanzees and human infants, no conscious awareness is required. Conscious awareness, as manifested in the appearance of object permanence, is a consequence of repeated occurrences of event sequences where these objects mark recurrence across situations. This sense thus is present prior to the emergence of consciousness, awareness, and meaning – which is precisely the position taken by the late Vygotsky. Thus, the infant girl with the giraffe and green-faced doll (Fragment 4.3, Fig. 4.3) is much younger than those infants where the appearance of object permanence is observed (e.g. Fig. 4.2). In this phase of the life of an individual, objects are not yet present when absent.

[5] Readers who have a hard time with this formulation may think of perceptual puzzles existing of black and white colored areas. Initially we may see just that. But we all of a sudden see a Holstein cow or a Dalmatian dog standing against a more indistinct ground. Here, figure and ground arise together and are mutually constitutive – a different figure means a different ground.

The foregoing shows that preceding the existence of objects and bodies, there is an *effective occupation of space* when future, anticipated contact experience comes to accompany vision. A field is thus opening up where the individual, in arriving at the seen thing, would or should find those resistances that announced themselves in and with the visual perception. The contact experience projected into the future is the result of prior contact experience. The content of this contact experience, which is *in* the individual, is associated with the current visual experience of an object *outside* the individual. In the completion pase of the cooperative act, the anticipated contact experience becomes actual contact experience. At that time, what has been inside the organism has the same content as what has been in the distant object and thus outside. Thus, consciousness begins, as it "connotes here the identifying of the effects of resistances and movements of things with the efforts made in our organisms in dealing with these things" (Mead 1938, 431). This effective transactional relation of an event extended in space – which brings the organism closer to the distant object – is a character of the relation of individual and physical thing, that is, of the {organism | environment} unit. Even though generally regarded to be subjective, relational qualities, color, sound, or odor come to be attributed to the things. It is by means of the same kind of abstractions that other aspects of transactional relations come to be attributed to a subject. Thus, for example, individuals are attributed characteristics such as dependency, aggressiveness, and pride. But in the transactional approach, they are all characteristics of relations between people (Bateson 1979) and thus always of events.

The appearance of the physical self over against a material object involves a second form of mechanism: the emergence of the *generalized other*. The generalized other is born when the individual, as part of cooperative activities, comes to take the roles of different members of the group and thus evolves a sense of itself as an other to many others. The individual comes to act upon itself as others act upon it and, in its own actions, it anticipates the actions of others in cooperative activity. Role taking becomes the paradigm case for the relation to the object. The physical thing as a permanent object arises at the same time as the self, which is a material thing object over against the physical object. But that development is modeled on the relationship with other persons, "for it is primarily in social conduct that we stimulate ourselves to act toward ourselves as others act toward us and thus identify ourselves with others and become objects to ourselves" (Mead 1938, 428). A more elaborate description of the relation has the self emerge from the pointing gesture: "the self appears in the social act and is a derivative of the gesture, that is, the indication by one individual in a co-operative act to another of some thing or character which is of mutual interest" and "when the memory of the indication associates itself with this object, the self has appeared" (75). Prior to the object's appearance in memory – i.e. prior to object permanence – there is no self. This is so because "the self is an *object* on the same level of reality as that of the others" (199, emphasis added). Thus once the infant begins to point, a bifurcation has occurred because the infant is characterized by a dual attitude toward the object – that of the recipient of the pointing gesture and its own. At that point the condition for a self that has a world have come into existence.

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Part II
Extensions

The preceding, first part of this book is dedicated to the articulation and development of the fundamental concepts that are required for theorizing phenomena of interest to educational psychology through the evental lens of the transactional standpoint. In this second part of the book, the fundamentals are extended to some of the core phenomena in any study of learning, including the human use of signs[1] (Chap. 5), meaning and sense (Chap. 6), inherently abstract universals like concepts (Chap. 7), and experience, memory, and their role in consciousness (Chap. 8). The list of topics is not exclusive but constitutes an appropriate selection for the purpose of exemplifying the many differences that become visible when we move from the hypostatizing of things accomplished by classical educational psychology (including its sociocultural and cultural-historical versions) to a transactional approach where there is a primacy of irreducible events. In that theoretical move from things to events, some concepts that have traditionally played an important role are no longer useful, including the concepts of *mediation* (by signs, language), *meaning* (of signs, language), and identity.

The four chapters in this second part of the book deal with issues that Vygotsky and his students and associates had been investigating but to which they had not provided satisfactory solutions when viewed from a transactional perspective. Thus, for example, although his interests in signs and tools manifest themselves throughout his work, an entire posthumously published text *Tool and Sign in the Development of the Child* (Vygotsky 1999) is devoted to the changing role of the sign in the course of the development of the human psyche. The word-thing and its meaning-thing are the central topic of *Thinking and Speech* (Vygotsky 1987), where the author also is concerned with the process of abstraction and the development of abstract concepts.[2] Although he was interested in human memory processes as part of his research on the changing function of signs (more correctly, signifiers) in

[1] Vygotsky, as many other scholars, conflates "sign" with "signifier," and hypostatizes it as sign-thing. In Chap. 5, the sign is taken to be a signifier-signified relation (as event) that unfolds in and constitutes a person-person relation (as event).

[2] Only the first and last chapters of the book present the more holistic and dynamic approaches characteristic of the final period of his intellectual life.

development, experience [*perezhivanie*] and consciousness became important to him only very late in his short life. This late arrival is shown by the fact that the problem of consciousness – a problem even more important than the problem of thinking and its relation to speech – was formulated as the main problem of psychology only in the final paragraphs of his last completed work *Thinking and Speech*. His lecture about the unity of individual and environment, denoted by the term *perezhivanie* [experience], was held only a month before entering the hospital where he died. Thus, the present part takes up some of they main phenomena of interest to those working in the lineage of a cultural psychology of education, but, in articulating these phenomena in the evental discourse of a transactional approach, provides new and different insights; and, in so doing, it changes our way of conceiving them.

A lot has been written about signs and sign mediation – on the part of the early Vygotsky and subsequently on the part of his followers. Signs (representations) and signing are means and ways of making present something absent or distant and bringing it into the accented visible (i.e. making it figure and topic). But how do signs and signing come to life? Vygotsky (1997) provided the example of how a child fails in its attempt to grasp an object, the mother then treats the movement as a pointing gesture and hands the object to the child, and eventually the child begins to point (see Chap. 4). Recent research shows that this is not the developmental trajectory. But even this newer research fails to address the question of the (permanent) *object*, which, as Mead (1938) describes, does not exist as such until a phase in the infant's life where it has a presence in the actions of the individual whether it is at hand, at a distance, or out of view all together. Mead's analysis even better than Vygotsky's work provides an explanation of the (cognitive) development of deaf-blind children, which is a form of *awakening to life* (see Chap. 4). In *passage*, some thing – e.g. the hammer is not present in consciousness while the seasoned carpenter is nailing. This is also the case for what are referred to as signs. In Chap. 5 I show how signs – signifier and indicated real or ideal objects – emerge.

In educational psychology, "meaning" is probably the most important and most frequent of ideal objects indicated by word-things and other sign-things. Meaning is often invoked with reference to the work in cultural-historical theory and especially on the groundbreaking work of Vygotsky with respect to signs and words. However, in the course of the months prior to his death, Vygotsky was changing his tune: word meaning was to be only a phase of a larger phenomenon, sense, which in fact "depends on one's understanding of the world as a whole" (Vygotsky 1987, 276). He recognized the predominance of sense over meaning and that the children's first questions are about sense rather than meaning. Yet most research in educational psychology still is concerned with thing-like words, meanings, rules, identities, and so forth rather than with the larger phenomenon that is a precondition of meaning (dictionary sense). Unrecognized in current research is the fact that no difference would be recognizable if there were not already an existing and presupposed common sense; everything appearing in a constantly evolving sense-giving field makes sense like a figure against ground (Mead 1972; Schütz 1932). Drawing on a meeting in an advanced experimental biology lab, I show in Chap. 6 why and how common

sense constitutes the condition for cooperative joint activity and, thus, for the sense of where things are at, how things are going, and, if an issue at all, what the meanings of words and phrases might be. Words are to the occasion what figures are against ground: integral part of the whole but standing out to accomplish a specific function in speaking. They make sense because of the commonsense ground that the participants in the occasion share. That common sense, which is based on a common ground, is not a single but rather multilayered phenomenon. Vygotsky intuited this to be the case based on his readings of the French philosopher Frédéric Paulhan (1928); and he captured this intuition in stating that meaning only was one of the zones of sense.

In everyday life as much as in the context of formal disciplines, humans use concept words, ways of dealing with a variety of phenomena all of which have something in common – *dog* is a concept-word because it summarizes many experiences of entities with four legs that bark, even though there are huge variations in the specific looks and barks of these entities. It is a recurrent experience across occasions of different kind. How humans learn concepts and other abstractions has been a core interest of educational psychology; and some of the classical studies in cultural psychology of education concern the categorization of schooled and unschooled peasants in Central Asia (Luria 1976). Classroom studies, especially in science and mathematics education, take up the earlier works of Vygotsky to theorize how students develop universal scientific concepts. But that early work overintellectualized concept development by characterizing it as *mental* (even in the late work *Thinking and Speech*) rather than focusing on a concrete human psychology according to which mind truly is public, physically existing in the relations between people (Vygotsky 1989). In Chap. 7, I build on the work of George H. Mead, Evald V. Il'enkov, and Karl Marx on the nature and emergence of the ideal (i.e. of concepts) from a transactional (relational) perspective. The origin of the universal [Rus. vse*obshchie*] is not merely social but is a characteristic of society [Rus. *obshche*stvo]. In a first phase, the ideal emerges when transactional relations between people come to determine the transactional relation to objects, and transactional relations with objects determine the transactional relations between people. The universal is an ideal characteristic: not of social relations (e.g. dyad, group) but of societal relations and the universal habits of the community. I use examples from mathematics classroom at the elementary school level to exemplify and theorize the trajectory at the end of which we observe children's actions exhibit universally valid patterns (abstractions).

At the end of his life, Vygotsky writes that consciousness is a problem much larger than that of the relation between thinking and speech. That program has not been taken up in classical educational psychology. The question of consciousness is associated with that of the unquestioned (common) ground. Consciousness is a product of evolution that provided the human species with an advantage; through the event of speaking, it is an aspect of the emergent material field in which social relations-as-events take place. Whereas Vygotsky was only at the beginning of pointing to and sketching a non-dualistic perspective on consciousness, Mead already had worked one out: "Consciousness becomes our experience of things not

as they are but as they impress us from a distance which we can never overcome except in imagination" (Mead 1938, 74). Consciousness thus arises as the experience of past or anticipated future experience. Remembering is key to the phenomenon of consciousness. But remembering is different from memory, especially when the latter is merely conceived in computer science term, as some information stuffed away in the mind. The transactional approach provides a particularly interesting perspective, because in it, experience is experience of events, and in remembering, past events (e.g. a lesson or examination) are present together with the current event (e.g. an interview or a debriefing session). In Chap. 8, I exhibit and theorize various phenomena related to remembering in terms of the transactional approach, including corporeal remembering, reminiscing, reminding, and recognizing. These phenomena show that remembering is an aspect of occasions and exists at the crossroad of corporeal and social events.

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Chapter 5
Symbolic Reference

> The production of life, one's own in labor as well as that of others in reproduction now simultaneously appears as a double relation – one as natural, the other as societal relation. … Here as everywhere appears the identity of man and nature, that the narrow-minded/obstinate conduct [borniertes Verhalten] of humans to nature determines their narrow-minded/obstinate conduct to each other, and their narrow-minded/obstinate conduct toward each other determines their narrow-minded/obstinate relation [borniertes Verhältnis] to nature. (Marx and Engels 1978, 30–31)

In the present-day literature, symbolic reference tends to appear in the guise of theories of the sign. Dictionaries most broadly define the term *sign* as something standing for something else or conveying some information.[1] Thus, in the reading event between the infant-boy and his mother (Chap. 4), the sound poo-poo comes to have the same function as the word "ball" might have had. Classical takes on the study of signs in learning situation would treat the sound (proto-word) as a sign-thing (signifier) standing for the ball-thing that appears in the pages of the book (signified). But it is also apparent from this example that the sound-word has a second function: it establishes the relation between mother and child. Moreover, rather than being a thing, sound is an event that is cogredient in some duration. Although there are many scholars in the learning sciences studying signs and their function in relation to things – including the meanings that people attach to them – the second function is much less investigated or made thematic in semiotic studies of learning. Yet as the introductory quotation points out, our human lives exist in the form of a double relation, one existing between people and things and the other between people themselves. This double relation is *alive* and thus has to be theorized as event. In the continuous production of life-as-event, the two relations cannot be separated, which is the position taken by the event-based transactional

[1] The term *sign* is employed differently in the literature. Many of the scholars reviewed here, it is used as something standing for something else. But in the tradition of the Swiss scholar Ferdinand de Saussure, the sign is the *relation* between a signifier standing for a signified. It is toward that second definition that we are working here, where relation is taken as event. My use of the term therefore is changing in the course of the text.

W.-M. Roth, *Transactional Psychology of Education*, Cultural Psychology of Education 9, https://doi.org/10.1007/978-3-030-04242-4_5

approach articulated in this book. As seen in Chap. 2, living persons are thought of as families of events, which come to intersect when there is a third form of event in common. This third event is a conversation. In the evental trajectories of life, which, in the reading event considered in Chap. 4, form a temporary bundle of events, one of which has as recurrent feature what we call the book and its contents. The relation between the people-as-events and the book-as-event exists in exchange events. "Poo-poo" is the event in which the mother- and infant-related lifelines intersect, and it is also the relation of these lifelines to that of a thing in their environment, the recurrent feature recognized as the drawing of a ball in a book. The message therefore is that our considerations need to take into account not only sign-things and object-things in the real or metaphysical (ideal) world – which are but abstractions from occasions, where they are recognized as recurrent features of events – but also the function of signs in the social relations of people. Current conceptualizations of sign and sign use, however, are far from considering the double function related to events of signing; and they are far from understanding signing as event within a process perspective of life. "The sign" is treated instead as a self-same thing-in-itself. In this approach, three factors tend to be investigated: mind and mental processes, the sign (symbol), and the referent (or meaning) of the sign. These formulations to not resolve but beg many theoretical issues. Thus,

> [i]nstead of inquiring how it is that a certain thing acquires its function as a representation, cases are taken in which social usage has given a thing that capacity; instead of asking how it is that just *this* thing and not some other becomes that which is stood for, or designated, it is assumed that the object is already there waiting to be referred to. Instead of a discussion of how and to what end being a sign or representation and being a referent are determined, we have at the very most merely a discussion of how this particular thing, *already* determined to be a *sign* comes to refer to or stand for that particular thing *already* determined to be an *object*. (Dewey 2008, 301)

In the transactional approach, the notion of symbolic reference is used, which implies two modes of prehension (perception): sensuous prehension, by means of which the environment becomes ingredient in the constitution of the subject, and non-sensuous prehension, the presence of the past that also constitutes the continuity of experience of the organism (Whitehead 1929/1978). Because both forms of prehension are corporeal events, symbolic reference is completely grounded in the body rather than being some purported connection between something physical (the signifier) and something from a different, metaphysical world (meaning). In other words, the *animate (living) body* is the common ground for the two forms of events that constitute *any* symbolic reference. Rather than wondering about the "meaning" of a "sign," we investigate the relation that some recurrence in the presence – e.g. an abstraction serving as a signifier – and a remembered percept from some earlier (previous) occasion in the life history of the percipient. Symbolic reference thus exists between a sound-word (or other material instantiation of a signifier) appearing in the occasion and its occurrence in a preceding occasion.

In this chapter, I develop an account of signing and signs from the perspective of a transactional psychology. In the required theoretical move, the idea of the sign-as-thing is to be dropped in favor of the event of signing; the sign is recognized to be

but a recurrent feature of occasions recognized and treated as such across occasions. I begin by situating this inquiry in the context of classical takes in the cultural-historical perspective of Lev S. Vygotsky. I then present two case studies, one from the animal world involving members of a close relative of the human species (bonobo) and the other one from a second-grade mathematics classroom.

The Sign in Existing Cultural-Historical Perspectives

Taking the sign as thing characterizes not only classical psychological investigations but also those inquiries that pledge allegiance to some form of sociocultural and cultural-historical theory. Investigations of learning pledging allegiance to these theories often draw on the work of Vygotsky in support of descriptions in which the sign functions as a *mediator*. For example, in studies of mathematical learning, the letters x or n that appear in algebraic equations are said to be signs (e.g. Radford 2003). Another example of a sign is when, while scrutinizing a bookshelf, "we decide to put a mark, or a sign of some sort, on the shelf so that the next time we enter the room the sign will mean something like, 'Here is the book!'" (39). In this example, the sign is some material entity that allows the person to remember a particular book to be read or used in writing an article. The situation has the same structure as the proverbial knot in the handkerchief that is to remind the subject of something to be done. We thus have three entities involved: the subject and its memory, the sign, and the book. The sign is theorized as a thing that stands between the person and the book. It is apparent that the theory is based on entities that have some supposed relation.

This approach to theorizing the sign has a history in educational psychology, having played a central role in the experiments that Vygotsky and his collaborators conducted. Thus, for example, the psychologist was interested in investigating "the connection between sign and meaning," "between word and object," "why a given object is signified by a given word" (Vygotsky 1999, 52). In a typical experiment, one of the researchers from the laboratory (Alexei N. Leont'ev) asked children to name the color of various objects that appeared in the questions he posed. The children were not allowed to use two color names, and, once the experiment had started, they were not allowed to repeat a name that they had already used. The experiment showed that seven- to eight-year-old children were failing to complete the task successfully. However, the same children succeeded when given a deck of colored cards that they were allowed to use. Once they had the cards and instructions, these children would then design some strategy that led to a successful completion of the task. For example, a child might pull from the stack cards with the two forbidden colors and then add the card with the color already named. Because "always answering through the mediated auxiliary stimuli, the signs, the child organized his active attention from outside and adapted to the problems that he could not solve by direct, elementary forms of behavior" (Vygotsky 1999, 49). The psychologist used a number of diagrams to express how the position of the sign in relation to other things

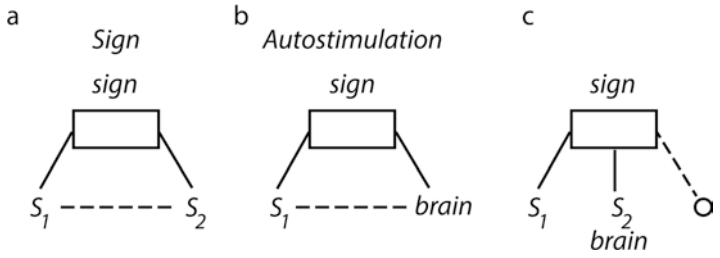


Fig. 5.1 Some of the ways in which Vygotsky conceived of the sign, all of which presuppose it to be a thing standing between the subject (S_1) and something else. (**a**) The sign mediates between two subjects. (**b**) In auto-stimulation, the sign mediates between the subject and its brain. (**c**) In a psychological task, the sign mediates between child, experimenter, and task or between child, its brain, and the psychological task (based on Vygotskij 2005)

(Vygotskij 2005). These show that two subjects (S1, S2) do not relate directly, as in stimulus response theory: a sign stands and makes connections between them in the form subject1 – sign – subject2 (Fig. 5.1a). During development, the brain takes the place of the second subject giving the form subject1 – sign – brain, which is an instance of auto-stimulation (Fig. 5.1b). A further development included the psychological task, which added a third thing to the two earlier ways of visualizing the relation between the subject, sign, and some other thing. The subject relates to the task by means of the sign, and it also relates either to another subject (e.g. the researcher) or its brain in the form subject1 – sign – subject2 – object (Fig. 5.1c).

It is apparent that in Radford's book-related memory example, the situation is the one between a subject and his brain (Fig. 5.1b). Psychologists, including those who take a self-actional approach to situated cognition, often refer to this as external memory. In the case of Vygotsky's experiment with the colors and colored cards, the psychological task is the object of the activity and the sign further mediates between the child-subjects and their brains (Fig. 5.1c). The first type of situations (Fig. 5.1a) is typical of conversations, where language or words are said to mediate between the participants: the sign bridges between the two spatially separate and self-identical subject-things. It is apparent that in all of these examples and illustrations the sign is theorized as a thing: characteristically, Vygotsky drew boxes above which he wrote the Russian equivalent word for sign (i.e. *znak*).

The sign also has been defined differently: as relation. For example, early in the history of semiotics (semiology) as a field, it was defined as the relation (in mind) between a signifier and a signified (de Saussure 1995). For example, a sign might exist as the relation between the concept *tree* and a (mental) image of a tree. Other ways of conceptualizing the relationship is between a word and the thing in the world that it denotes. In this way, the relation can, but does not have to be between the psychological images of two material things. This is the way in which some semioticians define the sign in its broadest terms: as one "portion of continuum which serves as its vehicle in its relationship with the other portions of the continuum derived from its global segmentation by the content" (Eco 1986, 44). In essence, then, the sign is a relation between two segmentations of the material

continuum, that is, between two clumps of matter. It is in this manner that the sign also has found entry into the social studies of science, where the entire trajectory of translations from the complex world to the abstract knowledge (discourse) of science is conceived of as a chain of signification, where each link consists of some external material thing of a particular form (Latour 1993). Important in this latter conceptualization, the connection between any two matter-form segmentations does not have a "natural" relation but instead is related through work (i.e. an event). The relationship between two segmentations is arbitrary, and any relation that does exist is subject to shared conventions. Absent in this account is the fact that signs are recurrent patterns of communicative events that are cogredient in some more encompassing event (e.g. publishing knowledge in science journals).

In Chap. 4, I note that an object as a thing is but an abstraction, marking the recurrence of similarities between events. The sign – whether conceived of in the (inappropriate) manner characteristic in the diagrams that Vygotsky used or in the manner that derives from the view of the sign as a relation – has the same problem when conceived as entity-thing. An alternative is to theorize situations where sign-use is currently investigated in terms of events. Chapter 3 already accomplishes this in the case of the word, which is the most distinguished of signs. Rather than focusing on word-things, we investigate communicating-as-event. In Chap. 3, this event provides for the intersection between two or more persons, each of which we think of as a family of events. This then constitutes a transactional approach to the relation between people, which, as the introductory quotation to this chapter shows, is one part of characteristically human relations. That still leaves out the second part, which is the relation of people to their (natural, material) environment, in other words, the conduct of people toward their surroundings. The unity/identity of humans and environment – the quotation states "*identity* of man and nature" – means that any study of conduct requires investigating the double relation and the relation between the relations. It thus behooves us to provide evidence not only for the role of the speaking event in bringing about the relation between people and between people and things but also for the reflexive relation between the two relations articulated in the introductory quotation. It is only in this way that we can work out what is specifically human. In the case of humans, "where there exists a relation, it exists for me, the animal '*relates to/behaves itself toward [verhält]*' nothing and not at all. For the animal the relation with others does not exist as relation" (Marx and Engels 1978, 30). The authors italicize and place in parentheses a German reflexive verb (*verhält*, third-person singular of *verhalten*) that is defined both as (a) behaving toward others and things and (b) relating. The emphasis in their text invites us to read and hear both of these ways of using the verb.

In the academic literature, the existence of the sign as thing-in-itself is presupposed much in the way common sense would take it. This may be one key reason why it is so difficult to move away from the common conception of signs (words) that has its origin in the Augustine conceptualizations of words – which pragmatic language philosophy considers to be "a primitive idea of the way language functions" (Wittgenstein 1953/1997, 3). The question posed in research tends to be with how people make meaning or interpret sign-things (signifiers). But how do signs-

as-relations come into existence? Unless we have some viable description of the birth of signs, we have no way of deciding whether a theory of signs is sound on phylogenetic (evolutionary) or ontogenetic (developmental) grounds. Otherwise we get stuck, as constructivist approaches are stuck because they presuppose the very capacities – e.g. interpreting, making/constructing meaning – that require explanation. That is, we have to overcome the existing ideologies of the nature of the sign.[2]

With respect to the attempt of explaining the emergence of language – one form of sign use – there are three main classes of theories, two of which presuppose the existence of symbolic forms that are discrete and unrelated to bodily processes, that is, unrelated to events. In the third class of models, communicative forms and their meanings are treated as "embodied," where the "meanings are modeled as the sensed states of the world" (Hutchins and Johnson 2009, 531). That is, even here where there is an emphasis on the body, the focus is on the emergence of things that are somehow embodied – with all the dangers that such discourses come with – rather than on the functional relation of events.

Symbolic Reference in Bonobo Mother–Infant Relations

The first set of case materials comes from the life of the bonobo (*Pan paniscus*), one of the two species making up the genus *Pan* – the other being the chimpanzee. Like humans, they are highly social; and they are also considered something like our closest relative because of similarities in behavior (parent–infant bonds, face-to-face sexual intercourse, altruism, empathy, tongue kissing). Some of their interactive forms – observed among captive animals though not introduced to human culture – exhibit features not only of communication generally but also of some language features specifically. Communicative exchanges that have the characteristics of language constitute a situation that "provides both a reasonable starting place for the simulation of the emergence of symbolic language and some clues about the

[2] Overcoming an existing ideology that reigns over one's own thinking is not an easy task. There are numerous critics of research in the social sciences who make the case that the scientific endeavors often constitute a refinement of commonsense concepts rather than engaging in a categorical reconstruction. The preconstructions of common sense lurk everywhere, and many scientists fall into the trap of the preconstructed object). The dangers come from language, which "poses a particularly dramatic problem for the sociologist: it is in effect an immense repository of naturalized preconstructions, and thus of preconstructions that are ignored as such and which can function as unconscious instruments of construction" (Bourdieu 1992, 241). The preconstructed shapes what researchers see and how they theorize the events under investigation. Rupture requires "*conversion of one's gaze … 'new gaze,' a sociological eye*" (251). The critique of theory because the use of preconstructed concepts was central to the issues Karl Marx took with the economist David Ricardo. Thus, "Ricardo's main error, according to Marx, lay in his inability 'to forget profit' in considering 'value as such,' so that his abstraction turns out to be incomplete, insufficient, 'formal'" (Il'enkov 1982, 79). The establishment of any sound theory requires a genetic reconstruction, which allows uncovering the current historicity of the world as perceived today and how the historical origins of the preconstructed concepts (Holzkamp 1983).

kinds of processes that might be involved in this historically elusive transition" (Hutchins and Johnson 2009, 534).

One particular case of communication is associated with the movement that leads the mother to pick up the infant. It is not as if the mother simply picked up the infant. Instead there is an occasion as part of which both individuals move so that the event, in transactional terms, consists of phases each of which presupposes the other. The pick-up event is produced in joint work that cannot be reduced to the addition of the individual participants' contributions (acts). Here is how the movements have been described:

> Mothers and experienced infants come together for the carry activity in a very fluid way. The transition from other activities to the carry is an almost ballistic event. Mothers often sweep up infants and move off while looking at their destination. A mother can pick up an infant without looking directly at the infant because the infant simultaneously moves its body and hands in ways that fit and take advantage of the mother's motions. Mother and infant just come at one another, interdigitating (grab, climb on, lift, etc.) mainly by feel. Bonobo mothers experience most carries as tactile and proprioceptive events rather than as visual events. Mothers and infants coming together for a carry is an oft-repeated trajectory, a shared practice with distinctive roles that tends to unfold in regular patterns.
>
> The ways of entering a carry range from direct "enactments," such as the infant climbing on as the mother lifts the infant, to something much more interesting that we will call "gestures." These gestures take the form of frozen fragments of previously enacted trajectories that have been part of the carry activity. For example, a common part of the infant's role in establishing a ventral carry is to lean back and reach out and up. Infants assume this pose and hold it as a solicitation to the mother to pick up the infant and carry it. The frozen gestures are produced in a complex activity field that includes other attention-getting actions such as the infant touching mother's knee to get her to attend or orient in a particular direction. (Hutchins and Johnson 2009, 535)

There are other aspects in signaling behavior that might be seen developing, for example, in captive animals. In one of the videos that I found on YouTube, the three members of a family can be seen stretching out a hand well before some fruit is thrown toward that specific individual. In the same video, the female "invites" the male to sexual intercourse by placing the arm around his shoulders (Fig. 5.2a), to the point of "nudging" him when the required movement into the position does not

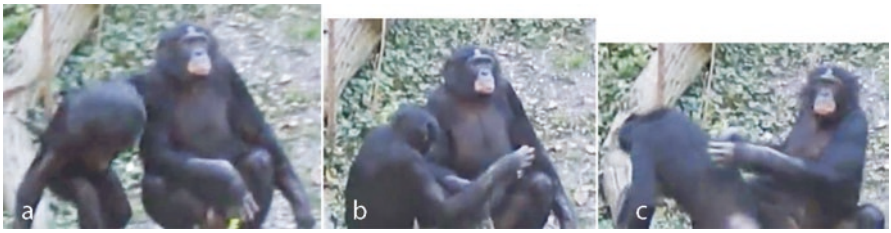


Fig. 5.2 To reduce social tension, a female bonobo initiates a sexual encounter. (**a**) The arm around the shoulder of the male, gaze toward face of male. (**b**) The female raises the right hand into the male's field of vision in face-to-face position. (**c**) The beginning of the joint movement leading to intercourse from behind, though the same pair also engages in intercourse in face-to-face position. (https://www.youtube.com/watch?v=pKMQxwW5Dyg)

immediately begin by raising the hand in his field of vision (Fig. 5.2b), before the joint movement begins that terminates in the act (Fig. 5.2c). These situations are of a kind of "animal behavior … [that] displays or exhibits transaction such that certain constituents in them *act, operate* or *work*, as preparatory of transactions to take place later" (Dewey 2008, 472). In other instances that end with copulation, the female approaches the male, begins to turn around, and both animals than move into position and begin mating. In such situations, therefore, the occasion is of the same ballistic kind as the pickup and carry, as the intercourse appears to arise seamlessly from other forms of activity, here feeding.

The aspect of these accounts is the appearance of what are called "gestures" and "frozen fragments of previously enacted trajectories." A gesture, such as a body configuration or a human pointing finger, is not a form, not a *thing*. Instead, whatever is denoted by the terms gesture or frozen fragment are themselves abstractions from events that are parts of the plenum, which also includes percipient events and the immediate environment-as-event surrounding the animals or human beings. As a phase of an event, the gesture in the form of a frozen trajectory fragment provides for the conditions of another mini-event, the pick-up. Each constitutes a phase of the larger event. Cogredient in this larger event are all those bodily events that produce the pathic forms of experience (affect, emotion), which change in the course of the event – e.g. a frightened infant is consoled in and by the contact with the mother. The pick-up (as event) occurs against other (mini) events, which might include the conduct of an adult male in some "agitated" manner. In the case of mating, which is also observed in bonobo groups in the wild, researchers have described its function as the release of stress potentially arising in accessing possibly limited food supplies.

An important aspect in the conceptualization of such sequences is the unit to be chosen for analysis. Thus, in common psychological approaches, the signaling would be conceived of as separate from the accomplished act, in both the pick-up-to-carry and the copulation situations. Whereas these events are antecedent to what happens later, they are not independent of it. But if these antecedent events are not independent of those that follow, then causal reason is inapplicable. Thus, if we were to see the signaling as a cause for what happens thereafter, our scientific inquiry would actually produce a fallacy. The reasons for this have been explicated in the case of the death of a person involving a shot from a handgun of another person (Dewey 1938). The mere pulling of a trigger does not bring about death. Even if one were to follow the trajectory of the bullet into the heart of the person who died, we would still not arrive at a proper cause. This is so because when the bullet enters the heart (or other vital body part), this micro-event is not an antecedent of death but it is integral to the constitution of death. The philosopher concludes: "the doctrine that causation consists of a relation between an antecedent and a consequent event is thus the result of a confused mixture of ideas of two different order" (449). In our situation, the event where the bonobo infant is moving into and holding a particular body configuration is itself part of a larger event that has the picking-up and carrying as its later phases. Similarly, in all of the different situations ending in copulation, different antecedent events may lead up to the recurrent final phase.

We learn from this analysis that what matters are forms of conduct that lead to certain evental forms (pickup and carry, copulation). In the case of the bonobo, we observe the presence of conduct that increases the range of situations that conclude with a phase denoted to be the "enactment" of a "ballistic event," but later involves other forms of conduct in the preparation. When we focus on speaking rather than on words and other signs, we may then transition to a transactional approach that analyzes not only speaking-as-event but also "world-as-event" and "Being-as-event" (Bakhtin 1993). This approach to speaking is extensively explicated in Chap. 3, and thus does not have to be repeated here. The move toward events as the basis for analyzing situations is characteristic of pragmatic approaches to language, as seen in the example of a most primitive language-game between a builder A and an assistant B consisting of the four sound-words "'block,' 'pillar,' 'slab,' and 'beam'. A calls them out;—B brings the stone which he has learnt to bring at such-and-such a call" (Wittgenstein 1953/1997, 3). Here, making particular sounds leads into the next phase of building, which includes carrying and bringing stones of shapes associated with sounds. One can easily imagine that some time in the evolution of the genus *Homo*, the making of certain sounds led to the handing of certain materials – a rock for cracking nuts, as some hordes of chimpanzees do, or a twig for pulling termites from their nests, as other hordes have been reported doing. What matters is acting in ways that are providing for conditions that make certain consequent events more likely than others. This allows us to abandon the notion of "meaning" of the sounds altogether, because the only question is the ways in which they lead up to other phases of the activity, or, in other words, what matters is how some sound-word is used and how the recipient acts after the sound has been made. In all of this conduct, the "sign" is but a recurrent feature of conduct, that is, of evental forms across occasions. We also learn from this about the inherently social nature of communication that imposes itself as soon as we take the event as the minimum unit and then ask how different events are related. Events of communication lead to coordination in subsequent phases of what will have been one single event.

Emergence of Symbolic Reference in a Mathematics Lesson

To demystify sign-based communication and rid it of the concept of meaning, which has no use in a pragmatic approach, we may consider it in its simplest form, where making a particular sound leads another person to go, get a stone of a certain shape, and bring it to the builder. For the correctly shaped stone to arrive, there has to be a consistency in the sound event as antecedent. When a sound pattern is recurrent and a recognized as such, we speak of words. Words are born as objects in and from recognition events. As objects, they "convey the permanences recognised in events, and are recognised as self-identical amid different circumstances; that is to say, the same object is recognised as related to diverse events" (Whitehead 1919, 62–63). Besides words, there are other permanences in events that contribute to communication, including events (things) that bear perceptual (i.e. "iconic") relations. In this

section, I use such a situation from a second-grade classroom where children are to give a blob of plasticine the same shape as that of an object hidden in a shoebox a small, screened hole so that it can be touched by one hand only but cannot be seen. The children are to see whether the two or three members of their group arrive at the same type of plasticine model. In classical terms, this task asks the children to create a signifier such that if held up, another child could pick from a collection of objects the one corresponding to the signifier or if asked what is inside the shoebox, they could indicate the contents by holding up the corresponding plasticine shape. That is, the task was asking the children to create a signifier by shaping one portion of the continuum (plasticine) to correspond to another portion of the continuum (mystery object). However, the sign – i.e. signifier–signified relation – would not exist in and for itself but would already be conceived as serving a particular function for future events – communicating which object is to be picked from a heap or indicating to others what is contained in a box and thus hidden from sight.

When they begin the task, the children in each group reach into the shoebox given to them and then pick up and work their plasticine. When they reach into the box, they do not immediately withdraw their hands, as if they had "grasped" the object at an instant, as is often assumed in visual perception (see Chap. 2). Instead, the fact that the children are groping around and quite apparently are turning and feeling the unseen object shows that there is an extended percipient event of the tactile kind. There is another event on the outside, which consists in the shaping of the material. The event character is not specific to the material character of the task, but is also found in other modalities. Thus, infants learn to speak over extended periods of time during which they come to consistently shape sound events they originate. For a signifier to be born, there needs to be a second form of event to which the first comes to be linked in repeated and repeatable ways. The other portion of the continuum may be of the same kind (e.g. sound) or be of a different kind, such as the visual shapes of the stones in Wittgenstein's example of the builder. We see another example in Chap. 4, where the infant boy consistently uses the sound "po poo" together with a pointing gesture to the images of balls. In Chap. 2, I show that even in visual perception, we do not perceive an object as such but that there is a percipient event at the end of which the sense of the thing emerges.

The coordination between the two permanences that come to constitute what we know as a sign is itself an extended event: learning. In the second-grade mathematics lesson, there were different types of plasticine shapes that had emerged in one group of three girls. Jane and Sylvia had made rectangular solids (slabs), whereas Melissa had shaped a cube from her plasticine. After the teacher had grouped the two rectangular solids and had distinguished them from the cube, the girls were encouraged to resolve the apparent conflict. Over the course of the discussion between the three girls, a procedure was evolved whereby one hand was in the shoebox feeling and turning the object while the other hand was doing the same with one of the differing plasticine shapes. Melissa repeatedly reached into the shoebox. But, despite others' repeated characterizations of the mystery object as something other

Fig. 5.3 Three different edges come to be aligned with the same caliper configuration of the right hand, thus providing evidence for the nature of the object as a cube

than a cube, Melissa articulated supporting evidence, such as verbally stating that she had felt three equal sides while rotating the cube and holding the three orthogonal edges against the thumb-index finger of the other hand in a constant caliper configuration (Fig. 5.3). Melissa also stated that she had felt the object in the shoebox in the same way that she was doing it while saying that there are three equal sides (i.e. edges). In this way – speaking with Dewey (2008) and Peirce (1932) – she provided a pragmatic definition that is more useful than a definition in the sense that it describes *what has to be done to perceive* the object corresponding to the word. That is, the definition is entirely in evental terms: doing, which entails seeing.

An object as something permanent requires recurrence in the associated percipient events. "Object" is a way of marking this recurrence. The word, as sound event, is a recurrence in the auditory experience across situations; and the material «cube» is a recurrence in visual or tactile experience across situations.[3] A sign, according to the definition given above, involves the coordination of two portions of the living continuum, two events associated with recurrent experiences (objects). It therefore marks multiple percipient events cogredient in the current duration. An object, and with it all signifiers, are literal abstractions, patterns of events and experience not dependent on their relations, whereas "an event is just what it is, and is just how it is related" (Whitehead 1919, 64). The objects – two slabs and a cube – are but ways of generating recurrences in communicative events, for example, by associating a particular sound with a particularly shaped stone during a construction project. In the case of Melissa, who eventually reshapes the «cube» into a «slab», we observe the disappearance of one form and the birth (generation) of a new form. The relationship of the particles going into a blob of plasticine is not the same so that we may conceive the blob as a family of events. Cube and slab are but particular ways in which the different part contributing historical lines come together to give what are recognized to be stable forms that allow other events to happen – not in the least more efficacious communication and coordination.

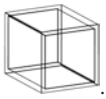
[3] The guillemets are used to mark that instead of «cube» there should be a shape:  .

Fig. 5.4 The strategy that is antecedent to agreement involves one hand feeling the object in the box, the other hand on a plasticine model

The conversation between the girls goes on for a while, bringing forth different (iconic) descriptions of the characteristics of the mystery object some supporting the slab-like shape, others suggesting a cubical form. The group then evolves a strategy for testing the relationship between a model (signifier) and the mystery object (signified), and two of the models are tested repeatedly. One hand enters the shoebox, which, though never seen, is taken as feeling over the mystery object. Simultaneously, the other hand outside the box feels over the model under consideration (Fig. 5.4). The person acting in this way is simultaneously experiencing two percipient events related to the sense of touch. Here, as before, feeling out the object involves touching the entity, turning it over, touching it again, and so forth. It is apparent that when one or the other entity emerges as a thing, the thing-like quality of the material is the result of an extended event. "Cube" and "slab" are abstractions from extended percipient events that are related to other percipient events from which the same or similar qualities may be extracted.

In Melissa's case, the procedure is used during the eighth time with the hand in the shoebox, and it is at that time that what is happening in her face is manifesting surprise (i.e. emotion, affect). This is the antecedent event to the birth of a new signifier form, which manifests itself in the event of giving rectangular prism (slab) shape to the plasticine. And it is the birth of a new sign, understood as the relation between signifier and signified, here in a simple case of ostension. This situation is not unlike that of "ostensive teaching of words" (Wittgenstein 1953/1997, 4), which involves saying "slab" while pointing to that shape (i.e. «slab»). In the ostensive teaching of words, too, two percipient events come to be associated, one related to sound, the other to sight.

In the preceding description, the phenomenon of the sign – here signifier–signified relation – has been entirely expressed in relations of events. In each situation, two percipient events come to be related. The relationship, too, is not a thing but an event, in which the sameness of two events of feeling is itself felt. The episode clearly illustrates a number of important issues. "The word" is not a thing. The word, as commonly understood, is an abstraction from events; it arises from a sense of permanence of sound experience arising from percipient events. The word – and even more clearly the phrase and the statement – is not instantly. In the case of the girls in the mathematics classroom, the percipient event related to the mystery object is not instantaneous but extended in ways characteristic of events. Similarly, the percipient event related to the signified (the mystery object in the box) clearly is not instantaneous. This situation may serve as an analogy for thinking about the meaning that the use of meaning in traditional theories of educational psychology. It shows that whatever the plasticine shape serving as a signifier points to or "means" arises from the experience of permanence in and of a percipient event. There is no more to it when we consider, for example, the phrase "I walked up the stairs." If someone said this phrase, we would not have to interpret; its "meaning" would be immediately apparent. That event of hearing these recurrent sounds, if requested, can lead us to talk about many experiences related to stairs that we have walked or crawled or pulled ourselves up. One of my personal stories concerning walking up stairs is related to the experience of chronic fatigue and not being able to walk up a flight after riding the bicycle on the previous day. That is, the speech event is related to other events in experience; and, in the telling of such stories, attention and a percipient event are presupposed on the part of the recipient as much as the events and experiences that are among the conditions for the speech event to make sense.

The case of Melissa also teaches us about the importance of experiences in the context of which it makes use to mobilize certain signifiers. Even though we cannot ever see the six equal sides of a cube, the word "cube" makes sense, for despite all its different appearances when viewed from different sides – which reveal only some aspects at a time – we can discover those six sides by turning about the cube or by making it turn in our hands in the way we observe Melissa do it (Fig. 5.3). As a result, "The cube with six equal sides is the limiting idea by means of which I express the carnal presence of the cube that is there, before my eyes, under my hands, in its perceptual self-evidence" (Merleau-Ponty 1945, 236–237). The sense of the word "cube" is related to the bodily senses by means of which we have experienced that permanence designated by the word. An experience is not a thing but an event involving a whole family of events, including all the different percipient events and those that give us our feelings (affect, emotion). A word, such as "cube," makes sense precisely when the saying (writing) or hearing (reading) of it gives rise to that (however vague) presence of the object in the here and now of the word.

Emergence of Permanences

> The permanence of colors and objects therefore is not constructed by intelligence. (Merleau-Ponty 1964, 65)

In the transactional approach, we theorize symbolic reference in terms of the relation between two forms of events. The first form of event is the source what we abstractly refer to as the signifier, and most generally exists in the shaping of vocal material or visual perception. In less frequent instances, such as in the case of the deaf-blind children discussed in Chap. 4, the percipient events may involve the tactile sense. The birth of signs implies the coming together of two forms of events, which, in the simplest case, are percipient events that intersect because located in the same body: saying or hearing the word "cube" that falls together with feeling or seeing the thing cube. This falling together occurs within the same family of events, the person. How do such permanences emerge? In a transactional approach, the emergence of permanences is tied to events; the experience of permanence itself has the form of an event in which experience is recurrent. The memory of tangible forms does not exist – as constructivists would have it – in some schema stored in the head that is then reenacted whenever required. Instead, the memory of the recurrence of tangible forms exists in and through movement (this issue is discussed with some depth in Chap. 8). Taking the mystery object, the children's hands (eyes) explore it. What their hands remember are not abstract geometrical forms but their own movements – similar to the way that we remember how to ride a bicycle. But we do not remember by means of sign-things in our heads (i.e. "mental" "representations"). We remember it in and through our animate (living) bodies that ride the bicycle again. Remembering numbers may also be taking completely corporeal form. I remember to the present day the experience of trying to dial up my PhD supervisor. But I could not remember her phone number. I then put the hand to the pad and began with the area code to get the operator, and the hand movement continued dialing what was going to be *her* number. I knew I had dialed her number because the melody that comes with dialing a number *felt* familiar.

We may take the case of the mystery object as an analogy for all situations in which we come to learn a sign, that is, the relation between two forms of events, each characterized by recurrent experience. What tends to be discussed in terms of "word meaning" – the topic that takes a large part in *Thinking and Speech* (Vygotsky 1987) – in this way turns out to be much less of purely metaphysical nature as this often tends to be made out. Words – recurrences in sound events – make sense when they occur as part of events in which they do specific kinds of work, which again are forms of events. In some situations, a sound event is the antecedent to percipient event, such as when "Where is …?" is followed by "On the table," itself followed by, "I found it" that implies that whatever was looked for now has been found.

The present situation can teach us even more. In the video we see that Melissa repeatedly took the hidden object into her hand, felt it, and turned it about to be able to build a model of it. This model, too, she held in her hands. In fact, when asked for a reason why the mystery object is a cube, she demonstrated it by means of constant

caliper configuration held against different edges rectangular to each other (Fig. 5.3). In so doing, she initiated a percipient event for herself (in touch, sight) and another one for her peers (sight). She maintained her argumentative position on numerous occasions during this lesson, despite repeated attempts on the part of Sylvia and Jane to convince her otherwise, and despite the attempts on the part of the graduate student and teacher interacting with her and requesting explications. It is apparent that the percipient events led to the identification of different recurrences, and that the form was not the same event though the material constituting this second portion of the continuum was not at all under question. Their problem can be found in the sciences too, where, for example, psychologists might argue over what exactly a named phenomenon entails; and they resort to operational definitions to ascertain that they all are talking about ("mean") the same thing when using a concept. The methods sections of research articles describe what has to be done to see what the results sections report that had been seen.

In the case of the girls, another problem emerged, where an abyss opened between kinesthetic memory of the past – what Melissa remembered to have perceived and felt – and present kinesthesis – what she is feeling while showing her procedure to ascertain the cubical nature of the mystery object (Fig. 5.3). This is particularly interesting in light of the fact that Melissa's right hand and arm moved in the way she also told to have done within the box – and where she had felt a «cube». Like scientists, she described what she had done (method) to bring about a particular kind of percipient event (result). She not only said that it was a cube, thus linking a sound to an experience of touch, but she built one, so that both the event of touch could be reproduced and felt outside the box. Recurrent experience arises from "doing it again," whereby an earlier experience comes to be present again. But here the object is present itself, in the movement and associated perceptions, rather than made present in a different modality.

In the end, a strategy was born for more directly bringing the two recurrences into a more direct relation. Rather than using words, the children had in fact been asked to create iconic signifiers, that is, signifiers that had the same shape as the thing signified. We may understand this lesson as part of a more extended learning event in which signifiers are employed that have increasingly less visual similarity with aspects of the original event. Another example of this are the different ways in which tenth-grade students illustrated on their physics test what they had done and seen during a particular experiment in which they rubbed transparency sheets, held glow lamps to them, which, when they lit up, provided evidence of the presence of charges. Some students subsequently explained what was done and observed by making literal sketches of the transparency sheets, the glow lamps used, and stick figures representing the experimenter literally standing on the (electrical) ground (Fig. 5.5a). Others still used literal figures for some aspects (e.g. hands, glow lamps) while drawing more abstract signifiers – such as "+" and "–" for presumed electrical charges (Fig. 5.5b). Still others denoted a larger number of aspects by means of signifiers that less similarity with the situation in the laboratory. Thus, instead of having a literal depiction of the glow lamp, its use is indicated by a square with two opposing plates; and instead of having a person or hand holding the glow lamp, we

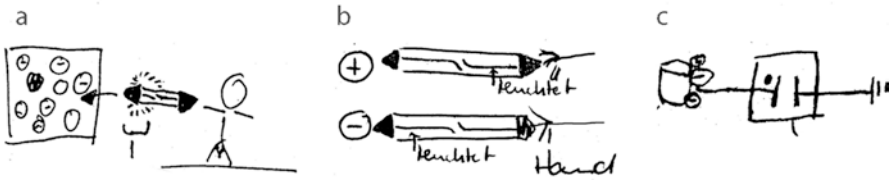


Fig. 5.5 From (**a**) through (**c**), we observe increasingly "abstract" ways of making present a student experiment involving transparency sheets and a glow lamp, which lights up in the presence of charges when one metal cap touches the sheet and the other is held in the hand

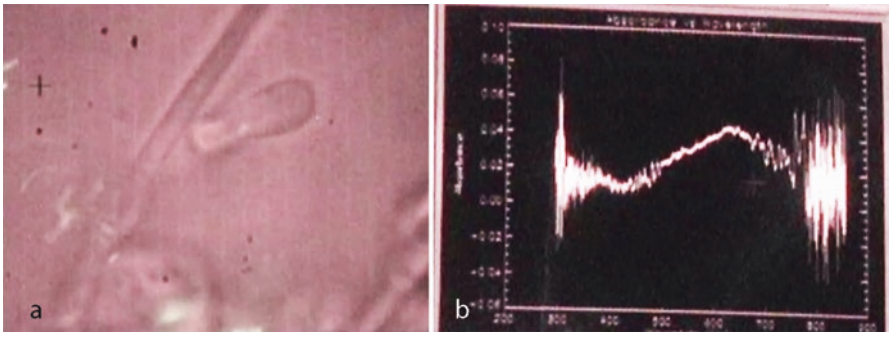


Fig. 5.6 Scientists often are in a situation not much better than the second-grade girl, as what they see (the dumb bell shaped cell in (**a**) and what they know it to be (a red part of a double cone as per the shape of the graph in (**b**) depend on each other. The two percipient events are coordinated

find the symbol commonly used in electrical diagram to denote the connection to ground (Fig. 5.5c). This again is not so uncommon in the sciences, as shown in one project that shows the slow transformations that turn a real piece of land into a graphical representation of the depth distribution of soil types in the transition from savannah to forest (Latour 1993). There is no mystery to the elusive "meaning" of words when we take the evental perspective, where those measuring events signified are related to the events signifying them. In my own research of an advance biology laboratory, what the scientists were seeing on a microscopic slide (Fig. 5.6a) depended on what they were seeing in a graph (Fig. 5.6b); and what they could see in the graph depended on what they were seeing on the microscopic slide (Roth 2009). That is, two percipient events were related. In their communications with peers – in journals – they would use the graphs as the signifier standing in for the kinds of things that could be seen on a slide.

The upshot of this analysis is that there is no mystery to the birth of signs when it is considered to be an occasion in which two event come to intersect – because of the work done (event) in which one portion of the living continuum comes to be associated to another portion of the continuum. The end result is that the event of one also evokes the presence of the other. The presence of this other portion may be direct (e.g. when we become aware of the specific person metonymically referred to as the "ham sandwich" or "green hat") or when past experiences come to be present

in more or less explicit ways (e.g. when we know what is said by the phrase "He sat on a chair" even though "he" and the "chair" are not present in the situation of the phrase).

Relating People and Things

In the quotation that opens this chapter, Marx and Engels write about relations and conduct that are specific to humans – which are indeed those that are generative of the human species as distinct from other species. The authors write about the double relation and conduct, whereby the conduct toward each other determines their relation to nature, and their conduct toward nature determines their conduct toward each other. Most of the research in educational psychology is not even concerned with the relation between people but focuses singularly on the signifier-things people use and the meaning-things they attach to them. In research to learning informed by the work of Vygotsky or Leont'ev – the founders of what is often referred to as the cultural-historical approach – also approach the sign as a thing that has two functions: to objectify the meanings of the person who produces (articulates) the sign and to mediate between interlocutors. From a transactional perspective, there are two issues. First, the sign is not a thing but has to be approached as ingredient in an event that brings into intersection other events. Second, the commonality across a diverse literature is that the thing called sign really is a recurrence serving as signifier to the related signified – each a part of the sign, a relation.

In the Marx and Engels quotation, we notice that the authors do not write about the relation between people as if it were a thing. Instead, they write about the *conduct* [Verhalten] of people toward each other and thus emphasize that something is happening rather than treating a relation as a fixed thing. In Chap. 3, we see how in the event of speaking, two lifelines come to intersect and become immanent in one another. The analysis can be extended to communication based on other recurrences, that is, communicating in modalities other than the one based on sound: objects or hand, arm, and other body movements, including those in which the body parts are held in certain configurations and orientations. The word does not only bring into relation two or more people (i.e. lifelines) but also manifest a relation to the world, for example, by bringing an aspect of the living material world into the accented visible – allowing it to show itself. Just as speaking also establishes a relation to the world, so do all the other forms of events that tend to be treated in "multimodal" sign communication. The signifier – in this chapter the models that the girls shaped from plasticine – materializes the conduct of humans toward each other, and it establishes their relation to its content – here the mystery object. In both instances – i.e. the signifying plasticine shape and the signified mystery object – percipient events are involved. Signifier and signified are abstractions from the percipient events. The girls' task was to make shapes (see Chap. 9 on growing-making shapes) that would uniquely identify the thing that the model was to stand for – here the mystery object in the shoebox (Fig. 5.7a).

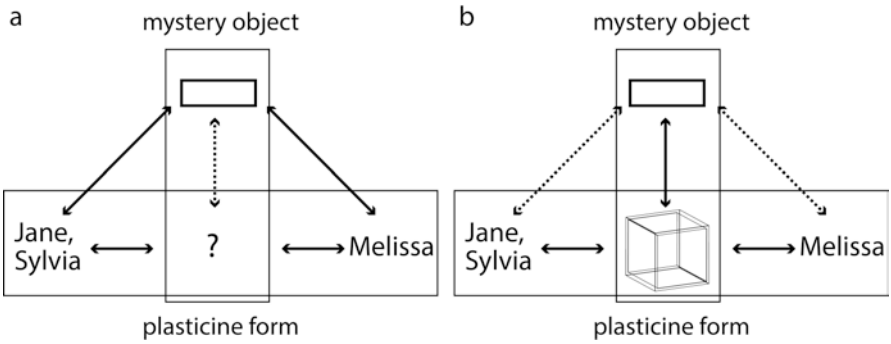


Fig. 5.7 *Sign* is an abstraction used to denote the relationship between events located differently in the transactional {person|environment} unit. (**a**) The girls were looking for a form that could be used to uniquely identify the contents of the shoebox. (**b**) Once the relation between signifying and signified percipient events is established, the plasticine forms may serve subsequent communicative function allowing interlocutors to identify phenomena in the world by holding up this or that plasticine form that establishes both the relation between them and their relation to the word

Once a unique relationship between two permanences in percipient events is established, one can be used in exchanges to evoke the other (Fig. 5.7b). Thus, in another activity – language-game – Jane, Melissa, or Sylvia could hold up the model and the others would know what to orient toward in the environment. In this situation, the relationship between signifying event and signified event is presupposed, which allows orienting the percipient event related signified (dotted lines, Fig. 5.7b). Those two events "are constituents of one inclusive undivided set of operation; any distinction drawn between them is the result of *post* or reflective operations" (Dewey 2008, 304–305). The percipient event related to the plasticine shape would be the antecedent to another percipient event located in the environment. Or they could use it to allow the object to be present even though it is not in their immediate surrounds, either because it is somewhere else or because it has been involved in past events. That is, a conversation about things not currently present simply is an extension of the specific case of the conversation in which the three girls had been involved. In a pragmatic approach to the philosophy of language, these findings are described in this way:

> Imagine a picture representing a boxer in a particular stance. Now, this picture can be used to tell someone how he should stand, should hold himself; or how he should not hold himself; or how a particular man did stand in such-and-such a place; and so on. One might (using the language of chemistry) call this picture a proposition-radical. (Wittgenstein 1953/1997, 11)

The first phrase is a gloss of work of the kind that the three girls conducted in their task: establishing a relationship between something they shaped and an event in the world. Once such a relationship has been established, it becomes part of a great variety of events, or, as Wittgenstein would call it, a great variety of language-games, including giving orders, describing the a permanence in the environment, and reporting or speculating about an event. The three girls were working on prepar-

ing for initiating recurrences (signifiers), that is, they were part of an event that is a necessary condition for other events (without being their cause). Thinking about and theorizing with the sign-as-thing rather than the sign as a marker of permanence across occasions entails many difficulties and inconsistencies, some of which are articulated in the *Philosophical Investigations* (Wittgenstein 1953/1997). In response to the question about the meaning of a word, Wittgenstein suggests that there are no situations in which the question of meaning is of concern but what matters is how the word is used. *Use* orients us toward the event, and the *signifier (word)* is an object in the sense that it marks a recurrence both in the percipient event in the appropriate sense modality and with respect to the percipient event with which it is associated based on tradition.

In a transactional approach, there is then no mystery to the understanding of signs, to the "meaning" that a sign has for a person. This is so because we no longer take the sign as thing but investigate recurrent features across occasions. How individuals "understand" a word manifests itself in manners and situations of using the related sounds or written forms. Signifiers are recurrences of occasions, and it is precisely in relation to the occasion as a whole that appropriateness or function of use is established.

From Sign-Things to Signing-Games

In this chapter, I show that referring to one of the plasticine forms – or any other communicative form and modality – *as a sign* involves many abstractions. First, it has been abstracted from and taken as shorthand of the signifier-signified relation. It is used in a metonymic way, as a character standing for a more complex phenomenon in which it is an integral part. Second, both signifier and signified are abstracted from events, those of percipient type and those that come to intersect because of perception (i.e. person-as-event, worldly-thing-as-event). The sign-thing also is abstracted from the conduct, which exists only because of the sign; and the result of this form of abstraction is talk about the meaning of a sign independent of the event in which the form appears. It is as if scholars were to assume that because speakers and sign-users are involved in all situations of sign-use, who can be assumed to be present in any occasion of interest, they cancel out and may be omitted from consideration (Dewey 2008). In such situations, the description of the use of a sign has been reduced to a statement that the word signifies some object. The sign therefore is an abstraction from an event, indeed, from multiple events, including conduct toward another and conduct toward something else – a material thing or conversational topic, both to be understood as events.

Instead of approaching signs as things that have associated with them "meanings," we are better off treating them as integral *moves* in language-games, a term used to bring into play language and the activities in which it is interwoven (Wittgenstein 1953/1997). We thus understand "that 'meaning' is no more inherent in things as 'objects' in independence of human ways of behaving than it is

inherent in the sounds and marks that are upon occasion surrogates for things in human behavior when the things are not directly present" (Dewey 2008, 305). Because communicating includes modalities other than speaking, we may coin the term *signing-games*. Both parts of this term highlight that we are talking about events rather than things; and these events appropriately are theorized as events, not as changes in states of things. Signing is something going on, and therefore cannot be confused with a sign-thing. Games are alive and exist only when they are played. There is no game when there is no play. It is insufficient to learn to repeat sound-words. We have to learn when, where, and how to make them ring. Research comparing the learning words from dictionary definitions versus learning words in everyday use shows that the former leads to about 100–200 words per year whereas the latter leads to up to 5000 words per year over a period of about 16 years (Brown et al. 1989). In many instances of learning words from dictionary definitions together with a few sample sentences, inappropriate word-use results. This is so because of the noted requirement that word-use has to be learned; and, as the notion of language-game suggests, it is by playing the game that one learns the game. Using a word is like a move in a game, and both moving and playing are phases of events rather than things.

The same move in a game may bring about different results, which classical approaches conceive of as the different "meanings" or subject matters. Thus, there are differences between mundane events where the sound-words "atom," "velocity," or "force" are occurring and those events that take place in specialized places (e.g. scientific laboratories, university lecture halls). The distinction between the uses, that is, "the distinction *with respect to subjectmatter*, is primarily one of span of duration temporally speaking and range of extent spatially speaking" (Dewey 2008, 306). In this description, therefore, we find precisely those qualities that characterize events, the duration that implies spatial and temporal characteristics of the sign. The transactional approach to the sign therefore can be summarized in this way:

> 1. Being a name or *linguistic* sign is a matter of the performance of behavioral operations. 2. To be name, or de-signation, a sign, is to have taken on the function, capacity or ability, of reference to a *specified*, a discriminated and identified subjectmatter. 3. One and the same set of behavioral operations determines, in strict conjunction or conjugation, *sign* and *referent*. For they are aspects of one and the same transaction … which is a matter of behavioral *application*. (Dewey 2008, 307–308)

A transactional approach to the sign, as developed in this chapter, has all three of the qualities that Dewey assigns to sign-use; and his description highlights that we cannot understand the sign-thing independent of behavioral operations, that is, independent of the events in which the signifier and signified are recurrences in percipient events. Dewey explicitly notes the transactional quality of communicative conduct; and he notes elsewhere that the behaviors involved are *strictly*, that is, irreducibly transactional.

Because signing is a material event – in which two or more person-as-events intersect – there are events other than those of intellectual nature involved. Signing generally and speaking specifically also have and communicate affective character (Melissa's facial expressions that we see as manifesting surprise). Signing-games

therefore also have qualities other than those of communicating some content. As a result, the dictionary-defined signified may not at all be brought into play by the use its signifier. An exchange between six workmen that Dostoevsky overheard and reported in his diaries consisted of six repetitions of the same sound-word so vulgar that it was not itself reported. Different cultural-historical analyses of the event suggest that the evaluative and affective dimensions completely obliterated the dictionary definition (Vološinov 1930; Vygotsky 1987). In my own research, I once reported the conversation in a physics class involving only the sound-word "penis," but none of its uses intimated reference to the male reproductive organ (Roth 2015). Instead, the sound-word was a move in a game – here literally a game of language – and producing a specific sound quality in the speaking event was the ultimate purpose of the game. In that study, I had already assumed that we should be concerned with the real life of language, that is, with language-as-event rather than with word- and sign-things.

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Chapter 6
From Meaning to Sense-Giving Fields

> A word's sense is the aggregate of all the psychological facts that arise in our consciousness as a result of the word. Sense is a dynamic, fluid, and complex formation, which has several zones that vary in their stability. Meaning is only one of these zones of the sense that the word acquires in the context of speech. (Vygotsky 1934/1987, 306 [276])

Meaning is an important concept in educational psychology. Any journal article or textbook in the field provides evidence for the all-pervasive nature of this notion. Many studies focus on how students make meaning (of words, statements) and such meaning making counts among the practices that lead to learning or occur in the context of learning activity. Many other studies of learning in classroom settings are concerned with the negotiation of meaning, that is, with the trajectories that lead learners from their initially different to some common position, word use, or norm. Pertaining to the latter issue, many studies also draw on the work of Vygotsky to make claims about the role of the collective (dyad, small group, class) in learning and the development of meaning – e.g. the social construction of meaning or the cultural meanings associated with specific word- and sign-things.

Not every one agrees with the assumption of the usefulness of the concept of meaning. It has been suggested that the notion of meaning as a correlate of the word has no place in a useful theory of language (Dewey and Bentley 1949/1999; Wittgenstein 1953/1997). In the transactional approach, the continual becoming of societal life is the core object of inquiry. Divorcing "word meaning" from the historical process of life "inevitably deprives meaning of its place in the living social becoming" (Vološinov 1930, 107). The introductory quotation manifests the shifting emphases in the later Vygotsky's thinking with respect to the notion. Despite his earlier interest in word meaning, the quotation evidences his intuition that meaning is only one aspect, one zone of the sense of the word. Vygotsky, when he wrote the introductory quotation, had adopted this position from a French philosopher, who wrote that meaning – the French term *signification* also translates the English term signification, and in all cases is equivalent to the German *Bedeutung* – is nothing but one aspect of the psychological states with which the word is associated and to the production of which the word contributes (Paulhan 1929). The predominance of the

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concern for meaning in current scholarship is especially remarkable in the face of the fact that during the last 2 years of his life, Vygotsky – recognizing in his earlier work the over-intellectualization of learning and development and the inherent Cartesianism – was turning away from meaning as a theoretical concept in favor of *sense*. He was convinced that sense – rather than practical action itself – determined the dynamics of practical action. The shift to sense also leads to a reconceptualization of language, which, as a material form of consciousness as a whole, is "inconceivable outside a common field of purpose and sense, a real–ideal field of *con-sent* and *sympathy*" (Mikhailov 2001, 26, underscore added). This common field – which indeed includes the actors as constitutive events – brings into the accented visible both real and ideal things in a *jointly* inhabited and *sensed* world. It is a field constituted by all the events of the whole of nature that make the current duration (Whitehead 1919), wound up together like the fibers, strands, threads, knots and so on in the analogy presented in Chap. 2. Because this field is made of events, which make sense as events, any figure|ground configuration also makes sense. Consider the chalkboard contents at the end of a meeting of research scientists that they have apparently treated as making sense (Fig. 6.1). What is it that allows the different graphs and other inscriptions on the chalkboard to make sense? What are the features of sense that Vygotsky might have deemed as providing more theoretical leverage than meaning?

The move from meaning to sense is theoretically important because it is a starting point for overcoming the over-intellectualization of the psyche characterizing Vygotsky's earlier work. There are intimations that his theory of word meaning failed as the unit of analysis because its intellectualist bias – as he was recognizing near the end of his life. Shifting to sense opened the door to theorizing the connection between body and sense: the body of sense, that which allows talk, actions, and things in the world to make sense, is indistinguishable from the sense of the body. The body is alive and, therefore, has to be theorized in terms of evental categories.

Fig. 6.1 Chalkboard contents at the halfway mark of a two-hour laboratory meeting. (The image was assembled from different screen prints of the video; chalkboard traces have been emphasized to improve visibility)

This includes both the sense of having/being a body and the senses that the body has. Because sense is based on the sense(s), there is a unity/identity of the sensual and the suprasensual (intellectual). This is especially so in the transactional approach, where all phenomena are theorized in evental categories.

Common ground and intersubjectivity frequently are made out to be a problem. But by its very nature, the material world is a common ground to the human senses that can be indexed by all participants to a setting; and, as can be inferred from the event-based approach outlined in Chap. 2, each individual's animate body also is material body for another animate body. Together, these two conditions constitute the *inherently* objective and intersubjective nature of the material and social world-as-event. Every percipient and every representation presupposes another's perception and presentation; the generalized other thus is always perceived and present without involving any (social) construction. Any difference between how two people perceive or appreciate an object is inherently understood when we take them to be event families among other events in the duration of which they are also part. Thus, the recognition of anger in the behavior of others implies the perception of our own anger-associated behavior through the eyes of others (Husserl 1973). Living under the same conditions in the same communal life, members of the same social group or society supposes, presupposes, and imposes a number of perceptions, ideas, impressions, or habits that are in common or converge in some way. But different people do not have the same ideas. Such differences exist against a common ground, relative to the familiarity with a common world that they inhabit together and that is common to all because of the common sense. Living in social and material world always already in common constitutes the basis for individuality to arise.

The purpose of this chapter is to exemplify the theoretical move from meaning to sense that Vygotsky was trying to make but never completed. Not only do we want to move from meaning to sense but also do we want accomplishing it in the context of a transactional theory so that this move makes sense. I draw on the data from an advanced laboratory in experimental biology, which was undergoing a conceptual change in the course of the work from which the episode was culled (Roth 2014b). In particular, as a result of this work the scientists came to understand the graphs they were producing (e.g. Fig. 6.1) in a radically new way. The first of the following sections shows that graphs make sense to scientists who produce them because these are integral aspect of the totality of their work-related, sensible field that constitutes a *contextural* ground. This field, which is common to the members of the research team and in which they are integral part functions as an *indexical* common ground against which particular actions, statements, and communicative body movements make sense. The second section then shows that when something one participant says or accomplishes does not make sense to another participant, there tends to be a lack of common ground that the meeting itself engages in work to reestablish it. The third section deals with aspects of the indexicality of all expressions, which is but one aspect of the problem of the common ground that makes for the common and therefore unarticulated assumptions implied in the appearance of sense. Two important issues are discussed: the movement from meaning to sense

and the pervasiveness of indexicality. The chapter concludes with a discussion of sense as the solution to the psychophysical (body–mind) problem.

Fields and Contextures

> In all cases where the words are *understood*, the total idea may be and usually is present not only before and after the phrase has been spoken but also whilst each separate word is uttered. (James 1890, 281)

All actions and human behavior generally are oriented toward sense; the sense of an action arises from its place in what we may refer to as a *sense contexture*. Such a contexture includes all (mini-, micro-) events of the duration that are relevant to a particular situation. Some of these events will stand out, as figures, against all the other events in the same duration, which make for its ground. The contexture includes both figure and ground, and thus corresponds to the notion of a *field*. A written or verbal statement makes sense when it has a place in a sense contexture, which also includes the motive of saying/writing the statement ("why") when, where, and how it occurs. As the introductory quotation shows, the totality of the idea related to a situation is present during every phase of the phrase. *Understanding* the sense contexture on the part of social scientists is equivalent to explaining the actual performance. Actions that make sense are social through and through even if performed in the absence of others. Sense-oriented actions may thus be interpreted in the way that words, phrases, and language are; and any such interpretation involves the constitutive relation of pre-understanding and explaining. Such pre-understanding is what leads to the perception that actions and discourse make sense even before any interpretation has occurred. Pre-understanding is equivalent to a *sense* of how the world works. It is thus not interpretation – it does not require conscious awareness (representation). But it envelops explanation, preceding, accompanying, and concluding it (Ricœur 1986). Any explanation, therefore, already presupposes a sense (pre-understanding) of how the world works. Conversely, this pre-understanding is developed through explanation-seeking efforts.

The analogy provided in Chap. 2 suggests that there is a multitude of more or less encompassing parts of the field that constitutes the duration. Each makes for a layer of common sense and, thus, is a sense-constitutive contexture that needs to be considered (Schütz 1932). First, as shown in Chap. 5, the signifier and the part of the experienced field that it signifies – i.e. traditionally referred to as the meaning of the signifier (sign) – form a sensible contexture. Second, any sign-in-use always already involves a sign system. The signifier (text) makes sense in the context of all other signifying events with which it forms the sensible field. The Vygotskian use of the term meaning as defined by the dictionary is included in the second dimension of sense. Third, every use of a signifier is a recurrence of an evental form, such as acting or communicating; it thus is tied into a field of an unfolding series of actions that allows it to make sense (e.g. a student's reply that is preceded and succeeded by a teacher initiation and evaluation, respectively). Fourth, the articulation and

presentation of a signifier may occur within the field of an information-providing act. Fifth, the specific nature of the addressee provides the context that shapes what precisely will have been said and done in the signifying event (e.g. using the F-word with a teacher is a form of revolt, whereas with a peer it may be an expression of impatience). Sixth, the fact that any *this* phrase is addressed to *this* person *now, here,* and *thus* shapes the sense it will make in the context of a specific future-oriented *in-order-to motive* (i.e. plan). This motive is part of the vision that orients situated action the success or failure of which is explained a posteriori by (non-) adherence to the plan. Most importantly, signifying events are initiated *for* the other, often *in-order-to* get the other to (subsequently) act in specific ways. The initiation of the event presupposes a common sense such that the recipient can be anticipated to hear a phrase in the intended way and act accordingly. This means that the person initiating a social act already has to take the attitude of others to anticipate their reception and action (Mead 1938). Any phrase, therefore, is social in the strong sense, that is, it is social whether or not others are present. Whereas Schütz only discusses the use of signifiers, later studies show that any form of action can be treated as a text and, thus, is subject to the same common sense and interpretive procedures. But when an action is treated as text, there will be the same kind of transformation as the one observed occurring in the transformation from the *Saying* to the *Said* (Ricœur 1986): acting is to action what Saying is to Said.

The sixth point in the preceding paragraph states that there is an interlacing of self and other in each act of speech. In other words, if we intend to initiate a particular form of social action, such as a question–answer sequence, then we have to take the attitude of the other toward our own speaking. It is only in this way that we can have any hope that the other will complete the anticipated social act. That is, if I want to ask a question, my speech needs to be such that the other can hear my phrase as a question (which is my in-order-to motive), and I have to be able to presuppose that the other is going or willing to respond *because* I asked a question (*because* motive of his action). There is therefore a mirror-type situation, where social actors have sufficient prior understanding of what the respective others know, and this understanding of the other includes sufficient acquaintance with what the actors themselves know (Bateson 1996). We thus act on the premise that other understand our actions as these were intended so that they will provide an adequate response; and if the response is not adequate or the preferred one, then this requires some form of explanation or contextualization. Individuals do not act independently of others. We are all constitutive parts of a field against which we also stand out. The actions of individuals therefore are to be understood as reactions that do and are required to take into account the action of another that has preceded and to which it is a reply. These replies not only orient to the preceding action but also project into the future, configuring what is to come as the next action, which itself is a response to what has gone on before. This dual direction is that of the specious present, which is not point-like but extended and thus has to be theorized in the evental terms of a transactional approach. As a result, an action is rational on the common-sense level because it occurs within an unquestioned and undetermined frame of constructs of typical and taken-for-granted aspects of the duration, including the motives, means

and ends, courses of action, and personalities (Schütz 1953). That which is taken for granted, common sense (ground), does not require further analysis and explication.

The empirical materials analyzed below derive from a six-year study of an university-based scientific research group that had as one of its projects the measurement of the changes in the composition of retinal cells during the life cycle of coho, an anadromous fish species (i.e. in the course of its life cycle, it moves from fresh to saltwater environments and back again). Two professors, each having obtained funding for a joint project, directed the particular project. PI_1, a biologist, was the head of the laboratory; his funding supported a doctoral student (Do) and a research associate (RA). He had joined up with PI_2, a physicist and applied mathematician, whose grant supported the postdoc (Pd). The research associate had a physics background and was mainly responsible for data analysis and the writing of the required software. The doctoral student's contribution to the project was going to be his dissertation. The postdoctoral fellow had done his PhD work on another salmon species but also was very familiar with the life cycle of coho – both those born in the wild and those raised in fish hatcheries. The research was intended to document changes in the composition of the light absorbing rod-shaped cells in the retina from vitamin A_2-based porphyropsin (short "A_2") to vitamin A_1-based rhodopsin (short "A_1"). The changes were thought to occur as part of the physiological changes that anadromous fishes were undergoing (according to the going, Nobel Prize-winning theory) as part of becoming ready for moving from the fresh to a saltwater environment. The ultimate purpose of the team was to provide fish hatcheries with a tool for identifying the ideal time for releasing freshwater hatchery-raised fishes for their ocean migration.

Sensible Contextures

Research on graphs and mathematical forms, such as those used in the empirical sciences, tended and still tends to investigate these phenomena from the perspective of static (mental, external) representation-things. Near the turn of the century, a shift occurred toward investigating such phenomena from the perspective of *inscriptions* with an associated shift to social practice of inscription-use. Neither approach could explain, however, why very experienced research scientists have difficulties explaining graphs that appear in introductory textbooks of their own field (Roth 2003). When asked to explain graphs from their own current work, these same scientists almost exclusively and extensively talked about different aspects in the production of the graph, including the natural phenomena under investigation and the research methods used. Although I had previously suggested that as the result of such experiences, graphs bear metonymic relations for scientists, I now think that that the relation is indeed *synecdochical* – a part standing for a whole including the part. As such, there is an indexical relation between the part, which is only figure, and the whole, which functions as ground.

In this laboratory, the graphs discussed in small-group and whole-team meetings make sense because they were an integral and constitutive aspect of the work as a whole. This work as a whole makes for a sensible contexture. My ethnographic studies show that any part of this contexture (tool, graph, object, scientific paper, material, equipment, etc.) made sense because of its connections to all other parts (e.g. Roth 2014a). When there were differences in opinions concerning an aspect of a graph, the subsequent discussions tended show that these differences were associated with different background assumptions (e.g. a team member looking at a graph with the assumption of differences in the water temperatures). The collective work of the research team constituted a sense contexture, and anything foregrounded during a discussion (figure) – i.e. a *text* taken generally – therefore existed against everything else as the *con*text (ground). This was especially so for the graphs produced, which were the result of the work completed and, along a chain of inscription, were used to point back to something in the original specimen – here the absorption of light as indicative of the A_1/A_2 ratio, itself a correlate of the physiological changes in the fishes and their readiness for ocean migration.

In one of the team meetings, there was a discussion concerning the anticipated distribution of the A_1/A_2 ratio at a particular time point in the life of a fish population. The team considered the fact that there were 20 or 30 cells from a single fish eye on which absorption measurements had been taken; and these may all be from the same part of the eye, or these may be from different (dorsal, ventral) parts of the eye where there might be real differences. The team also discussed that for any particular measuring episode (leading to a data point for a particular time point), there is one eye from each of 20 fishes involved. At one point, PI_1 got up from his seat walked to the chalkboard while saying that if the data were plotted numbers [of measurements] against percent-A_1 he then would predict something like what he was drawing (the left-most graph in Fig. 6.1).

In the meeting, the graph made immediately sense to all but to the postdoc – as the unfolding meeting would show shortly afterward. It is only when something did not make sense that it would become the topic of talk; so while working together in the laboratory, they may not have talked at all for stretches of time. The graph made sense to the others because it literally was figure against a ground that was constituted by the research activity taken as a whole. At the time, all team members other than the postdoc had worked together for one or more years. They knew and had completed every part of the research, from getting the samples to euthanizing the fish, extracting eyes (Fig. 6.2a) and from these (under a microscope) retinal pieces, macerating the retinal pieces, mounting them on a microscopic slide (Fig. 6.2b). They had entered the mounted cells and observed them in the microscope (Fig. 6.2c), aligned them with the sampling light beam (see cross, Fig. 6.2c) and had made the two measurements required for determining the absorption spectrum (Fig. 6.2d). Although the research associate was responsible for the extraction of the maximum of the absorption function and its bandwidth (Fig. 6.2e), from which the relative amount of porphyropsin and rhodopsin were derived, everyone else on the team had been to his office and seen how it was done. They knew the existing theory about the

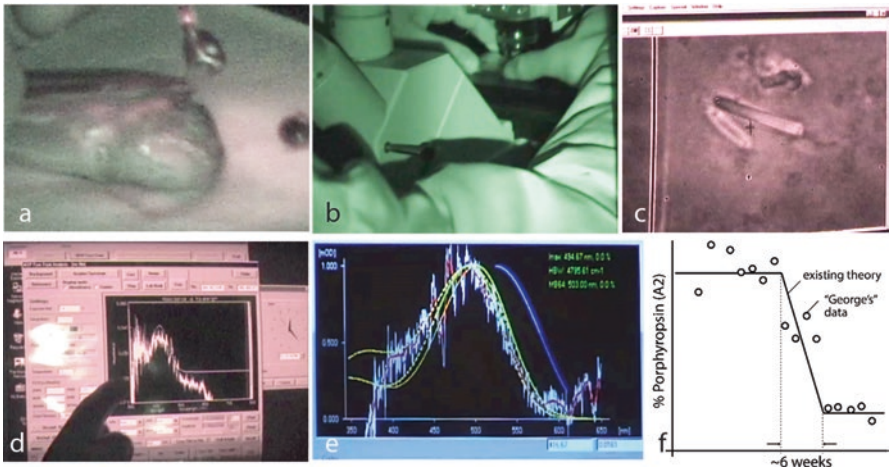

Fig. 6.2 Images from the research on the relative amount of vitamin A_1- and vitamin A_2-based material in the rod-shaped photoreceptors of coho salmon. (**a**) Extraction of fish eye. (**b**) Placement of slide in microscope. (**c**) Rod-shaped photoreceptor. (**d**) Absorption graph in wet lab. (**e**) Absorption graph and model curves after analysis. (**f**) Theoretical curve and confirming data from a previous study

changes in the photo-absorbing molecules in the retinal cells and the results of another research group in a nearby geographical area (Fig. 6.2f).

Each of the two lines in the graph pertaining to overall rod population, when the weighted mean is calculated, made for a data point in a graph plotting the percentage of porphyropsin against date (Fig. 6.2d). From each absorption curve (Fig. 6.2b), the scientists extracted the position of the maximum and the bandwidth, which allowed them to determine the relative amount of vitamin A_2-based porphyropsin (short "A_2") and vitamin A_1-based rhodopsin (short "A_1"). The measurement then added a count of 1 to one of the bins visible in the overall rod population graph (leftmost graph, Fig. 6.1). The mean of all measurements entering the graph would constitute one data point in a graph representing the change of rhodopsin over time (i.e. as in Fig. 6.2f). Although the team anticipated publishing a paper on these changes, this was not the ultimate motive of their research. Instead, as suggested above, the research was to assist fish hatcheries in the timely release of the fishes that they (a) raise beginning with eggs and milt culled from returning salmon and (b) eventually release into the wild when the young fishes physiologically change (becoming smolts) and begin their ocean migration.

Similar graphs had been the result of the scientists' work in the past, when the retinas from 10 to 20 fishes were analyzed with more than a dozen rods from every fish. Over the course of a single day, therefore, the researchers had seen the absorption curve maxima vary, which would translate into different A_1/A_2 ratios. Thus, each of the two curves was the result of – and represented – some 100–300 measurements counting toward the numbers represented by each "bin" ("# of rods" on the abscissa). At the time, the only person in the room less familiar than the others was

the postdoctoral fellow, who had joined the team only recently. His actual time collecting data, going through the many steps described above (Fig. 6.2), was much less than that of others; and so there were aspects of the research that he was unfamiliar with and that therefore did not (yet) make sense. It thus is the sense (senses) of the body that goes with and comes from the involvement with all parts of the production that leads to the sense contexture that forms the body of sense; and this sense of the objects, production, and transformation of inscriptions is common to all those who are involved in the same experiment. It is this common sense that underlies the feeling that the graph makes sense; and this feeling is deeper for the old timers on the team than for the relative newcomer. Indeed, it is in the course of the first year of this study that I also developed that sense – after having done all parts of the experiment myself.

Making Visible the Normally Invisible Ground

In the natural attitude of and toward daily life (as event), only some recurrences (objects) stand out over against an unquestioned field (Schütz 1953). This makes it appear more important to investigate the nature and functioning of the unquestioned common ground that makes possible and is presupposed in activity, change, and learning. The statement that the graph made sense to everyone but the postdoctoral fellow would be contentious if it were not shown that the scientists continued without considering something that makes sense (i.e. when it goes without saying) but make it an issue when it does not make sense, which occurs when there is not common ground. In such a case, aspects of the normally invisible ground are made visible. That is, the discerned event is the figure that emerges from the background because of its relation with the cogredient percipient event (Whitehead 1919). Although this ground is generally invisible, aspects of it tend to be brought into the visible whenever there is trouble, such as when something does not make sense; at that time, some of this field is articulated and thereby made visible). This was also the case in the research team under investigation, where, between team meetings, developments occurred in some part of the project that others were not aware of. In this section, two aspects are shown related to the invisible background that is part of the contexture of common sense: (a) how the lack of common ground becomes visible and is re-established as common and (b) how common ground is marked and thus can continued to be taken for granted.

Marking the Absence of Common Ground

An example of the visibilization of unnoticed and invisible background assumption occurs right after PI_1 completes drawing the two curves of his first graph (left, Fig. 6.1). The meeting fragment that follows may be glossed in this way: *A*

statement about failing to understand why a graph has a particular shape is followed by an extended turn sequence providing a reason for it to be so.

Fragment 6.1

1 Pd: I and (0.3) °I don't quite° understand [why] it has to be
2 PI_2: [wwa-]
3 Pd: (0.9) um (1.3) LOWer (0.2) >higher numbers in the low< percentages a=one (0.6) an=lower numbers and then it drops off in the middle (0.4) °for now° (0.9) °its gonna have to be° (1.6) if it went bel*ow* the first (1.3) the below the red line (0.2) >no?<
4 (1.7)
5 PI_1: WELL I am assuming that we did basically the same of number of rods °in this° okay?
6 Pd: uh hm
7 PI_1: ok[ay]
8 Do: [ye]get its just numb [ers]
9 PI_1: [SO]:; (1.2) SO::=>what< (1.8) THIS::: ((*red*)) (0.4) line represents th=same number of r*o:d*s
10 PI_2: [as this one] ((*blue*))
11 Pd: [uh um yea]
[((*nods 2x*))]
12 (1.2)
13 PI_1: okay it's jst that
14 (0.3)
15 Pd: yea
16 PI_1: here we h*a*ve
17 (1.0)
18 u: [m:]
19 Do: [a=two]
20 (1.3)
21 PI_1: up f::*ew*er (0.2) that are[a=two]
22 Pd: [((*nods 2*x))]
23 PI_1: an (0.4) a (0.3) a[GREAter]number that are
24 Pd: [((*nods 2*x))]
25 PI_1: a(0.4)[one]
26 Pd: [°num]ber of rods°

Grammatically speaking, an offering of a declarative statement of what is not understood (i.e. why the graph has a particular shape) opens the fragment; but it is treated as an invitation to provide the missing reason. The fragment as a whole thereby becomes an invitation–acceptance sequence. The point is not what an individual word, writing/drawing, or hand movement (gesture) "means"; and it is not even that there is an invitation–acceptance sequence. All of this unfolds in and constituting a phase of a research meeting in which the participants discuss next steps to be taken in their research and the variability within the data points that they collect. This phase has arisen from the preceding phase, and conditions the next

phase of the meeting that arises from it. That is, any statement makes sense within that continuously emerging and evolving field. With this statement, the postdoc makes available that he is missing some of the presupposed ground that appears to exist for to the others. He does not share in what otherwise is common sense, and, therefore, is not operating on the same ground. The statement marks the lack of the ground that allows the graph to make sense in the way it does to all other participants in the meeting.

In this fragment, a statement *here* and *also* invites a reply as a result of which the lack of understanding has been removed (has been undone). The sensible field of the action (stating failure to understand) solicits another action (explication); it is designed to get another person to act not in any arbitrary way but to solicit a reply that resolves the lack of understanding. This future action is not caused by the one preceding it, for it is already beginning (as seen in Chap. 3) while the preceding action is in its course. Before that next statement occurs, this design and solicitation – from the perspective of the individual speaking – constitutes an *in-order-to motive*: but whether it will be realized remains open. This motive provides for one sense of the statement. As soon as the reply has provided for the missing background, that same first statement may be used as a justification of the talk that followed: it has become a *because motive*. This motive provides for the sense of the talk (verbal actions) that follows the initial statement. In this situation, the "explication" that unfolds over the course of the meeting fragment is not so much *about* something; it unfolds *in order to* provide whatever is required for the graph to make sense so that the meeting can go on. That is, the ground will have changed with the action; and that action will make sense with respect to the ground from which it arose and with respect to its effect on the field. This is what we have encountered in preceding chapters as the relational quality of talking.

Talking is also *about* the graph, what it stands for (that in turn stands for something else) as much as the context together with which it makes a sensible field. But the function of the meeting fragment is the articulation of whatever is required for a common ground to exist so that the graph makes sense to all. The meeting fragment is not about the meaning making of the postdoc, or about PI_1 scaffolding him into the making of meaning. The graph did not have another meaning; it always was taken to stand for and signify the number of cells for different A_1/A_2 ratios. Instead, the fragment depicts an occasion when and where heretofore non-articulated ground is brought into the accented visible. This event involves speaking, which extends the ground by accenting a relevant part and thus making it visible. This fragment thus is all about sense; and what did not make sense now makes sense. It is the graph that makes sense. In this way of phrasing what has occurred, we therefore also have a decentering of the subject, who has actively attended to and received an explication and therefore was both agent and patient in the coming of sense.

That the graph indeed makes sense to the postdoc after this exchange can be seen about 2 min later (after having talked about another possible graph) when he offers a prediction of how the distribution would look like when the young coho salmon ("they") are "seawater-ready," that is, when they have undergone complete physiological transformation for the life in the ocean where they will spend the next

2–4 years. According to the theory, the retinal rods would at that point contain mostly the vitamin A_1-based rhodopsin leading to a mode of the distribution near 100% (there are still some rod-shaped cells that will not have all rhodopsin, leading to a tail of the distribution to the left). In the postdoc's hand gesture, the change from the intermediate position is visible. The statements are twice confirmed, once associated with a short linear mark on the abscissa at 100% and a second time with a cross at about 90%.

Fragment 6.2

1 Pd: and when they are all seawater ready, it pops up the right in the transition, it tilts the spectrum this way so they
2 PI_1: so when they're=all seawater ready, they'd be right there. ((*marks abscissa at 100%*))
3 (1.4)
4 Pd: Yea.
5 (0.3)
6 PI_1: SO [theym
7 Pd: [th=slope's] this way now
8 PI_1: they would be up there. ((*Marks a cross above ~90%, see Fig. 6.1*))
9 Pd: yea.

In this fragment, the exchange exhibits for everyone to see that the (shape of the) graph now also makes sense to the postdoc. But a closer look at the statement of the explication (i.e. the talk that provides the missing "why?") shows that it too rests on the massive nature of common ground shared with the postdoc. For example, for the statement "this [red] line represents the same number of rods as this [blue] one" to make sense requires understanding that neither the line nor the individual points represent "the same number of rods." Instead, the areas underneath of the curves each represent the same number of rods. Moreover, it requires as common ground the fact that each line represents a time point for the fish population, and that the blue line (i.e. the one higher on the right) is measured after the red line. It also requires as common ground everything else about the nature of the physiological changes generally and those related to A_1/A_2 rod composition specifically that those fishes undergo that migrate between freshwater and ocean. Thus, although the extended next turn has elaborated and explicated one part of what is common ground for everyone else, there is still a massive amount of non-explicated common ground.

Indeed, common ground always is required for any stretch of talk to make sense. Even the coming-to-be-known absence of sense requires common ground, for otherwise it would be impossible to communicate that common ground does not exist. For us to know that the earth moves, it actually must not move, for it is only against a non-moving ground that any movement can be grasped (Husserl 1940). This massive ground fundamentally exists in a common experience of the relevant segment of world. Common ground may be available indirectly, through the common experiences that are the foundation of the metaphorical extension of experiences to other domains.

Different presuppositions (ground) may announce themselves in different appreciations. Different grounds give rise to different ways of describing the situation: The change of context constitutes a change of contexture and, thus, to a different figure (text)/ground (context) configuration. In one instance in the laboratory, PI_1 talked about the removal of a linear background signal, which made it appear as if the nearly Gaussian curve "sits on" a sloped line (Fig. 6.3a). PI_1 suggested that the removal of the slope would move the maximum to the left while making a counterclockwise hand movement as if he were turning the graph. However, PI_2 and the research associate disagreed, saying that the peak would be moving to the right. For PI_1, it did not make sense until his collaborators explained that the addition of a linear signal falling from top left to bottom right would add more to the left part of the Gaussian than to the right (Fig. 6.3b). The situation immediately makes sense to PI_1. For the research associate and PI_2, both trained in physics and both concerned with mathematical modeling, there was common ground. That sense might not have established itself had the two talked about it in terms of mathematical functions, where the maximum of the linear plus the Gaussian shifts with respect to the Gaussian, as seen from the derivative once the functions are written out.

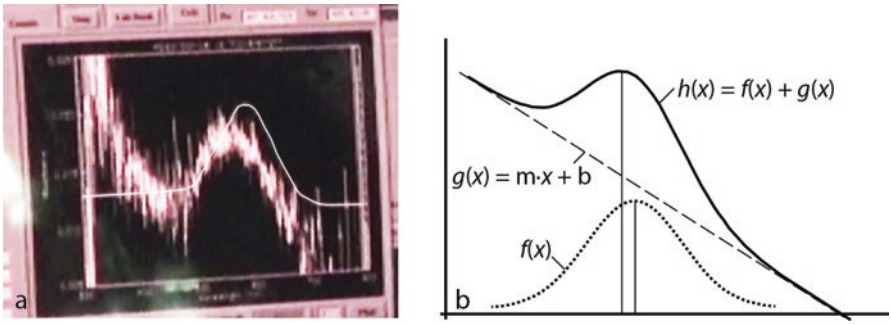

Fig. 6.3 PI_1 expects the removal of background signal to lead to a leftward movement of the maximum, whereas the research associate and PI_2 expect a rightward movement. (**a**) In the lab. (**b**) Model

Marking Common Ground

Common ground exists without having to be asserted or without participants actually having to be aware of at the time. We are always living in a world shared with others, who, as we ourselves, are integral part of this world. This whole world makes for the common ground, which is taken for granted until possibly questioned. This ground allows words, statements, and actions to make (common) sense. Close attention to the videotapes from the laboratory meeting shows that the taken-for-granted common ground also comes to be articulated on occasions when it is not problematic. Already in Fragment 6.2 there is an indication of the common ground for the doctoral student and PI_1 when turn 19 anticipates (and perhaps provokes) the articulation of a particular graphical feature: the number of cells with A_2 (turn 19), which in the case of the blue line (in the left-most graph of Fig. 6.1) decreases on the right hand side corresponding to an increase (as shown) in the number of rods containing a lot of rhodopsin (A_1) (turns 21–25). The doctoral student articulates for all to hear what is to come next even before the current speaker (PI_1) is saying it.

Fragment 6.3

1 RA: you do have a measurement error too, so we have to put an uncertainty around, to look at (1.3) so we can't really see if it is one hundred percent or ninety percent or eighty-five percent, for the accuracy of our median
2 (0.4)
3 PI_1: yea that's right
4 RA: the (?) is also less, but if you specify within one nanometer but the error's around five centimet[ers
5 PI_1: [right] in another words, we have to have b*in*::s ((*writes "bins"*))
6 RA: yea beneath it
7 (2.9)
8 PI_2: bt
(0.7)
> 9 that's what I thought that you indicated with the uh: (0.4) the steps anyway
10 PI_1: Yea exactly. These; these would be (2.1) ba:rs: ((*draws bars*)) (1.8) °okay°

Common ground may be marked after the fact such as in the fragment, which concerns the accuracy of the measurement with which the relative amount of A_2 (A_1) in any specific rod. The suggestion that each measurement is counted in a particular bin arises from the description of the error. It is at that point that the statement – concerning some previously existing thought that the steps in the distribution graph represented bins (turn 9) – comes to be accepted in the next turn (PI_1) followed by the drawing of two histogram bars for the beginning (first two steps of) the distribution (turn 10).

In this situation, the exchange makes visible to everyone that PI_2 has been working on the basis that the graph represented an ensemble of bins, a histogram. But this fact is unremarkable and goes without saying: it is common sense to take the step-like features of the line as the upper boundary of a histogram. We do not know whether PI_1 actually has been aware of that at the time he was drawing the curve. It does indeed look like a linear function rather than a histogram. He has used the word histogram prior to getting to the chalkboard, where he then was drawing line graphs. Nor do we know whether the idea that there should be a series of bins/bars came to him during the exchange. Instead, the exchange has him confirm this form, followed by his drawing of two bars. The line as a representation of a sequence of bars now *is* the common ground, the shared sense of how the graph fits within their work. The research associate, too, confirms this sense, which was already articulated in the earlier description about the uncertainty of the median of the distribution.

Throughout the meeting, we observe instances in which the taken-for-granted common sense comes to be brought into the accented visible when required, here for understanding the differences between the two graphs. Once again, in the production of the context in the form of the specification of what precisely is measured, we observe the existence and marking of common ground. Just as the event has PI_1 preparing to do the graph, after having drawn an abscissa and ordinate below what will have been the heading "Within Fish" (Fig. 6.1), he walks over to the other side of the board (around a desk blocking the direct path). There is a first specification of the "#" next to the first graph, "number of fish," but the production comes to a halt, the "fish" comes to be wiped off (turn 2), and the unfinished statement "the number of ..." comes to be completed by the doctoral student (turn 3), immediately followed by the completing "rods" with greater than normal volume. The text then comes to be completed in the way it will stay therefore the remainder of the meeting.

Fragment 6.4

	1	PI_1: [<°okay this is° n*um*ber of> (1.6) [fish::::: (0.8)
		[((*walks from one to other end of board*)) [((*writes* "fish"))
>		(°or°?) (0.3) <°the number of°>
	2	(0.8) ((*wipes off* "fish"))
>	3	Do: °the number of rods°
	4	PI_1: RODSs:
	5	(5.95) ((*PI_1 writes*))
>	6	Do: °for an (up?) date or something °
	7	(1.2)
>	8	PI_1: of the sample population (.) for (2.1) date (2.3) eXx::

First, the text that now features below the earlier abscissa label literally constitutes the *con*text – text that goes *with* other text – of the two curves (text) in this panel. It is an explicit articulation of the common ground against which to read these particular lines, indeed specifying what they stand for. Whereas the earlier

label "#"was what counted – which, in part, was at the origin of the exchange with the postdoctoral fellow – the nature of the signified now is explicitly articulated and thus has become figure. What heretofore was part of the tacit common ground now has become explicit. This elaborated ground then also allows a distinction with the next graph to be drawn, the production of which was aborted, and then is resumed. When its extended abscissa label has been produced, more of the heretofore-presupposed ground is made visible; and the contrast between the two graphs also is apparent and intelligible (makes sense).

In the hesitation and self-correction, we also see that the PI_1 did not have the details of the graph worked out, fully represented in his mind, as standard psychological approaches (constructivism) would suggest. Instead, the precise nature of the signified of each point on the line was unspecified in the way most aspects of our everyday lives are unspecified. The specification here takes work, which is exhibited in a first production, its removal, and then, jointly produced with the doctoral student, a second production that then comes to be further elaborated – again in joint labor with the doctoral student (i.e. turn 6).

In this fragment, we also observe the existence of common ground. Thus, the doctoral student twice articulates verbally what PI_1 will write on the board (number of rods, date); and the former does so precisely at the point when the offered phrase fits into the existing and still unfolding inscription. In one way of looking at the situation, the two work out together what heretofore was the trace of a thought, which is a living idea now further along the way to its completion in a finished verbal formulation (i.e. the *Said*). Not only does the *Saying* make sense, but, as seen in the joint contributions, it already was part of their common sense. But this common sense was not explicitly articulated before and therefore was not part of the accented visible. The special feature of common sense is that it makes for the phenomenon of *indexicality*.

Common Ground and Indexicality

In the philosophy of language, an attempt was made to introduce a clear distinction between objective expressions, on the one hand, and essentially subjective and indexical, occasion-specific expressions on the other hand. An expression is objective if it can be understood independently of the when, where, and by whom of its occasion. An expression is *essentially indexical* when its actual meaning depends on the occasion, the characteristics of the speaker, and the specifics of the current setting. Objective expressions include all those formulations that are built on "the principles, theorems, proofs, and theories of the 'abstract' sciences" (Husserl 1913, 81). The meaning of a mathematical expression or a scientific truth does not depend on who articulates it, when, or where. However, the above-noted indissoluble relation of expressions (words, phrases, texts) and their concrete historical field (world-as-event) makes for the indexical nature of all language. In other words, speaking is but an event among events with some of which it intersects; it is an event that two or

more families of events (people) have in common. An expression makes sense if it has a place within a sensible field; understanding presupposes this field, which constitutes the common ground equally given to the senses of all interlocutors. This given common ground is a field of events that constitutes the ground for (verbal) expression events and thus is the basis of common sense (Scheler 1923). The object of every demonstrative pronoun ("this," "there," "that") is a function of the common ground: it is indexical, referring to events somewhere within reach. That common ground continuously shifts (a "there" appearing in the same phrases may point to different places), and evolves with emergent features. Personal pronouns also are indexical, as are temporal adverbs, including now, yesterday, tomorrow, after, and so on. In every practical situation, "a member must at the outset 'know' the settings in which he is to operate if his practices are to serve as measures to bring particular, located features of these settings to recognizable account" (Garfinkel 1967, 8). In the case of any situationally determined need (e.g. when there is a breakdown of some form), the taken-for-granted may itself be turned into something problematical and thereby become the topic for the joint work at hand. This section exemplifies why indexical pointing or words are indeed only part of an encompassing signing event and thus require (presuppose) the other part to be anything at all.

Body Configurations Treated as Pointing

Words tend to be taken as signifiers for something else, including sensuous things and super-sensuous (ideal) meanings. In this same take, certain hand/arm/finger configurations (e.g. Fig. 6.4) are taken to be indexical (pointing) signifiers – and this is so irrespective of what there might be (or not be) in the prolongation of the configuration. The sign – a term frequently used inappropriately in lieu of signifier – actually is a relation between two parts of the material continuum, one part serving as a signifying event and the other as the signified event (see Chap. 5). Consistently, it has been suggested that pointing is constituted by the mutual contextualization of a body seen as pointing and some property of the surrounding space that can be seen as the target of the pointing. Thus, a body is pointing only when there is something pointed to (out); and there is something pointed to (out) only when there is a body pointing. That is, a particular arm/hand/finger configuration (Fig. 6.4) at best is a signifying event. To be part of an indexical signing (that has a function in the meeting generally and the resolution of the query–reply sequence specifically), there needs to be another part serving as its signified part of the world in flux. The hand/arm movement is a pointing gesture when the intended recipients can see or find something that could serve as the signified event; and it is the possibly signified event that can be seen as motivating the hand movement.

In the depicted duration (Fig. 6.4), the other team members can find something in the extension of the hand/arm/finger configurations; and the verbal part of the expressive movement, though fragmentary, is consistent with the gestural part. Each provides the context for the other, thus contributing to the overall sense of the nature

Fig. 6.4 The body (sound, orientation, configuration) as expression of thought

of what is heard/treated as a query. Here we observe that there is a relation between what we generally might refer to as a form of text (any form of signifier, expression) and context. The indexical properties here mean that the relations constitute sense. Text and context together thus form a *contexture*, which lends itself to different figure/ground configurations. A text, here a pointing gesture, *makes sense* when the appropriate context exists; if not, the movement may be taken as irrelevant to the situation (e.g. when it is treated as a grooming gesture). We cannot therefore speak of the meaning of a pointing gesture, for the pointing itself is a pragmatic reality only in the relation between body configuration and thing. This relation between recurrences, the sign proper, exists within the larger frame of what the exchange treats as a question; and indeed, it is within this larger frame of the field as a whole that the pointing event as such exists. The pointing is constitutive of the questioning, and the questioning motivates the pointing that is orienting participants in specious present in a particular way: here, first to the "higher numbers in the low percentages" and then to the "lower numbers." The context for the "lower numbers" exists in the relation between the trajectory of pointing and what can be found to be happening in its extension: the high percentages. Although the high percentages are not

articulated, there is a sufficient common history within the group that recipients can be assumed to fill in what is missing: the complement in the comparison. Thus, higher numbers are to low percentages as lower numbers are to *high percentages*. This contrast is available in the change of body position, where the first pointing movement is inviting the intended recipients to orient up and left on the graph and the second movement invites orienting down and right.

Body Movements Treated as Iconic Reference

Consistent with the preceding subsection, a body movement is an iconic gesture symbolizing something else only when that symbolized something already exists for the recipient. Saying that a body movement *is* an iconic gesture presupposes a common ground where the original form can be seen to exist. Thus, for example, "This line" (turn 9, Fragment 6.1) might be produced together with a pointing gesture. If the postdoc had been saying this while moving the bodily as he did, the nature of the line could have been ambiguous because there are two lines on the chalkboard, one in red, the other one in blue. Rather than or in addition to pointing, the person's hand (or other body part) may move in a way that an iconic relation can be seen with a feature in the environment (Fig. 6.5). When a hand follows a line drawn on the chalkboard while the person says "this line," then the index (pointing) exists not only punctually but also over an ensemble of pointing movements. The "iconic elaboration" is not related to speech but to the ground (i.e. the lines on the chalkboard) over and against which the movement occurs. The continuity of the

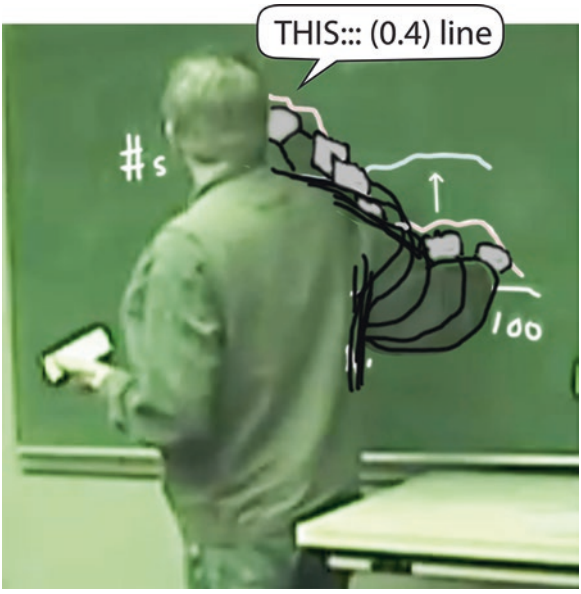

Fig. 6.5 Indexical properties of an iconic hand movement perceived as a symbolic gesture

pointing, also existing in the continuity of the hand movement, decreases any possible ambiguity. Not only are there many pointing events (a relation) but also the form of the movement has a (literal) parallel in the form of the movement trajectory (Fig. 6.5). Indeed, the pointing (symbolic) movement reproduces the movement that led to the production of the line in the first place; and the recipients of the expression, to see hand and chalk line, have to have their eyes moving accordingly (see Chap. 2). This is the basis of the common sense: the sensation associated with the movement of the eyes along a particular trajectory. The iconic relation is the result of the similarity in the two movements, the one perceiving the line and the other one perceiving the hand moving along the line. That event of movement is common to the participants, it is common to their senses; and it thus contributes to the constitution of a common sense. This is also what allows the contexture of "it pops up the right" and "the slope's this way now," the hand movements produced at the same time, and the chalkboard display (left graph, Fig. 6.1) to make sense.

"This line" and the hand movement let the curve be seen; and "this line" and the hand movement exist because of the curve. Even if the hand does not move to the line, as it does here, the similarities in shape between the trajectory of the hand and the curve brings the graph into the accented visible. But the point is not the line in itself. Instead, as the phrase describes, the line represents a number of retinal rods from which measurements were taken, and this number is the same as that represented by the other curve. That is, the curve does not merely represent a distribution of the measurements on the rods but also a total number of measurements. The line together with that total number – which is also the total number of rods that the scientists making the measurement will have looked at and taken measurements from on a particular day – make for the signing event. That signing event (i.e. relation) makes sense because of its place in the work as a whole, which is one of continuous transformations. All of this work constitutes the contexture, wherein the graph serves as a text to relate to some other part of the research, and that relation itself being integral to and constitutive of the research.

In this example, the form already exists – though the event has PI_1 drawing it visible to all. But the event of drawing, a work-related movement, may leave as its trace an index and simultaneously be a symbolic gesture. Thus, for example, subsequent to the exchange with the postdoc, a further elaboration of the common ground comes to be produced and inscribed by means of an arrow (Fig. 6.6). The arrow, the trace and result of a movement, shows the direction of the movement that has occurred between the two data collection sessions but also takes the preceding exchanges as its ground, which thereby is further elaborated. The drawing of the arrow makes sense, even if little is said, because of what its production and perception presupposes. More importantly, it is an elaboration of what was presupposed, the unarticulated ground against which the graph was to be read and now can be read. In this, drawing the arrow also constitutes a gesture; it is doing the work that could have been done by means of gesturing. The two movements are the same, only that in the case of the chalk line, there is an additional pressure forcing the chalk against the board. The context for the phrase is the contrast between the two graphs, each standing for the totality of hypothesized measurements of the relative

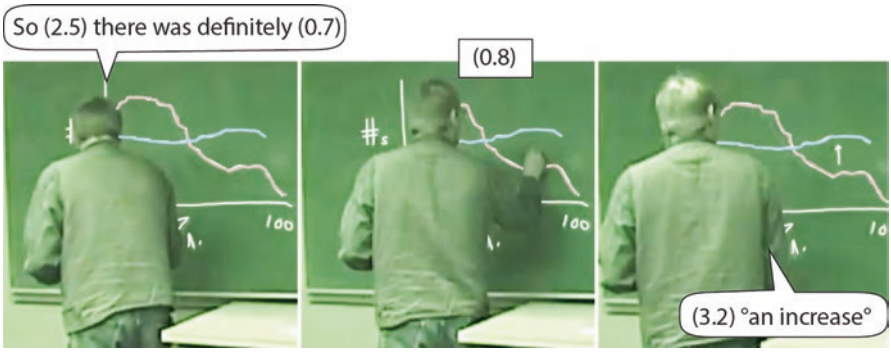

Fig. 6.6 Pointing, diagramming, and elaborating the presupposed ground

amount of (vitamin A_1-based) rhodopsin that would been observed in the fish retinas in different phases of this meeting. Here, the drawing of the arrow functions like a gesture; it is the fixation of the hand movement that is producing it. It is the end result of the movement that has produced it; and it stands for the movement as a whole in a synecdochical relation – part of something that stands for the whole including the something. The arrow points to an increase; and that increase is visible in the contrast of the two graphs that is pointed to and constituted on the right-hand side of the graph (Fig. 6.6). That index is not outside of the graph but integral part thereof.

Indexical Properties of Verbal Expressions

It is quite apparent that for any talk to make sense some minimal practical understanding of the immediate context is required. In particular, an expression – a word, phrase, or statement – makes sense in the context of what it signifies: together, the word, phrase, or statement and its signified event forms a sensible field. Whereas much of the research on the construction and negotiation of meaning inherently presupposes the absence of the latter, it is suggested here that without an already existing meaning, the sound is not a word (sign). About 5 min into the meeting, PI_1 makes the following statement about the speed with which the measurements have to be conducted are the core issue.

Fragment 6.5

Yeah, w*ee*kly if not, you know like measurements every three or four days, like– You take– what *Geor*ge did is a r*e*capitul*a*tion of what's been done historically, okay. That's fine. What we're after here is something that adv*an*ces the area. Okay? I wanna know in gr*ea*t detail wh*at* happens in that swing period. I wanna know, you know in … I wanna be able to measure the slope of that change, okay, so, um, that's why, I am not completely satisfied that we went with two-week intervals this, this

year. But I mean we are stuck with that, we couldn't go any more quickly then that, because we are just there are constraints we were– we are j*ust* ready too r*eal*ly tackle this.

It might be assumed that the talk that has occurred so far provides sufficient context for understanding what is happening here. But even observing the meeting from the beginning does not provide what it takes for the statement to make sense. Any person watching the videotape from the beginning will not understand (a) what the measurements are about, (b) what is being measured, what the significance of the measurement is, who "George" is, (c) what George has done, how the results of George's doing are relevant in the present context (other than that the team wants to advance over what George has done), (d) what "the swing period" is, (e) how the fact that the swing period simultaneously refers to the physiological changes in the young anadromous fishes in advance of their ocean migration and the swing in the anticipated graph featuring the amount of porphyropsin in the rod-shaped retinal cells, (f) why the slope of the former is referred to in the next part of the statement (rather than the slope of any of the many other graphs that the lab produces), or (g) the fact that "George" did measure the porphyropsin levels weekly. Indeed, previous research shows that each elaboration itself requires a common ground the elaboration and explication of which may be queried ad infinitum.

For any saying to make sense, its content (the Said) has to be part of the common ground. This is so because the sound-word itself is not the signing event. Instead, and in analogy with the pointing gesture above, signing consists of the sound-word, functioning as a signifying event, together with its signified event. Thus, for example, "the slope of that change" and a graph structured such that a "slope" can be found (Fig. 6.2f) together constitute relevant text, the context of which includes the theoretical graph, the one that "George" had measured and published, the physiological changes in the fishes, the opening of the gates in the fish hatchery that releases the juvenile salmon, and so forth. The saying of "George" presupposes what it makes visible. In analogy with indexical pointing and iconic gesturing, this counterpart (context) to the word (text) already has to exist – that is, a relation between two events has to exist for the word to make sense in the occasion. This reading is consistent with the suggestion also quoted in Chap. 5 that "'meaning' is no more inherent in things as 'objects' in independence of human ways of behaving that it is inherent in the sounds and marks that are upon occasion surrogates for things in human behavior when the things are not directly present" (Dewey 2008, 305). That is, the signifying event, text-in-context, is getting something done. The phrase, "what George did is a recapitulation of what's been done" brings into the accented visible that the results of an existing study is aligned with what has been done historically, including the Nobel Prize winning theory (Fig. 6.2f). In this function, the phrase is part of the first type of the six sensible contextures: it is a signifying event. But the work it does is different. It is part of a sequence of phrases that together constitute the in-order-to motive for the work to come: advancing the field over and above what has been done in the past (exemplified in "George's" work). This issue then constitutes the current research in a particular way; and it contrib-

utes to creating the sense that everyone is participating in advancing a field. It is also part of another contexture: why this phrase is unfolding *now, here*, and *thus*. The two-week interval (the one also used in "George's" research) is unsatisfactory, and, to advance the field, PI_1 phrase is articulating the intention (the in-order-to motive) for the team to conduct "measurements every three or four days." The phrase about George is a phase in a sequence of phrases that constitute the urgency of sampling frequently, for "almost instantaneous data analyses" and "for off-line modules to analyze data."

Nothing *Never Happens*

The ideas of sensible fields and the associated unnoticed background expectancies essentially refer to {figure|ground} phenomena. This figure-ground hypothesis also means: nothing *never happens* (Bateson 1996, 51). When an expression does not make apparent sense, participants may reconsider the ground such that the expression will make sense. Just as it may be significant that a possible signifying event is not cogredient in the present duration, some event actually present may not be significant. Whether some present event contributes to the dynamic of sense is a function of that dynamic – the field in its unfolding. Thus, a sound, even if it does not appear in standard or alternative dictionaries, may have a function because it has a place in a sensible contexture. In this way, every act of preparing and producing a signifying event is a special aspect of the sensible field: in that sign-use is an expressive event. Everything a person is saying and doing potentially is significant, because for each member to the setting, the body movements of other persons are symptoms of their thoughts. Consider the opening of the fragment in Fig. 6.7, where we see a complex organization of talking, pointing, and corporeal moving. As the next paragraph shows, it exemplifies that for any participant the other's body and any of its multifarious expressions may be a manifestation of a thought.

While the postdoc articulates that he does not quite understand something while simultaneously pointing to the chalkboard, PI_1 is still oriented to the graph that he

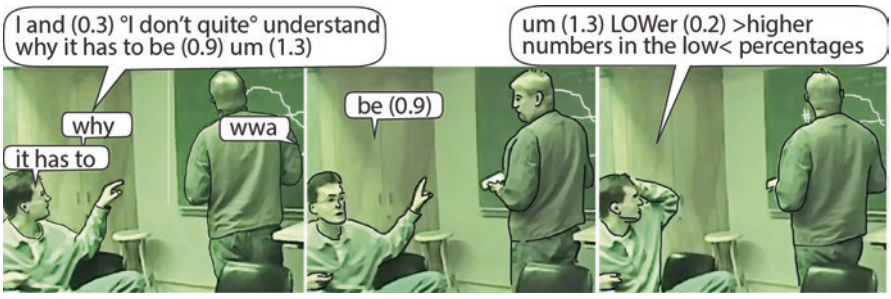

Fig. 6.7 Even a non-word ("wa"), the possible beginning of a word may be indicative of an action to come

has just drawn. The beginning of the repeated "why it has to be" is overlapped by a "wwa–" sound that PI_2 is producing. The postdoc is turning the head toward PI_2 whereas PI_1 is turning the head toward the postdoc, who still is pointing toward the chalkboard. There is pausing before he is continuing, retracting the hand/arm; and PI_1 is turning toward the chalkboard again. Following the "wwa," the postdoc is turning towards PI_2 as if he was expecting something to come – e.g. the sound particle could have functioned as an offer to access the speaking floor. As PI_2 neither is continuing nor using the opportunity to access the floor that is existing in the immediately following pauses (0.9 and 1.3 s), we do not know whatever fleeting idea may have been on his mind. Later in the meeting, there is evidence that PI_2 not only will have understood the purpose of the graph but also operated on the basis of a sense that it represented a histogram rather than a line graph. The particle "wwa" therefore comes to be treated as irrelevant. It is through the joint work (postdoc, PI_2) that the "wwa" has no other function. The occasion is managed, and the talking also concerns this management work. Indeed, a theoretical focus on the meaning of the word would leave out most of the massive amount of work that goes into the continuously changing occasion, paralleled by the continuously passing of the overall sense, itself constitutive of the content of talking. They are jointly managing who is talking, who is getting to respond, who is giving space so that others can respond, and who is receiving that (metaphorical) space to act.

This meeting fragment exemplifies that the nature of a sound or body movement *as* signifying events is itself the outcome of a joint work event. Thus, in the situation of body movements, the question is whether some movement – e.g. that of a hand, arm, or finger – is to be a signifying gesture or a grooming gesture, tick, or other irrelevant movement. This is also true for recurrent sounds heard as words, the dictionary meanings of which may not be relevant at all to the situation; and this is so independent of the question whether words have some object or idea as their signified.

From Meaning to Sense-Giving Field

In this chapter, I make the case for a shift from the investigation of meaning (making) to the investigation of sense consistent with a transactional approach to psychology of education in which there is a primacy of events. The central point of the forgoing analyses is to show the role of the context in the constitution of text (word, sign, graph, phrase). Any bit of text writ large (including actions) exists in relation to context, and the two aspects together form the sensible contexture. Meaning (signification) is only a small (and sometimes insignificant) part of a signifying event (word, graph) in the face of all the other aspects of sense, which, in fact, constitute the very context in which something like meaning (signification) can exist. The individual or the group does not just *make* such sense exclusively. Instead there also is a passive aspect, well rendered in expressions according to which something is found to make sense or feels right: *sense is revealed as much as it is made*.

Everywhere, common ground and common sense are presupposed and required for events to happen in the way they are seen to be happening. Something makes sense when it is part of a presupposed field, the whole world in its continuous unfolding. As an interwoven, dynamically evolving phenomenon, a sensible field weaves together a fabric of sense including everything making the occasion.

The focus on the meaning of such things as graphs, language, or words makes sense in the context of an illusion that any such thing might be of interest in its own right, outside of some activity in the course of which it has some function. Thus, research is concerned with investigating the interpretations that experts (often scientists, mathematicians) or non-experts (often school students, sometimes workers) articulate with respect to graphs. But in the world outside psychological research, graphs do not stand on their own – they are always part of some occasion in and for the course of which they have particular functions. For example, the research scientists involved in this study produce graphs that are integral to their publications, which are integral to their career progress. But the graphs and the publications have a purpose that goes beyond academia in that they (potentially) inform fish hatcheries about when to release juvenile salmon; and hatching fish for release itself has a particular societal function. Their sensible field therefore always exists in society as a whole, not in themselves, in some abstract (ideal) meaning that is part of the self-sufficient existence of the graph. Their use is essentially shared, for we do not understand "tools" or "symbols" without knowing what it its use is doing for others. Any understanding of the graph presupposes a massive amount of common ground, which inherently resists any complete articulation. If words and actions do not have meaning outside of a field, then focusing exclusively on the construction and negotiation of meaning may indeed make little sense. Any stretch of human communication or action exceeds the lexical meaning of what is said or done. A reasonable alternative to the focus on meaning therefore is to investigate sense and the continuously evolving sensible fields in which it has its place.

The benefit of a move from meaning to sense is exemplified in Fragment 6.1. Here, it is not the meaning of the graph that is at stake. It stands for whatever is anticipated to be the case once the number of measurement for specific A_1 amounts are tallied. But the graph, which initially does not make sense, does make sense following the exchange. It is the situation as a whole that serves as the context for the individual signifying event, itself a relation of things that has to be fulfilled for the event of signifying to exist; and the overall relation is determining the relation of the two events (signifying, signified). The two other graphs that make it onto the chalkboard over a 25-minute period (during which the "eyeball" also is drawn) make sense only in the context of the research of this team, which uses equipment that it has developed only 2 years earlier; the novel method was the object of a paper just published, the research for which was conducted during the preceding year. The existing technology was based on the extraction of the retinal tissue, making spectrophotometric measurements on the whole extract. In a spectrophotometric analysis, the different wavelengths from the light spectrum are made to traverse the sample one at a time until the full spectrum was covered. The new technology measured the absorption for the entire spectrum in one take; it allowed the measure-

ments on individual cells; and it even allowed measuring the rhodopsin/porphyropsin ratio anywhere along the cells, as the light beam had a diameter that was less than the width of the cell (Fig. 6.2c). The familiarity with the apparatus provides the sensible contexture for the two graphs labeled "Within Rod" and "Within Fish." All of this is part of the laboratory members' shared history that are immanent in them in the form of the common sense. The graphs are conceivable in the absence of the particular sensible field of this laboratory, but it would have made no sense talking about them as predictions for what they will be observing. It is only in the field of this team's activities that it is plausible to anticipate observing a variation of rhodopsin content measurements within a single fish, for the team was conducting absorption measurements on 20–30 retinal cells from each fish. Similarly, because they have already talked about where along the longitudinal extension of a cell to take the measurements for the purpose of controlling variability, it make sense to expect that the rhodopsin/porphyropsin ratio may differ within the rod (as shown by line with negative slope, Fig. 6.1, right of center) or to be indeed more or less constant (as shown by the three bars, Fig. 6.1, right of center).

We also observe in Fragment 6.1 how the literal meaning of a statement is not the most important aspect that promotes the occasion ahead and thereby allows the sense of what is going on to pass into its successor sense. In the opening turns of the fragment, the postdoc makes a statement about not understanding. What we actually observe as next action is the articulation of context. The articulation of the context provides what the preceding statement appears to ask for in a roundabout way, that is, without actually asking for something. The entire exchange makes sense in the way it unfolds, and it indeed constitutes an integral part of this meeting event in which further graphs are produced that depict anticipated results of the experiments. The present analyses provide evidence for the fact that the graph makes sense to the postdoc. Thus, in Fragment 6.1 work is done such that the scientists can continue to talk their research: they have maintained the conditions for talking research in this way and, thus, the intelligibility of the occasion as much as the intelligibility of the expressions. This phenomenon, the maintenance of conditions to continue acting in particular ways, is a hallmark of the reflexivity that makes for the social nature of actions in a strong sense – i.e. even if only one person is present. In the particular instance, the projected shape of the data has been rearticulated in the form of graphs, and to continue in the project of understanding the variation of the data, anything interfering with the assumption that everyone is on the same page has to be dealt with.

As the exchange is articulating context, common ground and common sense come to be reestablished. In other words, sensible common ground is a performative and an ongoing achievement; and in this achievement, the common ground shifts and evolves. Common ground is assumed, monitored, and produced for the purpose of framing the replies of the other, who answers in a way so that another reply may issue forth. Unsurprisingly perhaps, any particular utterance or action thus has to be considered as part of an ecology that includes context (ground!) rather than as a

thing that has meaning (or sense) on its own. The consequence of this position is that neither actions and texts nor contexts can be described independently of each other, for each is constitutive of the other. The context for any sequence of action or a stretch of talk is produced by the same behavior in which the action and talk are constitutive part.

In the foregoing analyses, pointing, drawing, and moving body are shown to accent what is potentially visible and attended to. One function of all forms of expressive events is to extend and change those parts of the field that are accented and thus visible, which may be actually visible or ideally present. The visibility is itself due to percipient events. The indexical nature of language is implicit in the statement of the function of discourse: In genuine discourse, talking presupposes knowledge of its content. If talking *draws from* the known, then it is presupposing this something; and the purpose of talking is to make manifest precisely this "what" that it is about. Talking thereby is making accessible what it is about. To make it accessible, talking presupposes that there already exists access to its content; the question only is about its becoming visible. Normally, speaking brings something into the accented visible without being visible itself, though any word or phrase may actually become the topic of talking and thereby become itself visible – e.g. as being gendered, as not making sense, and so forth. The accented visible thus is the same as that which "language is about." The signified event not only is always already presupposed but also constitutive of a particular material configuration as a signifying event of something else. The term *sense* thus marks that the intellectual and affective content associated with a word has been absorbed from the situation in which the word is used. That is, the field is equivalent to sense; it provides the degree of content that any form of signifying event contributes. Text thereby acquires its psychological functions from the context together with which it constitutes the field.

In conclusion we can that for a graph to be intelligible (i.e., to make sense) requires a massive amount of common ground in addition to understanding what the graph stands for. Each graph makes sense when its contribution to a signifying function is established – i.e., the signifier–signified relation – against everything else that the team is doing and *takes to be as common sense*. Because it is common sense, it no longer has to be articulated. There is therefore a unity/identity of text and context: a sensible contexture or sensible field. The word acquires meaning in the context of speech, itself occurring in the context of a societal activity. When the context changes, so does sense, and, as a consequence, the sense with which the word is associated. This is why sense becomes primary for the later Vygotsky. Sense is a more important concept than meaning because already the infant lives and "makes" sense long before it has words that could be used as tools for this poetic creation. Indeed, the infant is participating in a world shot through with sense, and, in the course of participating, acquire, with its senses, a sense of how the world works.

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Chapter 7
Birth of Ideals and Universals

> It is only man who has entered into a social relation with his environment, and then has abstracted and generalized it into a physical theory. (Mead 1938, 110)

A major weakness of all theories in educational psychology – including those of sociocultural and cultural-historical inclinations – is their intellectualist bent. Even Lev S. Vygotsky never explained how the scientific concepts that the children in his studies were learning came about in the first place, and how any abstract universal concept could have emerged in the course of human history – though he did intimate that *all* higher psychological functions were relations with others first before they were functions of the individual (Vygotsky 1989). Piaget's main problem was the reduction of development to biological maturation underlying the different stages; and he used biological concepts for describing the development of qualities that are recognized to be purely societal or cultural in the approaches developed by social psychologists such as L. S. Vygotsky, A. N. Leont'ev, A. R. Luria, and their students and followers. Mainstream psychological theories also have an intellectualist bent in that they conceive of what we know in terms of ideal things, such as concepts, which are abstracted from the physical world.[1] In the cognitive sciences and psychology, these ideal things exist somehow exist independent of the world, which, as suggested in Chap. 1, leads to the symbol grounding problem, that is, of the connection between the material world and ideal concepts. The problem of the missing connection has been made thematic in different names: the psychophysical or body–mind problem. The problem, however, is one of method and presupposition. As soon as we shift to a transactional approach, where everything is conceived in terms of events that together make the world-as-event, and where phenomena are the result of recurrences in percipient events and experiences, the existence of ideal things as an ensemble effect of material processes no longer is a mystery. This is so because in this approach, "all awareness, even awareness of concepts, requires at least the

[1] In the transactional approach developed here, an *abstraction* is occurring when an event is referred to, after the fact and in another event, by means of some signifier. In chapter 5, the signifier for an event (e.g. graph) has a synecdochical relation to the event (i.e. scientific research process).

W.-M. Roth, *Transactional Psychology of Education*, Cultural Psychology of Education 9, https://doi.org/10.1007/978-3-030-04242-4_7

synthesis of physical feelings with conceptual feeling" (Whitehead 1929/1978, 243). Just as stereovision arises as a new quality in the cooperation of two eyes, mind is a new quality arising from the cooperation of people. This chapter is concerned with how ideals and universals come to exist in human history and in the life of young people (students in early elementary school). Even the birth of ideals is an event, and any ideal exists in and as a twofold relation – as intimated in the introductory quotation and, as seen below, in statements that Marx and Engels made in the mid-19th century: relation among people and relation between people and things.

Historical Emergence of Cultural Objects

All cultural forms arise from and are indicative of some form of organized activity. This is so also with cultural concept words, including economic concept words and practices that led to the capitalist markets or the concept words and practices that led to, and were included in, the Euclidean formulation of planar geometry. Prior to the (social, economic, natural) sciences, there already existed activities out of which the recurrent use of certain words emerged. Although such concept words may appear abstract later, they directly arose out of mundane exchanges in mundane activities. It is important to understand the cultural history of concept words, because subsequent members of the associated cultural practices in a way re-understand what the original geometers, went through in the re-constitution of the conditions within which actions and language make sense.

One genetic analysis of abstract concept words at the cultural-historical level uses geometry as its case; its history is understood in terms of an unfolding tradition of the unity of humans and their environment (Husserl 1939). Thus, geometry emerged from the activities of Greek craftsmen. The things they were concerned with were surfaces, corners, edges, lines, and points (e.g. of intersection). In using building materials such as stones, they were concerned with smoothening the surfaces to make them fit, and to straighten out lines to bring neighboring stones as close together as possible. Whereas flat surfaces, straight lines, sharp edges, and point-like corners would have been of concern in some activities where rounded surfaces would have bothersome, other activities would have required increasingly perfect curved surfaces and lines, such as in the construction of wheels. Thus, for example, the word cylinder has its origin in the ancient Greek *kúlindros* [κύλινδροσ], which translates as "roller," the perfection of which would have improved the capacity of an object to roll evenly; the word cube has its origin in *kúbos* [κύβοσ], a die to play with, the perfection of which would be concerned with addressing fairness of all sides to have equal probability; and the term pyramid has its origin in the Greek name *puramid* [πυραμιδ-, πυραμις] for the monumental structures of the Egyptian people. Refinement processes involved measuring and counting events. It is out of these and similar concerns that the idea of an *ideal* geometrical object historically emerged. Real objects are not perfect, but ideal objects could be envisioned as the limit objects if the craftsmen could shape their objects perfectly. The possibil-

ity then arose of working with these ideal objects, ideal in a practical sense of perfect material objects, which then were objects of thinking alone because they did not and could not exist in an inherently imperfect world. Historically, there is thus a move toward the distinction between two very different worlds: one material and imperfect, the other ideal, immaterial, and perfect. Once detached from materiality, these ideal objects appeared to exist outside of time. During the historical period of what will have been upon looking back the first geometers, there was no conceptual language that they could use to communicate. Nor did they have the apparent need for a precise description of the after-the-fact pre-scientific materials that they were working with; and there was no need yet for describing the ways in which geometrical identities and the first axiomatic statements emerged during their collaboration.

Emergence of the Ideal: A Cultural-Historical Account

> The form of value is *ideal*, although it exists outside human consciousness and independent of it. (Ilyenkov 2009, 254)

At the heart of the quest for appropriate theories of abstract concepts, that is, of ideals and universals, is the relation of these phenomena to the material world of our everyday concerns. In the cognitive sciences, the failure to theoretically relate ideal, universal, general, and abstract concepts to the world we inhabit is known as the above-noted symbol grounding problem, which may be taken to be another word for the psychophysical problem. The Dutch philosopher Baruch Spinoza had suggested that all attempts to understand the relation by beginning with the material body or with the immaterial mind (thought) would have to fail. Some recent cultural-historical studies of cognition in educational settings draw on the works of the German philosopher Georg F. W. Hegel, who had developed a (phenomenological) theory of the development of mind that focuses on process – *Being* [Sein]. The choice to ground those studies of cognition in the works of Hegel was justified, for his "intelligent (dialectical) idealism, which is the idealism of Plato and Hegel, is much closer to the essence of the matter than materialism that is popular, superficial and vulgar" (Ilyenkov 2012, 164). Although Hegel's formulation is superior to simple materialist (biological) accounts, he did not provide the key to the real materialist solution concerning the relation between the ideal and material aspects of life, between thinking and the body. Hegel did not consider the material as material; he writes "not about nature 'as it is,' but exclusively about nature *as it is represented*" (172, emphasis added). Recognizing the shortcomings of the best of idealist (Hegel) and materialist epistemologies (Ludwig Feuerbach), Karl Marx and Friedrich Engels developed an event-based approach that actually explains how ideal, universal, and abstract ideas emerge from real, mundane activities. This conceptualization would be the basis of cultural-historical approaches to human activity, mind, and culture in the works of Vygotsky and his student and collaborator Alexei N. Leont'ev. Both authors extensively refer to and actively engage with the works of Marx and Engels.

In *Das Kapital* [Capital] (Marx and Engels 1962), a cultural-historical analysis is provided of the emergence of the abstract, suprasensuous (exchange-) *value* from the concrete, sensuous use-value of a commodity. In the first section of the book, Marx shows how the abstract exchange-value of a commodity historically emerges from what initially only is concrete use-value. That is, he exhibits the emergence of the sensuous–suprasensuous character of commodity from its initial solely sensuous form; this sensuous–suprasensuous character is synonymous to saying that it is societal (Mamardašvili 1986). That something has suprasensuous quality should not lead us to think that it cannot be present; instead, we theorize it in terms of everything present in perception but in non-sensuous manner, such as that which is recognized as permanent across occasions (Whitehead 1920). Classical epistemologies treat the suprasensuous as the *ideal* (e.g. mathematical knowledge). But the noted dichotomies are overcome only when the ideal is thought as sensuous–suprasensuous. This means that abstract concepts never are detached from the plenum of the material world, where the sound-words denoting so-called concepts are events among events, having the special function of making some of these events intersect. This chapter works toward such a practical conceptualization of the *concept*, which is provided after a case study that serves as its material ground.

Marx and Engels begin with considering simple barter exchanges; and they return to the earliest considerations of such exchanges in the recorded history, such as in the works of Aristotle, with whose examples they begin. Thus, the simple value form of a commodity comes as *value expression* or *value relation* between things:

Form A

5 beds = 1 house; or
20 yards of linen = 1 coat

Here, in the exchange relation between 20 yards of linen and 1 coat, the actual proportion may be accidental (contingent). Such an exchange relation is an event that also expresses a particular *social* relation: the exchange, as an event, is a social relation between buyer and seller, which thus also is an event rather than a thing. It may occur in the absence of human society (e.g. in exchange relations observed among animals). The value of the beds is measured in terms of the commodity house such that the five of the former are equivalent to one of the latter. Marx and Engels note that Aristotle stopped in his analytic tracks because he could not overcome the equivocation of dissimilar things: two things such as beds and houses cannot be commensurable. The idea of value thus did not yet exist during that historical period even though in practice, people were not only engaging in barter exchanges but also using money to pay for products.

The next step in the conceptualization occurs when the exchange is given general form: z Com[modity]. A = u Com. B, or = v Com. C etc. In this form, value no longer is contingent to the particular, inherently social exchange event, but stands in relation to the world of commodities particular to a society. At a minimum, two living persons – i.e. families of events – are involved. These respective families of events intersect in an event involving giving and taking simultaneously – not unlike

in the event of communication where words are exchanged. That is, the economic exchange, as all exchanges, is transactional; in other words, each action involves at least two people and thus is *joint* action. Exchange thereby comes to be conceptualized in temporal terms, not as an abstract relation-as-thing where the things exchanged stand (thus mediate) between the individuals-as-things. The failure to conceptualize the exchange from a transactional perspective – i.e. as event – leads to a misunderstanding of what the theory of Marx and Engels entails. Thus, for example, commodities are conceived in terms of the unity/identity of use-value and (exchange-) value. Those who take interactional perspectives will say that what a commodity is depends on the perspective of the person involved, such that the 20 yards of linen are exchange-value for one (e.g. the weaver) and use-value for the other (e.g. the tailor). But adding up two individual perspectives does not yield something new. It is when they act jointly that the two eyes can give rise to stereovision; and this binocular "double view *is* the relationship" (Bateson 1979, 133). In the transactional perspective, the two perspectives cannot be separated but are an integral quality of the relation. In other words, the exchange situation cannot be reduced to the addition of two individual perspectives because the event is one in which giving and taking not only occur simultaneously but also are constitutive of one another. They are phases of one whole event: the exchange.

Continuing with their analysis, Marx and Engels conceive of the total or expanded form of value, which appears in the relative relations of Form B:

Form B

20 yards of linen = 1 coat
20 yards of linen = 10 lbs. tea
20 yards of linen = 40 lbs. coffee
…

In this form, the value of linen remains constant whether it is traded for and expressed in 1 coat, 10 lbs. of tea, 40 lbs. of coffee, etc. In this form, the accidental dimension that characterizes Form A has disappeared so that the value amount determines the exchange relation rather than the other way around. The bodily expression of each of these commodities is realized as a particular equivalent form. Form B thus expresses the situation where weavers trade their linen for everything else that they need. But even earlier in the evolution of societies, commodities and their relations existed in Form B. Thus, for example, certain tribes on the Northwest Coast harvested eulachon oil, which they then traded for everything they needed but did not produce on their own – e.g. "four blankets, two beaver skins, or two boxes of dried halibut" (Le Dressay et al. 2013, 118). These tribes related to others in terms of what they could get for a certain amount of eulachon oil, which thereby became the basis of a measure for everything else. But to become measure for everything, something else was required.

In Form B, any *general* expression of value is excluded, because the value of a commodity (e.g. eulachon oil) is expressed in terms of the value of many other commodities. In contrast, the general form of value, the condition for the money form,

makes one commodity the measure of all the others. That is, it reverses the forms of Form B, which is expressed in a new kind of system of relation:

Form C

$$\left.\begin{array}{ll} 1\,coat & = \\ 10\,lbs.tea & = \\ 40\,lbs.coffee & = \\ 1\,quarter\,wheat & = \\ 2\,ounces\,gold & = \\ etc.commodity & = \end{array}\right\} 20\,yards\,linen$$

Such an expression no longer is merely social, for, as it is valid in society as a whole: it is *societal*. The value of everything now is measured in terms of the same commodity. It was in this form that the blanket became the basic unit of trade among Northwest Coast aboriginal peoples. Everything traded was expressed in terms of blankets. This was therefore a precursor to the money form; but in addition it had a form that it could be used: to keep warm. Here, then the value of all commodities but that of linen in the Marx and Engel's example and the blankets in the Northwest Coast First Nations case now is expressed in terms of the value of linen or blankets. All these commodities express their value simply, in elementary form, and unitarily, that is, with respect to the same commodity linen or blankets. The result of this development is that "value is elementary and the same for all, therefore general" (Marx and Engels 1962, 79). The value form is general because in every single trade relation of a society or nation, the same references – e.g. linen, blankets – serve to specify the values of all other commodities in the pertinent exchanges. The value-form comes to be articulated in *Das Kapital* [Capital] as a reified form of human societal life-activity (Ilyenkov 2012). This has the effect that the human production of life "now appears as a twofold relation – on the one hand, as a natural, on the other as a societal relation" (Marx and Engels 1978, 29). It is that same twofold relation that reappears in the introductory quotation from Mead's *Philosophy of the Act*. The natural relation here pertains to that between two commodities that are literally present in the hands of buyer and seller simultaneously – e.g. the coat and the 20 yards of linen; and in that same exchange there exists a social relation between the two people. The two relations reflect each other. Whereas this may appear mysterious when we use an object-oriented approach, the appearance of the twofold relation is a consequence of the transactional approach, where it is theorized as an event of *exchanging*. In this event, at least four strands come to be bundled; in other words, four strands (person 1, person 2, commodity 1, commodity 2) come to intersect and thus are related in and by the same event. Take out one of these

strands, and the exchange event will disappear. To Marx, therefore, the ideal (here value) is a societal product existing precisely *as* societal relation (an event) not merely *in* societal relation.

Value Forms A to C are expressions of a historical process from simple barter exchanges between individuals to complex economies. The ideal (exchange-) value of a commodity is an abstraction that completely differs from its use-value. The value does nothing to keep warm or quench the thirst, but the blankets, linen, and tea are used in the satisfaction of human needs. Value is an ideal form, a form of consciousness directly arising from the societal relations that turn 20 yards of linen, a certain number of blankets, and, later, money into universal measures. The ideal first existed as relation – *exchanging* as a form of Being – before it could *be* a form of consciousness (ideal, suprasensuous exchange value). We observe here how a commodity expresses (i.e. manifests) itself in two distinct ways, as material sensuous use-value and as ideal suprasensuous exchange-value. Once the system is established, every new commodity follows the pattern of all previously existing commodities and expresses its value in the same general form.

These considerations lead to what is going to be of central importance to psychological considerations: the societal nature of the ideal, general, and generalization. In the commodity exchange, the value form "has to have *societally* universal form" because "the object character of value of commodities," which is "solely the 'societal existence [Dasein]' of these things," "can be expressed only by means of its general societal relation" such that "the general value form … is the societal expression of the commodity world" (Marx and Engels 1962, 80–81). As a result, "the value form is ideal, although it exists outside human consciousness, independent of it, in the space outside the human head, in things, i.e., in the commodities themselves" (Ilyenkov 2012, 164). Alternatively, the value form might be said to exist in human life-activity, that is, in the evental forms of economic, mathematical, scientific, and any other mundane praxis.

The foregoing analysis shows that exchange-value expresses itself in the relation of people and things. It does not exist otherwise, because as the abstract and general, it cannot be found in the object (commodity, mathematical expression) or in the human (mind). Instead, the ideal is a recurrent form in the {unity | identity} of the *forms of (cultural) things* such as commodities or mathematical objects, which exist outside the individual, and *forms of dynamic life-activity*, inherently alive and societal in nature. Thus, "'ideality' as such exists only in the constant transformation of these two forms of its 'external incarnation' and does not coincide with either of them taken separately" (Ilyenkov 2012, 192). This transformation is a "process by which the *material* life-activity of societal man begins to produce not only a material, but also an *ideal* product, begins to produce the act of *idealization* of reality" (158, underline added). Once it exists as a recurrent and thus permanent form, the ideal functions as an essential moment of the material life-activity of the societal person, making possible the opposite process (event) of *materialisation* and objectification of the ideal. Ideality, appearing in the form of knowing-how, is entirely *societal* in nature, existing in societal, transactional relations (i.e. events) that cannot be reduced to self-identical individuals *inter*acting such as to produce the merely social.

The ensemble of societal relations – i.e. also society-as-event – is reflected in the relations among commodities generally and in the generalized value specifically. Value, the result of commodity relations, hides its own origin in generalized human relations. Thus, the "proper societal relationship of people of common labor (value) is presented by consciousness as occurring outside the societal relations of things, as consciousness of the suprasensuous properties of the latter" (Mamardašvili 1986, 109). The *ideal*, in the way developed here, is a recurrent pattern of the real material human life activity, which, qua activity, is theorized in this book as event. As relation involving material people and things, the ideal exists outside the head, outside the brain and thus accessible to all, as recurrent features of real relations-as-events.

From Commodities to Educationally Relevant Objects

Those objects of school subject matters – mathematics, science, social studies, or reading – are no less material and thus alive than economy. Thus, for example, related to school mathematics, the ideal includes mathematics truths (e.g. $2 + 2 = 4$), logical categories, topological structures, imaginary numbers, regularities in natural numbers, and, everything else that mathematicians investigate. It is precisely because of their materiality that these idealities exist as recurrent characteristics of in events, and, therefore, exist for those participating in public forums. This has been shown in the social studies of science even for the most abstract of subject matters, including mathematics and theoretical physics (e.g. Merz and Knorr-Cetina 1997). Thus, for example, mathematics "investigates the real material world, even though it examines it from its own special perspective, from its own specifically mathematical point of view" (Ilyenkov 2012, 183). As a result, if we were to "declare the topological structure to be exclusively a *psychological* phenomenon, as subjective idealism tends to do" then we would effectively "deny mathematical science, and in the end the whole of mathematical natural science, of the objective and necessary meaning of its constructions" (183). The ideality of mathematical forms therefore does not come from their mental characteristics, but from the fact that the material forms of events are only external expressions of something very different with which the material form has nothing in common. Thus, according to Marx, ideality is but the form of societal-human activity represented in an abstracted object-thing that reflects living objective and mundane reality. We might also say, conversely, that the form of human life-activity, which reflects objective reality, is represented as an inherently abstracted object-thing. If the ideal were to be approached as something existing in the human head, as "some purely psychological or psycho-physiological, mental phenomenon" then we would already be "helpless before a subjective-idealist understanding of the object of contemporary mathematical knowledge" (183). Instead, it is real precisely because it is not in the head that the ideal (i.e. "meaning") can be investigated anthropologically as a quality of real events.

Ontogenetic Emergence of Cultural Concept Words

Existing psychological approaches to the ideals and universals that children learn as part of their schooling experience tend to theorize the outcomes in terms of thing-like concepts and meanings that might exist in connection with other concepts to form conceptual frameworks. There existed attempts, however, to focus on concept formation as process – but nevertheless focusing on *the* concept and *the* meaning of the associated word-thing. In this section, I briefly sketch these approaches before describing and analyzing in transactional terms a classroom event in which a classification develops.

The Classical Approach to Concept Learning

One of the important and best-known classical approaches to concept learning presents children with objects among which they are to isolate, abstract, and generalize some perceptual feature that is common to all. For example, experimenters used cards with drawings that included borders and figures. In the classical case, the observations (facts) are clear, as there are only small, limited numbers of attributes; and the concept can be given in an unambiguous manner, such as "two figures and a boundary or two boundaries and a figure" (Fig. 7.1). It is apparent that in this situation, "concept" means a recurrence across percipient events related to the different drawings. This is an example of a conjunctive concept, because two types of features had to be combined to describe the class as a whole. Because the features common to those cards within a concept tended not to be visible on first sight, this paradigm was also used to study the formation of hypotheses. The children (subjects) were told to identify/discover the concept given instances and non-instances

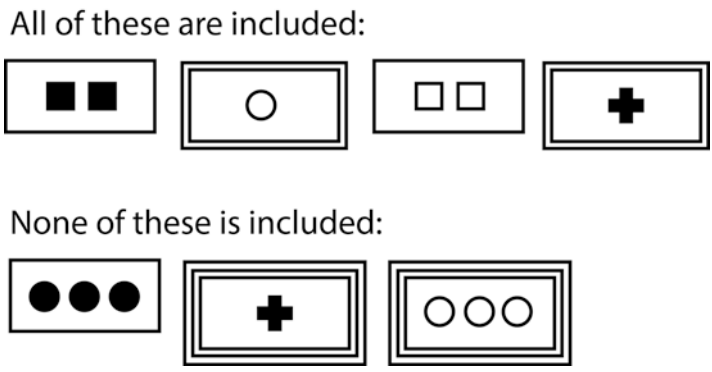

Fig. 7.1 The classical concept-learning paradigm consists of tasks where the child is asked to perceptually isolate and identify those features that make the concept, here *two* (borders or figures) *and one* (figure or border)

thereof. The same types of materials were included in the early science curricula that emphasized "hands-on" approaches, because doing these tasks were thought to develop the ability to generate and test hypotheses and, thereby, also develop the ability to form concepts.

The Genetic Approach

Although reigning in the 1950s and 1960s, this classical concept-learning paradigm had already been rejected much earlier. Because the approach focuses on the perceptual process, it was held to ignore the function of signs generally and words more specifically in the concept formation process (Vygotsky 1987). The descriptions of concept formation thereby come to be overly simplistic, failing to make visible the determining role of signs (language). It is but the reversal of an older idea of concept formation that had been concerned entirely with the learning of definitions. Both approaches fall short of presenting good theories of concept learning, for the concept-learning-by-definition approach begins by isolating language from the objective material, whereas the concept-learning-by-extraction-of-perceptual-features approach begins by isolating the perceived material objects from the use of language and non-language signs (i.e. Vygotsky uses the term *sign* where we should be using the term signifier, because sign is a relation not a single thing). Vygotsky then presents a better method for studying the development of concepts. In this method, both the words and the concepts are new. During the learning period, the participants manipulate a number of objects provided to them and for which artificial names are provided. The features of the concepts are not describable by means of everyday language. Vygotsky, however, did not critically interrogate the fact that the subjects even in this improved paradigm were not operating outside of their own life history. Indeed, he approvingly states: "the subject's resolution of the task that faces him in the experiment presupposes no previous experience or knowledge" (Vygotsky 1987, 122).

In the text on the development of concepts, Vygotsky does recognize at times that word-meanings and concepts are alive; but once a concept has formed, it is treated as a thing. In presenting concept formation, he fails to take into account the function of language in the relation between humans. That is, in his discussion, he only focuses what is represented in Fig. 5.7 as the relation between the plasticine form and the mystery object. The text does not consider the double relation of person to another person – e.g. the experimenter, to whom the child participants responded and for whom they performed – and the relation of persons to things. Vygotsky does note however that some goal that orients the activity is required, though the goal does not explain the work (event) but that instead, just as tools in the context of labor, the use of concepts needs to be explained in terms of language. Crucially, he considers signs (i.e. signifiers) generally and language specifically as *mediators* of higher psychological processes – which points to his ontology of doing psychology in terms of self-identical things. The sign (signifier) is a means to mas-

ter and direct psychological processes. The word specifically is described as the means to concept formation, and subsequently shifts its function to become the symbol for the concept.

> On a game board divided up into fields, about 20–30 wooden figures resembling draughtsmen are placed in one field. These figures are differentiated as follows: (1) by colour (yellow, red, green, black, white), (2) by shape (triangle, pyramid, rectangle, parallelepiped, cylinder), (3) by height (short and tall), (4) by planar dimensions (small and large). A test word is written on the bottom of each figure. There are four different test words: "bat" written on all the figures small and short, regardless of their colour and shape; "dek," small and tall; "rots," large and short; "mup," large and tall. The figures are arranged in random order. The number of figures of each colour, shape and of each of the other attributes varies. The experimenter turns over one figure – a red, small, short parallelepiped – and asks the child to read the word "bat" written on its exposed underside. Then the figure is placed in a special field on the board. The experimenter tells the child that he has before him toys that belong to children from some foreign country. Some toys are called "bat" in the language of this people, for example, the upturned figure; others have a different name. There are other toys on the board that are also called "bat." If the child guesses after thinking carefully where there are other toys called "bat" and picks them up and places them on a special field of the board, he receives the prize lying on this field. The prize may be a sweet, a pencil, etc. … The experimenter asks why the child picks up these toys and what toys were called "bat" in the language of the foreign people. Then he has the child turn over one of the figures not removed and finds that "bat" is written on it. "Here, you see, you made a mistake; the prize isn't yours yet." For example, if the child picks up all the parallelepipeds regardless of their colour and size on the basis of the fact that the model is a parallelepiped, the experimenter has him expose the unremoved small short red circle "bat" similar to the model in colour. The overturned figure is placed with the inscription up alongside the recumbent model, the figures removed by the child are taken back, and he is asked again to try to win the prize by picking all the "bat" toys on the basis of the two toys known to him. … The game continues until the child picks up all the figures correctly and gives a correct definition of the concept "bat." (Sakharov 1994, 94–95)

From this experiment with subjects of a range of ages (children, adolescents, and adults), it was concluded that only participants after the transition into adolescence exhibited mastery of the process of concept formation. In that phase of their life, participants made "functional use of the words for the purpose of directing attention, partitioning and isolating attributes, abstracting these attributes, and synthesizing them" (Vygotsky 1987, 130). As a result of a complex activity, during which the participant operates on the word or sign (signifier), the researchers observed concept formation and the "acquisition" of word meaning. On one level, the events in the second-grade mathematics classroom described in Chap. 5 can be understood in terms of Vygotsky's approach to concept learning, which he denotes by the term *dual stimulation*. In dual stimulation, the subject is presented with tasks that involve two sets of stimuli, one functioning as the material object – the mystery object in the case of the three girls – the other functioning as signifiers to facilitate the organization of this activity.

It is quite apparent that in this presentation, the word and its meaning obtain thing-like quality. There is a transitive relation between subjects and the words or signifiers that they operate on, and word meaning is acquired as children acquire a toy, download a piece of music, or purchase a piece of furniture. Of particular inter-

est here is also that Vygotsky does not write about the experimenter and the experiment or about the subjects participating in a particular form of activity, which is research (i.e. a societal activity) on the learning of recurrences. And yet, he does employ process terms, pointing out that the *process* of the formation of concept is irreducible to other processes, including "association, attention, representation, judgment, or determining tendencies" (Vygotsky 1987, 131); but then again, he writes about these same as function-things. The key aspect for Vygotsky is *mediation* that begins to occur in the transition from childhood to adolescence. The basic difference between the forms of thinking and intellectual activity before and after concept formation "consists in the *transition from unmediated intellectual processes to operations that are mediated by signs*" (133). In this statement is expressed precisely the situation represented in diagrammatic form in Chap. 5 (see Fig. 5.1). Vygotsky thereby focuses on a purely *transitive* relation between the person and the environment, which includes the task (objects), the signs written on them, and the relationship to the experimenter. He does not actually provide a description that would have been consistent with the *sociogenetic approach* noted elsewhere; and he fails to attend to the intransitive dimensions of life that can be understood only in the evental terms of a transactional approach. In his work on concept formation, he does not address what he stated to be the essence of all learning and development: every higher psychological function *was* a social relation with another person (Vygotsky 1989). In the experiments, concept development and the signifier use are made out to be accomplishments of the children working on their own. All reference to the cultural-historical determinants in development is absent.

In the transactional approach developed here, processes would be thought of as events, that is, in categories that have the quality of events rather than things; and, as the attentive reader may have sensed, the concept formation process is conceived as an ensemble effect in which the lifelines corresponding to the different constitutive processes are brought into an active relation, into intersection. Vygotsky does however point out that the motive of the activity – task, goal, or need – emerges for the adolescent subject in the social setting of the experiment. It is in this way that thinking develops to operate with words and to form concepts. That motive, therefore, is not inside the individual but outside and concretely available: it is social. Vygotsky, however, was not conceiving of the relation of events as events, and how two separate events come to be related in an event that intersects and thus is common to both. During this event, each of the originally separate events come to be immanent in each other; and the event that intersected both comes to be part of their common history (cf. Whitehead 1919). The concept formation Vygotsky describes is something that has to be attributed to the experimental occasion as a whole; and there are likely other forms of occasions where such a development can occur and is initiated.[2] Thus, one important form of occasion is schooling, which leads to very different categorization and category formations than when people have not attended

[2] Development is another phenomenon that Vygotsky did not theorize in evental terms. He has the child as the subject of the phrase, who develops – "the child develops …" – whereas operating with evental concepts would take development to be the subject: "There is development of the child …"

schools, as seen in the different ways in which Russian peasants categorized colors (Luria 1976).

Whatever Vygotsky may have had in mind, or whatever development there was in his thinking, his descriptions lend themselves to the individualist and (social) constructivist readings characteristic of interpretive psychology (as distinct from scientific, physiology-oriented psychology). The living, social-material environment is a condition for the adolescent to evolve the particular forms of thinking. Piaget might have said that there are processes of accommodation and assimilation that lead to an equilibration. Vygotsky does not at all talk about the relations between participant subjects, experimenter, and other aspects of the environment making it as if the participants developed something internally. The English translation of the work – which consistently uses the adjective "mental" rather than psychological that better renders the adjective that the psychologist used in his native Russian (i.e. psikhicheskij) – contributes to the mentalist take on development that manifests itself in the work.

Learning Geometrical Concepts

In this section, we take a look at how ideal forms emerge in the course of the life of a second-grade classroom on the day that they begin a new curricular topic: geometry. At this point, the children do not know any formal geometry – which is why it made the topic of this part of their curriculum; and yet, as shown in here, the children participate in and contribute to the emergence of geometrical categories, that is, to the emergence of ideal mathematical forms. Their participation must not be understood in terms of receiving something (e.g. information), or in terms of being *scaffolded* into a cultural practice. Instead, the children are constitutive of the event in the same way as are the two teachers cogredient in the occurrence of the lesson. Mathematical forms are abstractions, as shown above in the historical considerations of the emergence of geometry in ancient Greek culture; that is, these inherently material forms are recurrent across occasions. In this lesson, the abstractions will come to be expressed in the grouping of mystery objects that the children pull from a black plastic bag preventing them to see the object they are to pull and then to add to the classification scheme that is emerging before their eyes as a result of the activity and in the middle of the circle they form on the floor. The lead teacher (Mrs. Winter) had set up the task by talking about the shape of objects (a cube), that they were sorting objects but not by size or color. Mrs. Winter pulled an object from the plastic bag and placed it on the floor on a colored mat made from heavy paper. She then laid another colored mat on the floor and said that after having pulled an object, each child task was to decide: "does that shape match or belong in the same group with the one I put, or any of the other ones out, or does it need its own new colored piece of paper to sit on."

In the course of the lesson, in fact, *as* that living curriculum, a configuration of mats and objects comes to life on the floor as seen in Chap. 3 and as reproduced

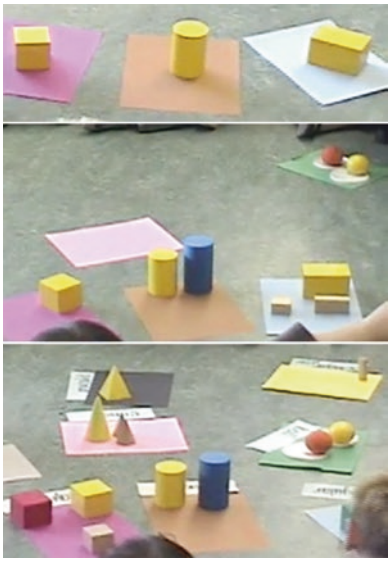

Fig. 7.2 The configuration on the floor is not stable but continuously changes as more and more objects and mats are added, moved about, etc. To understand this emergence requires a transactional approach, where the minimum unit is itself an event rather than a state at a fixed point in time

again here (Fig. 7.2). The configuration is emergent and living; it is therefore appropriate to model it as an event. This event of the emerging classification scheme includes and consists of an entire series of mini-events or phases of the larger event; the coming to life of the configuration *extends over* these phases (mini-events) in which the different geometrical categories take shape. Each of these categories tagged with labels in the course of the emergent classification – e.g. cube, rectangle, cone, pyramid, and sphere – is an event realized in the coming together of different mystery objects that are said to have something in common even though they are different in size and color. Each category exists in the form of an ensemble of forms. In terms of the analogy developed in Chap. 2, each category exists like a strand made from fibers as the trajectories of the objects come together and for a while relate because of their spatiotemporal location on the same colored sheet of heavy paper. We therefore have an emergent relation of things, which, at the end of the lesson, will have come together in groups of material things. But that coming together, that relation between things belonging or not belonging into the same group is tied up with the event of the relation between people, as shown in the subsections that follow with respect to different aspects important to the knowing and learning of mathematics. Just as in the example of exchange-value, which is an expression of the twofold relation of people and things, the geometrical categories will be existing, after the lesson event will have ended, as the expression of the twofold relation of people (students, teacher) and things.

In the end, all 22 mystery objects will have found a place on the floor. They manifest an aspect of the classical concept-learning paradigm in that each mat corresponds to a class of included objects standing over and against all the other objects that are elsewhere on the floor (on other mats) and thus not included. These other objects do not form some oblique class, as in the classical case where they were grouped as "non-included" (Fig. 7.1), but instead have their place in another group

of objects relative to which all others were "non-included" objects. The result is a complete (exhaustive) category system – e.g. temporally last arrangement in Fig. 7.2. The lesson shares similarities with the above-discussed paradigm used in the experiments of Vygotsky and collaborators. In those experiments, the nature of the four groups was emergent – for the research subjects – and predetermined by the names found on the back of the objects used. In those experiments, therefore, there was a hidden order, which all participants knew to be known by the experimenter but (initially) unknown to them.

The mathematics lesson provided opportunities for learning these geometrical categories before any formal rules for inclusion and exclusion were specified (e.g. six equal faces, eight corners, and twelve edges for the cube). The concepts do not exist in the form of abstractions but in the form of groups (classes) of actual material objects. Within a specific group, each object, despite its differences with other objects on the same mat, is a manifestation of the category. By the same token, the category is known not abstractly – by means of definitions – but concretely, in the plurality of expressions available on any particular mat. The underlying method has been called the *documentary method* in concept learning (Roth 2017). This method originally was described as being used by investigators of cultural objects: How does the investigator of a cultural object – e.g. impressionistic painting – know and investigate the phenomenon? Subsequent studies have shown that the documentary method is used across a wide range of societal situations where people are involved in finding out about something that they do not already know (Garfinkel 1967) – e.g. how does a coroner find out the exact cause of death? As a means for investigation, the method works like this. The investigator takes some observable fact as a concrete manifestation of the phenomenon of interest – e.g. a painting by Claude Monet, a composition by Claude Debussy, or a poem by Arthur Rimbaud. All these cultural artifacts produced during a particular year or period of years may be taken to be concrete manifestations of the spirit of the culture. Whereas sociocultural studies recognized the role of the sensuous material in the formation of concepts, its mentalism is clear in viewing the concept as something abstracted from the concrete. It is said that the sensuous material is perceived and transformed to give rise to a mental thing: the concept. But in the documentary method, the concept exists only in and through its material forms. It is similar to what has been described as *family resemblance*, where the "various resemblances between members of a family: build, features, color of eyes, gait, temperament, etc. etc. overlap and crisscross in the same way" (Wittgenstein 1953/1997, 32). Games, including that in which mystery objects are grouped on the floor, form families.[3] The spirit of the times thus is known only through its concrete manifestations. Impressionism, for example, is not something abstract but known through its many concrete manifestations that are made reference to in relations with others. In the present lesson, the categories exist for the children in the same way, as concrete manifestations of ordering objects other than by color and size, an order that will be characteristic of geometry, the

[3] In Wittgenstein's families, there does not have to be a single property (characteristic) that is common to all members, unlike the "families" in the classical concept formation paradigm, where there are two or more characteristics in common to all those within the family.

subject that they do not yet know but are in the process of learning. Indeed, the concrete classification on the classroom floor is the first manifestation of their learning trajectory. The different categories are forming while existing individual or bundles of lifelines (moving objects currently *holding* a position) come to be augmented by an additional one (e.g. two objects on a mat that are joined by a third object after it has undergone an extensive trajectory over and above the existing configuration on the floor, as in the following sections), or a new category is formed in the conjunction of an object with an empty colored mat.

Reasoning Work

In this subsection I demonstrate in which way mathematical reasoning, in being communicated and thereby implying its intelligibility, inherently rather than accidently manifests itself in and as social event. The analyzed phase of the lesson begins after Connor had been invited to come forward, pull an object from the bag, and then place it. There is a description of what is to happen: that it was his turn and that he had to explain his thinking. We can hear an invitation: "Now look at the groups (Mrs. W gestures over the configuration of mats and objects), does it belong to another group or can you start a new group with that. The placement of the object (turn 1) accomplished by Connor and seen by others is the reply, that is, the second phase of the act of responding. The statement, "why does it get its *own* category now" (turn 3) not only presupposes and implies a norm but also, in requesting, "you have to explain your thinking," the respondent is held accountable to the actions that preceded (i.e. the placement of the mystery object on its own mat). If a new category is formed, then there must be something different; and this difference has to be accounted for in terms of a reason. That is, what Connor has done is treated as not conforming to a norm that is yet to be enacted. The statement thus formulates what will eventually be emerging: the mathematical norm of tying a mathematical action to its account (reason).

Fragment 7.1

1 C: ((*Places object on empty mat*))
2 (1.08)
3 W: NOW. befORE YOU GO ((*Holds right hand out in "stop" configuration*)) you have to explain your thinking. why does it get its OWN group now.
4 C: cause this one is sort of (0.32) bigger than the other ones? ((*He has walked back and now stands over his object.*))

In the fragment, this tying of action and reasoning has not yet happened in its entirety: it is an event in its unfolding and it is flagged as happening. Its first phase, the categorization, has happened; and this statement, which is articulating that something is missing and thus also is issuing an invitation for the remainder to come forth, is, at this stage, part of the joint work that will have made the event happening. That invited articulation of a reason is accepted in the forthcoming of a reply in which the size appears as the decision criterion.

The norm of tying a mathematical action to reasoning is an event that plays out in the public forum of the circle. The event and every one of its phases make sense as something that is happening. There is nothing that is not already intelligible. The event is observable as such in the sequentially organized turn taking. Indeed, the act that ties categorization and the articulation of its underlying reason exists *as* the relation, for the very speaking that provides the reason for an antecedent categorization also is the relation between the two people (Connor and Mrs. Winter). Mathematical reasoning is social because it is witnessable and observable in and as that real turn-taking relation first. If it did not or could not exist for two people, it would not exist at all, as an object of consciousness. What we observe here has the twofold relation of people and things (which may be in the form of the topic of talk) described above. When at some later point in the curriculum this tying of action and reasoning was observed in the actions of individual students, it was no less social through and through – because it was intelligible as a way of proceeding in this and subsequent mathematics lessons. This was the point made in the fragmentary text "Concrete Human Psychology" (Vygotsky 1989) from 1929, but which the author did not consequently implement, for remnants of individualistic approaches to concept learning appeared in the subsequently completed but posthumously published work on concept formation discussed above. To show the social nature of the work of mathematical reasoning, I draw on the framework laid out in Chap. 3, augmented here by an articulation of the structure of practical actions from the perspective of the sociologies of the visible order (Garfinkel and Sacks 1986). These sociologies focus on the public nature of the inherently joint work event by means of which the visible (social) order is accomplished such that people always are aligned as to the sense of what is currently happening.

The recurrent pattern of the practical action, categorizing by shape, may be denoted in this way: "doing [sorting by (geometrical) shape]." The "doing" refers to the actual work, which is a form of event and has to be theorized in terms of evental categories. The parenthesized statement "sorting by geometrical shape" is a gloss of the type that members (e.g. the two teachers in the classroom) use to characterize this work. Mrs. Winter had articulated such a gloss at and as the beginning of the task, in saying "when we do our any kinds of sorting activities today, we're not going to do them by color and we're not going to do them by size." This gloss, here, is something like a recipe (instruction) that the children are asked to follow. The actual work of the sorting was accomplished 22 times during the task, in and as micro-events that produced this part of the lesson. The work of sorting was completed in and as *joint* work. Sorting, as event, involves two phases: (a) the act of attributing an object to a group that in this classroom has or does not yet have a

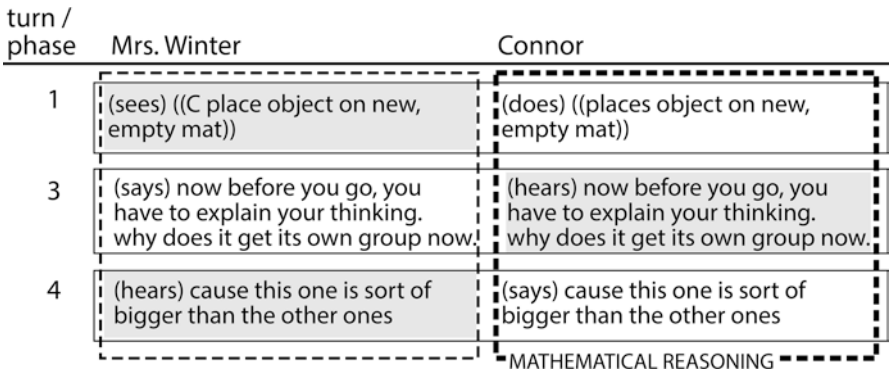

Fig. 7.3 Mathematical reasoning is a micro-event that (asymmetrically) exists for both. It is the micro-event that intersects both lifelines, which thereby come to be immanent in one another. Reasoning exists in a twofold manner: *in* and *as* the relation

name and (b) the act of stating a reason for the attribution. We notice in the lesson as a whole and in this fragment specifically that event "acting + reasoning" already is intelligible and makes sense. From a classical psychological perspective, the children already know how to sort and reason in an intelligible way, though the specific permanences used are not those that would be typical in a mathematical context (i.e. color and size). *Specifically* mathematical *is the characteristics of the classification, "by shape," and the tying of the placement to its specifically* mathematical *account (reason)*. In other subject areas, like the fine arts, different classificatory characteristics would have brought out the specificity of those fields, including those that sort objects by color and size. There is nothing outside the children that would not already be inside; and, conversely, there is nothing inside that would not already be outside.

In the traditional psychological literature, every phenomenon is reduced to the actions of individuals; and these actions are causally linked to supposed contents and structures of the individual mind. This literature would focus on the fact that Connor (a) did not provide the reason for his sorting action without solicitation and (b) provided a reason that is inappropriate in the mathematical context. The socioculturally oriented part of this literature might highlight that the teacher, in soliciting an explanation, "scaffolded" Connor into providing one, even though the forthcoming reason is another instance of what has repeatedly been described as inappropriate: sorting by size. The transactional approach allows us to see that the event as a whole exists for Connor, as it does for Mrs. Winter, in all of its phases though it does so asymmetrically. For both individuals, all the phases of reasoning exist (Fig. 7.3). This is so because Connor not only is categorizing the object and articulating a reason but also he is actively attending to Mrs. Winter and receiving the words; the same phases of mathematical reasoning exist for Mrs. Winter

(Fig. 7.3).[4] Thus, (a) the relation of Mrs. Winter and Connor and (b) their relation to mathematical reasoning as a witnessable event are happening in and as the same micro-event in the event that brings forth the ultimate 23-object configuration as a whole (one object placed by each one of the 22 children and the first one that Mrs. Winter placed). The upshot of this description is that there is nothing for Connor to internalize, as studies avowing to a sociocultural framework or taking a sociocultural lens often state in taking up from Vygotsky. In fact, the representation shows that from the very outset in the event sequence, there was nothing *other* that was not already Connor's own. There is but a steady coming and going, in the event that intersects both lifelines in precisely those parts shown in Fig. 7.3. There is nothing coming from the outside that is not already on the inside, for what is outside is so precisely because we experience and comprehend it as such on the inside (Mikhailov 2001). This is why any form of mind, here taken as an event, is possible only at the interface between people, which exists in the form of an event where multiple lifelines intersect.

The lesson fragment exemplifies how the children, in their first geometry lesson, did not on their own tie classificatory actions to accounts. Like Connor, other students as well were placing their objects on separate mats and then were retreating towards their places in the circle without having provided a reason that "explained their thinking" (cf. Gina in Chaps. 1 and 3). Explaining one's thinking is not inherently part of human practices. For example, in other occasions, such as the work of a fish sorting facility that I observed in a hatchery, the workers were not asked to provide verbal accounts (Roth 2005). Instead, the *placement* was taken as an account of their thinking; and when the placement of a specimen was error, then another worker would complete the corrective action by placing the specimen on the correct conveyor belt. The work set up for a group was accomplished by the group. There was never an issue over and about the "wrong" placement of a fish on the part of an individual worker. In other contexts analyzed in the same study, such as exploratory work in scientific research, classifications required reasoning, which was embedded and materialized in evolving operational definitions that specified group membership. In the same way, reasoning is specifically mathematical only in the tie of an action recognized as mathematical and of a specific intelligible verbal account that provides a justification of the action. That tying of action and justificatory account was one of the mathematical norms observed later in the unfolding geometry curriculum but that was a micro-event observed early on in the mathematics lesson in the relation between people. How then did that mathematical norm emerge? In that it was social relation first: it *was* the social relation, which was unfolding as event over the course of three turns at {talking | listening}.

Some readers might be tempted to suggest that an instance of scaffolding has occurred. But in the transactional approach it is not that Mrs. Winter, the teacher, "scaffolds" the student Connor or provides for the conditions that create some zone

[4] This description is consistent with recent neuroscientific research according to which the two events doing something and observing someone else doing it both are associated with the same neuronal events (Rizzolatti et al. 2006); and the micro-events of hearing action phrases were associated with (mirror) neuronal events observed when the individual actually does what the phrase describes (Buccino et al. 2005).

of proximal development. These terms imply that Connor somehow puts everything together himself, in the privacy of his mind, and that the teacher, just as a scaffold in construction work, is external to that internal construction for which it is providing but a context. The representation (Fig. 7.3) clearly shows something else at work. There is an interlacing of two lifelines, which occurs in the event of doing and talking together, an event that only exists in their doing and talking something together. There is a dual situation in that they find themselves *in* the event of doing and talking and listening to each other but this event also is the result of their doing and talking together. The three-turn exchange sequence manifests and reproduces a social relation. And it is *as* that relation that the mathematical norm {categorizing + providing reason} exists. Connor participates in the event. He can witness the event in its unfolding, though he may not grasp it (as a whole) until it has ended and until it has become some definitive event that can be characterized by some event of indicating (i.e. abstraction, abstract description). Everyone else in the room not only witnesses the micro-event – i.e. Connor's turn at categorizing and reasoning – but also is constitutive part (in the form of event) of the living-evolving, configuration-producing event as a whole. The mathematical norm is not somehow hidden *in* the relation with the teacher: the relation *is* the mathematical norm. That is, the norm that binds a placement and its reason together first (i.e., during the first lesson) exists as a relational order, as a social relation; the same work that produces the relation also produces the tie. And that social relation, the relational order, is at the origin of the norm – rather than some sort of negotiation or scaffolding as this is described to be in other research traditions. It is as the sequence of classification, solicitation of thinking, providing reason—a sequential order of the distributed forms of *joint* work that constitute the different phases of a single event. It is in the event that Connor and the teacher are part of all slots. It is in and as this relation that we first observe the norm of classifying (sorting) three-dimensional objects. That order at work is witnessable by those present: classificatory action followed by provision of reason. Inherently what has happened, qua a distinguishable event in a stream of events, is available only after the fact when the (micro-) event has come to an end, is "complete in itself, standing out because marked out from what went before and what came after" (Dewey 2008a, 43). It first exists in the sequential turn-taking order of student (S) and teacher (T) in the form S-T-S and later in the lesson sequences observed in single turns S (e.g. Melissa and Jane in Chap. 5). That is, there is a shortening of the relational order S-T-S ➔ S that parallels the passage from {classifying | requesting accounting | accounting} to {classifying | accounting}.

There is a second way in which the S-T-S sequence of events is important. The phrase "Before you go, you have to explain your thinking" not only de facto invites an explanation to which it is the conditioning initial phase, but also constitutes a critique of what has been done before. The invitation to explain thinking that apparently has occurred also constitutes an evaluation that the explanation has not yet been provided. It is an evaluation of what has preceded, that is, the event of placing the mystery object on a mat of its own. The work of this statement may be glossed in this way: placing an object alone is insufficient as an appropriate act in a mathe-

matics lesson. It is thus precisely here – in the evaluative function that that middle turn falling to the teacher takes – that anyone who cares can find out whether what has been done does or does not conform to some (sociocultural) norm. We see this at work when Connor (as others in this classroom) eventually uses size as the reason for the placement (turn 4). He does so even though Mrs. Winter might be taken to have *made clear* what she wanted to occur: not sorting according to color and size. Connor has an opportunity to find out that his actions do not conform to the rule to be learned when Mrs. Winter, in the next turn, marks his explanation as inappropriate (see turn 5 in Fragment 7.2 below). On the other hand, when a {placing | providing reason} micro-event passes, children can discover the norm *as* the form of the relation that has just passed. This not only holds for what the norm can be said to state explicitly but also to any contingency that the rule/norm may be said to imply. This phenomenon is known as the "etcetera clause" (Garfinkel 1972, 28). What a rule or norm (and the implicit agreement) does or does not state can therefore be *discovered* after the fact. Thus, it is not that students *first* constructed the norm and then behaved accordingly, as this tends to be described in the literature. Instead, the children are afforded to discover a rule when immediately preceding actions (micro-events) are marked in the next phase of the larger event in terms of conformity or violation of the norm. This is not unlike children learning the grammar of their mother tongue, which they learn to speak before any grammatical rules are stated and even comprehensible.

More generally, any explicitly stated rule or norm (e.g. "no sorting by color or size") only makes sense if the domain within which it operates is already known. This is why the earliest approaches of concept learning from definitions totally failed. Vygotsky's subsequent work, as illustrated in the description of the new experimental method provided above, failed to take into account the relationship with the experimenter, especially in the case to be discussed below concerning rules of exclusion. That is, the children can learn the rules of the game of sorting only when they already know the game in some way, just as children learn the grammar of their mother tongue only *after* they already know to speak generally – and indeed, only after they already speak (mostly) in grammatically correct ways. Those instructions that were part of the sorting game – such as (a) sorting but not by color and size or (b) sorting and providing reasons – make sense once you already know how to act in the ways that the instructions describe. This is why Marx and Engels (1978) state that consciousness is conscious Being and that consciousness of praxis arises in and from praxis rather than that consciousness is creating some praxis. In more than one way, therefore, rules and norms do not *determine* (cause) their practical actions. Whether an action is following a norm, plan, or instruction always is available only after the action (event) is completed. This does not mean that plans, norms, or instructions have no purpose. But they should be understood as orienting actors. As abstract descriptions of happenings, their use makes sense only after the associated action has been completed. In school classrooms, it is through the teacher that such evaluation of an action as consistent or inconsistent with a norm occurs. It is as that turn – a slot in the conversational routine that falls to the speaking of the teacher and to the corresponding listening of the children – that culture comes into play.

When the action is in accord with the norm (rule), as determined in and by the exchange, when the reasoning has been provided and when the content is appropriate, then other students may add to the reasoning or another student may have a turn. If not, as seen in the next subsection, other phases come to be added to make the entire event named "Connor's turn." It is when there is an invitation to reconsider a classification and reasoning that the divergence between norm (rules of the game) and the foregoing action comes to be stated publicly. The relevant member of the group is thereby also held accountable. When Mrs. Winter – in the fact that she initiates continuation after some statements but initiates repair work after others – selects among actual statements made and thereby marks an account as adequate, children are afforded to see (hear), in what they have done, the in/appropriateness of their preceding action.

Excluding Work

At the beginning of the task, and repeatedly throughout the formation of the classification (system) Mrs. Winter exhorted the children: "When we are doing any kinds of sorting activities today, we're not going to do them by color, and we are not going to do them by size." She thereby provided a gloss of the work to be done on that day. In the course of the lesson, Mrs. Winter was repeating (or asking for repetition of) this statement right up to the end of the classification (game). Even though, children were using especially size in their explanations of the reason for a categorization (grouping). Many educators and researchers may take this "failure" as an occasion to talk and write about children's lack of ability or the appropriateness of the lesson. But these events may be viewed differently, for example, through the lens of the idea of *losing the phenomenon*, which is central to and distinctive of the discovery sciences (Garfinkel 2002). This author suggests that many investigators fail to appreciate the nature of the sciences (including mathematics) in focusing on some crucial experiment as an already accomplished – i.e. through the lens of *an* experience that is to be repeated in the form described. The original experimenters are not in that situation, for they do not yet know about the existence of a phenomenon and thus are facing losing as much as observing intended phenomena. Indeed, much of scientific discovery work exists in finding out the conditions that lead to the loss of the phenomenon and thereby finding out what not to do as much as what to do to be able to observe it. It is thus important in the discovery sciences to know about all the different ways in which something goes wrong, which allows them to discover why to do or set up something like *this* rather than in another way. Thus, for example, once astronomers in one study had a first hint that there might be a new phenomenon, a pulsar, it took an entire night's work before its existence was ascertained (Garfinkel et al. 1981). In that work, finding out how the phenomenon goes away was just as important as knowing where and how to make it appear. The same can be stated in terms of the classical concept-learning paradigm: a concept is defined as much by the material entities that belong to it as those that do not. In the present

situation, mathematical categorization and reasoning is as much defined by what you can do and say as it is by what is not done and cannot be said. One part of what the children are producing and thus participating in is an event of the type {doing [classifying according to rules that exclude color and size]} when the work is successful but which takes the form, in the case of Connor and some other students, of {doing [classifying according to size]}. The movement from the latter to the former type is part of the work of {teaching | learning}, which eventually leads students to sort and classify according to accepted and thus acceptable rules.

Fragment 7.2 presents the continuation of the event the preceding phase of which appeared in Fragment 7.1. In the room, we can hear the commentary and critique of what has been said in the statement "that's size" (turn 5). There is an explication that it is to be remembered that the activity is not about telling size and that size and color are not counted (as legitimate reasons) (turn 6). We then hear the offering of another invitation and for another explanation (turn 10 and turn 12).

Fragment 7.2

5 K: that s[ize.
6 W: [Connor
((*Connor picks up his object*)) just a minute stop for a sec. (0.53) remember WE:Re not telli counting si::ze (0.62) ((*pulls up left-hand index finger with right index*)) <so thats bigger or smaller, and we are not> cou:nting co:lor.
((*pulls middle finger, as in counting 1 then 2*)) ((*C is looking at her until she is done, with his object in his hand.*))

7 (0.50)
8 C: °°this (0.21) um°°
9 (0.99)
10 W: SSo how is it this? (0.24) different now.
11 (0.83)
12 or the same as other shapes.
13 (0.23)

The statement in turn 6, about not counting color and size as reasons, follows another statement in which size was provided as reason subsequent to a first invitation. (We see here that one phase of the event of Connor's turn leads to another phase, and that the event as a whole cannot be reduced to the parts precisely because *this* event in its actual unfolding is contingent in its existence on all the parts.) As the fragment shows, not just any account suffices in the context of this mathematics lesson. Color and size are discounted; color and size as integral parts of the explanation are not approved. In this, children participate in a form of activity (game) that

explicitly excludes certain descriptions (properties) of objects – those pertaining to color and size – that may not be used as the basis of accounting for categorization. Children are participating, but not as if they were independent things (subjects) in an activity that is thought like a box or like a network of things (e.g. as this is made out to be in the triangle often used by those subscribing to a version of cultural-historical activity theory). The implicit rejection of Connor's account – not in the form that the event is taken but in the particulars of its content – does not mean that the classification itself is incorrect. It is the pairing {object ↔ verbal account} and the nature of the second part that is at issue in the context of this lesson.

For that verbal account to be provided, which has to correspond to the result of the (classificatory) action, only some statements are accepted and thereby marked as acceptable in and as the exchange between teacher and students. The acceptable ones are those that at the time unbeknownst to the children conform to the historically evolved mathematical norms – whereas others, though legitimate in other contexts such as fine arts lessons, are marked as not being legitimate (e.g. classifying by color or size). The desired norm provides for the orderliness of the lessons marked "mathematics" as an aspect of the mathematical world it promotes: both in how it is produced and how it is recognized. Thus, when sorting (categorizing) by geometrical shape is linked to a mathematical account – in form and content – then what has been done is thereby marked as recognizably *mathematical*. Members to the occasion see that something was mathematical when it can be described by the rule grouping without making reference to size or color.

Attending, Perceiving, Comparing Work

In the review of the Vygotskian take on concept learning provided above, it was noted above that he suggested the link between a concept and the sensuous material upon which is formed; and he noted that there is perception and transformation occurring to lead to any resulting concept-thing. The transactional approach goes further in that it takes any characteristics that may be perceptually identified as recurrences in sensuous experience and percipient events. The neuroscientific research cited above seems to suggest that events are recognized because of events within systems of neurons that mirror action-producing neurons. It would therefore not require for concepts to exist as an abstraction in some otherworldly form but simply in the recurrence of neuronal events that mirror recurrences in percipient and action-related events. At a more public level, classifying involves micro-events the unfolding of which exist in the public forum where they are initiated and into which any results return. Thus, for example, classifying by shape requires attending to and perceiving recurrent forms that are different from other recurrent forms when a comparison occurs. All of these micro-events and phases are conditions for classification; and they can be seen to be playing out in the public arena in the same way as the actual placement of an object on a specific mat (its own or on one already occupied).

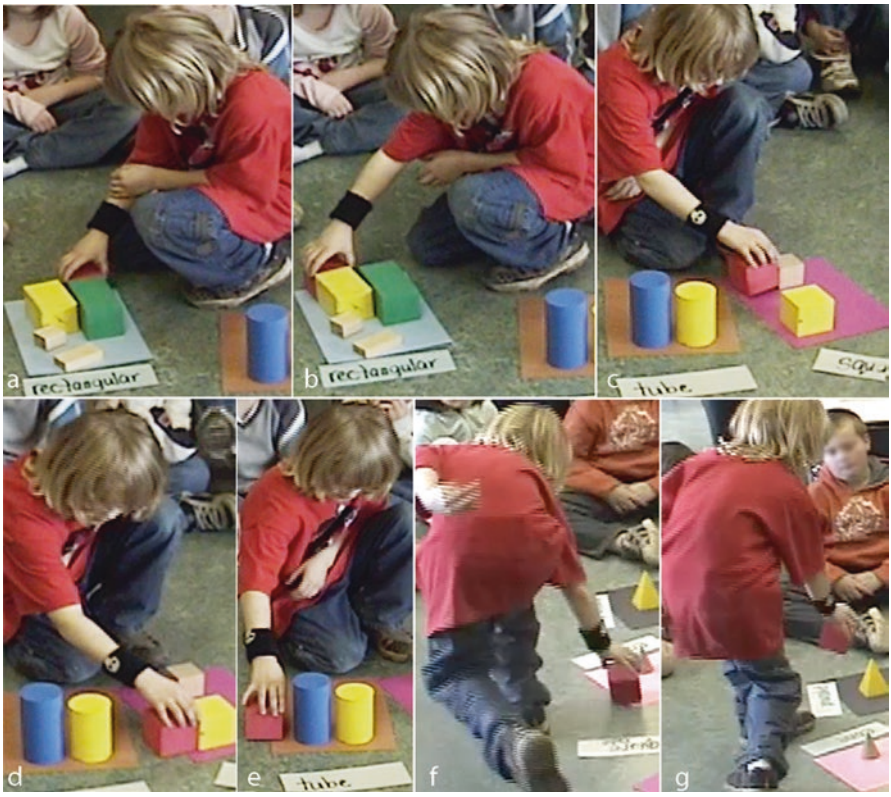

Fig. 7.4 Three phases in the event of comparing the (red, cubical) mystery objects to objects in other groups: (**a**, **b**) Comparing to mystery object to the "rectangulars"; (**c**, **d**) comparing it to the "squares"; and (**f**, **g**) comparing it to the cone and pyramid

These aspects also play themselves out in the lesson event of building a classificatory configuration from mystery objects. This was also so during Connor's turn.

Fragment 7.3 presents a transcription of the phase immediately following what was transcribed in Fragment 7.2. An initial movement is noticeable toward the rectangular prisms (Fig. 7.4a), which, after a number of speaking turns that also included the re-articulation of size as a criterion, leads into a series of occasions where the mystery object in Connor's hand (a cube) comes to be held near six other before it comes into its final resting place on the mat containing already occupied by two cubes (of different size and color).

In reply to the statement that he cannot say how the mystery object (cube) is different from the rectangular prism next to which the former is held (Fig. 7.4a), there is an invitation to "look at the block," "take it to each group," and "see whether it looks the same … or is different" (turn 21). We may take this description as a formulating gloss describing a sequence of events and work: {doing [looking at the block]}, {doing [taking it to each group]}, and {doing [seeing whether it looks the same … or different]}.

Fragment 7.3

14 C: km ↑this ((wa*lks in a curved path toward the collection of* rectangular *objects*)) one::s:sorta ((*holds object next to green rectangular, Fig. 7.4a*)) (0.91) °ti°ny bit, (0.83) i say it is a tiny bit °different°.
15 (0.60)
16 W: but how::. ((*head moves down in "teacherly" manner*))
17 (0.72)
18 C: ((*shrugs shoulders*)) °i cant really say° °°how°°.
19 (1.33)
20 C: °itll be (big[ger?)°
21 W: [I WA]NT you look at that block ((*points to C's block*)) and i want you to take it to each group ((*points around circle*)) and i want you to see:: ((*C holds object next to yellow rectangular, Fig. 7.3b*)) (0.56) whether it looks the same as any of the other groups or if it is different from all.

22 (0.32)
23 W: brandon you gotta get your ((*C holds object next to small cube, Fig. 7.4c*)) feet up ((*C holds object next to large cube, Fig. 7.4d*)).
24 (5.68) ((*C holds object next to tubes, Fig. 7.4e, quickly moves to and holds cube next to cone, Fig. 7.4f, then the pyramid, Fig. 7.3g*))
25 C: °um. a. um.° i thinki::t probably: go (0.98) *this* one ((*places object with the cubes*)).

Whereas we do not know what Connor may actually see when looking at the block, but any cogredient percipient event could have witnessed that the invitation also is an appropriate description of the action that ensued: Connor does look at his "block" after the invitation has been issued (see offprint in turn 21). Everyone in the room would have been able to witness that the movement is consistent with the gloss "take it to each group" provided earlier. Seeing that the work and event of comparison is occurring was not immediately evident, though it also was manifested. This is so because the event sees him moving from group to group and, in the final turn, has him placing it with the other cubes stating that his block "probably goes with *this* one [group]." That is, out of the possible choices following the comparison, including the initial already choice of a new mat, emerges the placement with the cubes; that is, the beginning of the placement occurs before the actual putting down of the cube. In this event also is encompassed the non-placement with all the other existing groups. That is, even in the absence of any other public manifestation of the work of comparing, its results are seen. If challenged,

Connor or anyone else in his position could have said, “I did hold it to all the other objects, compared, and *then* placed it with the cubes.”

We notice an invitation happening: to look at the block and then to compare it with the items in the different groups. It could also be perceived to be an evaluation: that which is being invited has not occurred before or has occurred in some problematic way. The invitation is accepted, and the micro-event described, which not only gets something done but also allows others in the setting to perceive conduct that comes to be accepted as having done what the invitation requested doing. When the comparisons are done, the mystery object (“block”) is finding its place with other objects on a mat with the label “cubes.” Had the micro-event not ended in this manner, further work would have been required to get it to that place. It would be in what had followed that we could have seen whether the teacher or others were missing something in the actions, something required in the comparative assessment of the object – perceiving or comparing.

Concept Formation as Event

In the preceding section, a description is provided of the formation of a classificatory configuration consisting of a number of groups to which geometrical concept names were attached. The formation is described as an event *in the evental terms* of the transactional approach. There is no reduction made to the competencies of individual students, or the scaffolding efforts of a teacher outside of concept formation. Whereas the classical concept-learning paradigm involved the binary task of deriving a concept from included and non-included objects one concept at a time, the emergent configuration was exhaustive in that it assigned every object to a category – much like this would occur in the grounded theory method that has currency in the social sciences. Every event within the formation of the configuration is constitutive, that is to say, without this or that micro-event, the overall event of the birth of the category scheme would have been different. This is important because every micro-event is associated with participant-related percipient events that are also constitutive of the overall event. The whole event emerges from shorter events, including the initial turn of the teacher and the 22 following mini-events in which students came to place their objects. These smaller events are not distinct, but the ending of one simultaneously is the beginning of the next. The smaller events therefore are not like independent beats on a thread but are interconnected like chain links. Each turn-producing event consists of events of shorter duration, such as attending to an object, perceiving characteristics, and comparing it to one or more other objects. Everything required for learning how to sort geometrically is publicly available in the encompassing event of the birth of the configuration. This is so because the event and all its constitutive phases – i.e. all constitutive, concurrent or sequential micro-events – are what there is to the reality of sorting geometrically as a cultural-historical practice (skill).

Received theories of concept formation are contradictory in that they allow for mathematical concepts to be empirical and transcendental (otherworldly). In the preceding section, I suggest theorizing concepts in terms of multiplicities consisting of all concrete instances that are recognized to be manifestations of the concept; and these instances are related like the members in a family. In this manner, the concept cannot be reduced to any one of its individual recurrences (forms of experience), whether these be in speaking events (hearing, uttering "tju:b") or in events of gestural, tactile, and visual perception. Thus, all of the different percipient and actional events are integral and constitutive parts of a recurrent form, and thus of a concept. A concept *is not intended*, as constructivists epistemology holds it to be, but an emergent recognition of a regularity occurring across events. The recurrence arises *in* and *as of* events and associated experiences that have their basis in percipient events. It is precisely when different events and experiences gel into the recognition of recurrence that a concept has formed. The recognition arises in and from the different classificatory events that led to a particular group – e.g. the one associated with the label "cubes, squares. Thus, different mini-events will have contributed to the formation of each group, beginning with the placement of the first on the part of Mrs. Winter (Fig. 7.5a), and further emerging with the placements on the part of Nathan (Fig. 7.5b), Connor (Fig. 7.5c), and Jonathan (Fig. 7.5d). In this way, we arrive at a theory of concepts entirely grounded in immanent qualities characteristic of events. Concepts – emerging in and from events – exist in and of the experience of these events; in every new instance where a concept is in play, sensuous or non-sensuous (i.e. supra-sensuous) percipient events are unfolding.

In this chapter, concepts are treated not as abstract, immaterial things but as recurrences in events and family resemblances, and in the associated experiences (i.e. {person | environment} relations). A first consequence of this way of understanding concept formation lies in the inseparability of a concept and its application. A concept never is abstract but in any actual occurrence it is given in all its concreteness. It exists in the recognition of recurrences across actual events (e.g. in recognizing some concrete object *as* the member of a group or category). In concept formation, experiences are no longer thought of as (independent) entities but as

Fig. 7.5 The different turns that add to the items on the mat labeled "cube, squares" are phases in the formation of the concept. As event, the formation consists of many parallel and sequential events: Mrs. Winter (**a**), Nathan (**b**), Connor (**c**), and Jonathan (**d**)

recurrences in and across events. The neuroscientific research on the role of mirror neurons in spatial and social cognition predicts that especially observing others touch and manipulate objects provides opportunities for the learning from others.

A second consequence of this transactional take is the constitutive nature of the concrete manifestations in the conceptual whole. Each event and related experience contributes to the concept – it is or is not art of a family. This approach therefore allows us to understand why there often are no sharp conceptual boundaries, such as between cup and mug. Between those objects that are easily group as cup or mug, there are others that do not easily fall into one or the other group. The boundary becomes sharper with experience (e.g. Roth 2017), which points us to the fact that the concept is dependent on events and experiences rather than lending itself to some sharp definition.

A third consequence of these considerations is that there are no simple concepts. Each concept has event-related components and is defined by them. Any concept that students in this second-grade mathematics lesson form is a multiplicity: "What is distinctive about the concept is that it renders components inseparable *within itself*. Components or what defines the *consistency* of the concept, its endoconsistency, are distinct, heterogeneous, and yet not separable" (Deleuze and Guattari 1994, 19). A concept is an instance of recurrence, coincidence, condensation, or accumulation. A (mathematical) concept is not found in its genus or species but in the composition of material events, percipient events, and associated experiential appearances. As a result, a concept is itself a form of event, for it "is in a state of survey in relation to its components, endlessly traversing them according to an order without distance. It is immediately co-present to all its components or variations, at no distance from them, passing back and forth through them" (20). But despite its constitution in and through events and associated experiences, the concept is neither denotation of states of affairs nor signification of the lived: it is the event as pure sense that immediately runs through the components.

A fourth consequence is that concepts are theorized as forming and existing in and through actual experiences in a world inherently shared with others. A concept is not abstract but it lives as and in relation with other people. The question with which I began – classification of objects when a conception of the object does not yet exist – no longer poses itself because in the way articulated here, concepts emerge in the passage of events that are witnessed and experienced. Those who witness and experience also are constitutive (cogredient) parts of the events. A concept never consists in anything else but recurrent experience. The psychophysical problem does not pose itself because concepts exist only in and through recurrences that are being felt (seen and recognized) in events based on prior experience.

A fifth consequence of the transactional approach to concept formation is the inherently societal nature of concepts. In the preceding section, we note that there is a twofold relation of people to things (here the mystery objects) and people to other people. The relations between people, established in and by communicative events that bring about the events intersecting the lifelines of the different participants, not only reflect but also actively constitute the relation to things. Those relations that we find in schools are typical of a society at a particular time in its history: the beatings

with whips from reed and the 100-fold repetitions writing some violated rule (e.g. "I must not talk during the lesson unless asked") were normal events during my first years at school might entail lawsuits today should anyone dare making them return. Anything that happens in a school is an event cogredient with society-as-event, and thus societal in its nature. The children thus are not external to schooling events and relations, as if stepping into boxes. Instead, the children are constitutive of the relational events that make society; and their lifelines are simultaneously shaped. So is the nature of the recurrences that are perceived and felt – as percipient events they are related to other events because of events that intersect both and lead to immanence of one type of event in another. Speech events are related to percipient events not in any causal way but because of their co-occurrence in the same durations of the different lifelines.

Describing the Social Bottom Up

Objects do not exist in abstract form. From the transactional perspective taken here, categorizing and the micro-events that constitute it *are* all there is to concepts. As recurrences (e.g. forms of speaking), concepts always exist in a concrete manner, in selecting this over that membership, this over that neighborhood, and, as always, *for this or that purpose* – here accomplishing a lesson that after it has ended can be said to be consistent with this or that philosophical or epistemological approach (which, e.g. it was for my collaborating colleague who adheres to an enactivist approach). Those lessons are societally specific events that are both made by and formative of the children. When these children come to the classroom, they do not construct knowledge and rules bottom up; instead, the "knowledge and rules of social interaction have a whole cultural history behind them and therefore pre-exist the interaction that takes place in the classroom" (Radford 2008, 224). When we investigate the order observable in practices as recurrences across events then we find that participants behave in ways that allow those practices to be recognized. Everywhere something is going on, whether people are alone or with others, participants are managing and monitoring the ordinary, routine ways in which everyday things get done. Such maintenance of the observable recurrences in and of events is part of the background expectancy that characterizes participation. What people do and the accounts they produce – e.g. that a placement was made based on size – the paired nature of doing and accounting, is typical for a specific kind of event and community (e.g. doing school). Whereas it may be appropriate to group objects by color and size in fine arts classes, similar group would be inappropriate in a mathematics class. Classifying by size and color is part of the (language) game of arts (a family of events) but is not part of the (language) game of mathematics (another family). In the preceding empirical materials, the social "machinery" (i.e. the joint work) is described for undoing an inappropriate classification and for producing a new one. Indeed, the initiation of an undoing also is a sign of the inappropriateness of what had been done and accomplished before.

In and as part of the analyses, I note that there are pairs of actions that go together so that when one happens, the others does as well. Inviting and accepting/declining are events that recognizably go together (i.e. are overlapping phases of a duration), the latter motivated by and arising out of the former. In the present chapter, placing an object with one or more other objects or on its own mat and then accounting for the placement by describing a reason would be such a pair. If one is done, the other one is done as well. But at the outset of this lesson, the pair is not observed in the conduct of any individual student. I show how this pair exists as transactional event implicating at a minimum student and teacher. The movement toward the appearance of the two forms of events in the same conduct is itself one aspect of learning. We may describe this tie between action and an account as a norm. But such a norm is not determinate, which is to say, it neither *causes* the account once the action has been completed nor does the account cause the action, in those cases when the account has been provided before (e.g. as plan or instruction).

When children or students in mathematics classrooms are observed, the observable order characteristic of mathematicians is not in place. How then do the children come to act in ways that at their very core are typical of mathematical culture? The data presented here show that children did not "construct norms," for they would already have to be knowledgeable about the domain that will be governed by the norm. Instead, what we observe is how that norm, the tying of classificatory actions and verbal accounts, emerges and exists *as* social relation first. That is, the children participate in exchanges where those norms constitute observable. Integral part of an intelligible event, each part and the joining already can exist for the children. A crucial aspect of these exchanges is the teacher, who, in taking a particular place in the observable order of the relation, affords existing cultural orders with respect to objects to become observable – here that of the norm of tying a categorization event with a verbal account. This tying was already observed above in the description of the classical concept formation paradigm, where the participants were to tie their observations of different to a verbal description that describes all of them. Here, the verbal account ties together different events in which some form of recurrence can be felt and seen.

The emergent order also pertains to the type of justifications that are permissible. That relational work includes an aspect of sanctioning what occurs; and it is precisely in this way that any form of mind comes about and exists. The relational order makes available opportunities for children's cultural learning and development, which has been described as "the growth of a world and is directed to the production of objective features of the persons' environment that 'any competent member can see'" (Garfinkel 1972, 30). The expansion of the children's world is "necessarily accompanied by the progressively enforced and enforceable compliance of the developing member to the attitude of daily life as a competent societal member's way of 'looking at things'" (30).

In the lesson fragment, as in mathematics classrooms generally, we observe social relations typical of schooling: involving teachers and students. Any relation is an event rather than a thing (see Chap. 3), and, thus, as to be theorized in evental terms. However, to say that the tying of classificatory action and verbal account

occurred *in* the social relation (event) is trivial. It treats the social in a weak sense. This is so because a classroom always constitutes a specific societal group tied by the forms of institutional relations that recognizably make a school class a school class. This recognizability is important, because it is as such that recurrences manifest themselves as such. The recurrences associated with objects that had ended on the same mat – e.g. the squares/cubes in Fig. 7.5 – emerge from events followed by other events that will be experienced (felt) as sharing something with the former and thus make a family. In the analysis, I show how one speaking event, which arises from and is conditioned by a placing event that precedes it and a speech event on the part of the student that it conditions and lets emerge. The tying is a direct consequence of the transactional approach that recognizes the different ways in which events are and can be connected. It is non-trivial to say that the tying *is* the social relation. If it is a relation, then it is part of the visible relational order – that is, it is an event. We learn to participate in this order without having to know the formal rules used to describe them – though we may have memorized verbal articulations of such rules. Such rules may also be formulated for defining mathematical or scientific objects. We thereby come to the transactional notion of the concept, whereby we know what chemical substance is through the prescription (rule) of what we have to do to have specified perceptual experiences (Dewey 2008b). It is in this way that we form concept by learning to do things that have perceptual consequences without knowing the formal rules that may be stated to distinguish one concept from another. More generally, we tend recognize "particular cases prior to there being a rule which covers them, for it is only if we meet with a number of cases of a certain sort that we formulate a rule" (Rawls 1955, 22) and thus a concept specified by such a rule. It is in this way that the social is prior to any "social construction" of norms.

Primacy of Society-as-Event

In this chapter, concepts are understood as recurrences of events that are typical and constitutive of society generally and of schooling specifically. Studies of the societal order to not conjecture the social as the underlying truth, such as in the "social construction" of knowledge or norms, but instead re/discover the social in the witnessable order of everyday life. Concepts – understood as recurrences recognized and felt in and across diverse events that form families – belong to this social order. In the literature on the formation of abstract concepts and abstractions, the social is derived and secondary. Thus, traditional social constructivist and sociocultural approaches are circular in a sense because they use the already existing social (i.e., the interactional order) to explain the social. I suggest here that it is the social that they already "have"; and it is this same order that those working within the social constructivist or sociocultural perspectives both presuppose and describe in the research on the social – including socio-mathematical and socio-scientific – norms. To re/discover the social in reasoning and doing means to find and show how the social comes first and enables reasoning (talking), doing, and feeling. Writing about

the primacy of the social in the societal nature of the ideal (e.g. concepts), the social is essential to what people do and is omnipresent throughout the event that currently unfolds. This social, in the sense of the capacity to exist in two orders at one, has been located in nature itself, where it shows itself as emergence (e.g. in evolution) and novelty (Mead 1932).

Classroom talk is a societal event. It is orderly, it is both producing and the result of the sequencing of events that are related but not in a causal way. The sequencing is oriented to, expected, and accountable. The relational order – e.g. the always emergent and open-ended sequential organization of turn taking – is part of the evental whole, the duration; and it is this whole that lets (or does not let) the Said make sense in making apparent how the Saying is related to the other phases of the event. This is opposite to the ordinary ways in which talk and relation are analyzed and theorized, which give primacy to the talk and secondary nature to the relational (social) order. It is not the classroom talk that determines the transactional order but the other way around, the transactional order determines what is said and done in talk, and how what is said is to be heard and understood. Because the new ways of relating, any norms and concepts exist *as* the relation (in addition to occurring *in* the relation), the societal nature of the (ideal) norm and concept is the result of the orderly nature of the relation, which is the primary societal phenomenon. The primacy of society arises from that relation that is constitutive of the society, and the societal nature of a new set of rule that a group is said to have negotiated is a derived one. For the social constructivist and sociocultural approaches, the origin of the social nature of norms is the fact that there are groups of individuals who decide to act in particular ways and to disallow other forms of actions.

To find out the origin of the subject-matter specific ideal form in the social, we need to investigate the transactional events and work involved in organizing certain occasions, which produces the occasions (i.e. relation), and, as a consequence, all identified outcomes. What is societal about the work that results in any negotiation and the ideal forms that result from it? How do members orient to recognizably producing and monitoring the recognizability of order, an order that is at the origin of the phenomena resulting from producing and monitoring the order-related recurrences?

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Chapter 8
Remembering

> Memory is a very special instance of an antecedent act of experience becoming a datum of intuition for another act of experience. Whitehead 1929/1978, 142

> If we account for the continuity of internal life and, as a consequence, of its indivisibility, then it no longer is the conservation of the past that has to be explained but, to the contrary, its apparent abolition. Bergson 1911, 31

The human relationship to past events is through the continuity of experience, a term taken here in the sense of the German *Erleben*, which is the noun form of the verb that translates into English as "to be affected," "to go through," and "to be subject to." To learn *from* experience (as distinct from learning through experience), more is required than simply to go through one: we have to reflect on past events and the actions taken therein. Reflection generally is taken to have its material, a past event, which now, in some form, becomes the object of reflective processes. Remembering is the event in which the past is present. It is an event of the becoming in the present of the past. This chapter is concerned with the process of remembering past events in some present occasion (event). Remembering may be for the purposes of becoming conscious of what has happened and thereby learning from experience.

Unlike frequently perceived in the everyday world, where remembering tends to be attributed to the capacities of the brain that acts like a storehouse, classical studies in the sciences and literature have pointed to the constructed and essentially social nature of (explicit) memory. However, if remembering means that the past is constructed anew in the present then the individual somehow has "to acquire the capacity to turn round upon its own 'schemata' and to construct them afresh" (Bartlett 1932/1995, 206). Accordingly, it is consciousness that enables this turning upon the traces of and from the past. That is, in this view remembering itself is a form of reflection, constituting the beginning and condition of the phenomenon that goes by the term *reflection on action* (or experience). It is the most prominent function of consciousness. Bartlett suggests that the first idea we ought to get rid off is that of memory as reproductive, for "literal recall is extraordinarily unimportant" (204) in a world that is as complex as that of humans. Many philosophical and neu-

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roscientific studies suggest that remembering has an organic, corporeal basis. Remembering therefore would play itself out as event that has corporeal and social qualities, a relationship that has its genetic origin in development, as captured in the observation "that although the young child thinks by remembering, an adolescent remembers by thinking" (Luria 1976, 11). A second aspect of this chapter concerns the role of artifacts in remembering, supporting the modes of corporeal remembering (shape, place), recognizing, and reminding. The latter two aspects are further discussed below. Most importantly, in investigating what people do when they talk or are debriefed about events that they have lived through, this chapter shifts the focus from *memory* treated as a storage facility to *remembering*-as-event to which those involved actively contribute but that also happens to them. Once we constitute this theoretical move to a transactional (evental) approach, then "the conservation of the past in the present is nothing other than the indivisibility of change" (Bergson 1911, 33). That is, the theoretical move leads us to consider remembering as one part of the whole: life-as-event.

In the transactional take, remembering is theorized as event rather than reduced to memory, storage, wetware (mind), etc. in the mind, which then is treated as a box or set of boxes. As such, remembering bears relations to other events that are of two kinds. First, there are events cogredient in the same duration, such as the different aspects of the occasion that then intersect with the event of remembering. For example, when, as described in chapter 5, Luis Radford sees the mark or sign on his bookshelf, its presence is *reminding* him of the book that he is looking for. Reminding, a form of remembering, is tied to and intersects with a recurrence in his living surroundings; a percipient event and a light transmission event provide for the intersection between the two event families joint in the unity/identity {Radford | office environment}. Second, as event, remembering intersects with other events in a manner that has temporal quality. Thus, remembering arises in and from something happening, an earlier phase of the event, and becomes the beginning of a later phase of the event, for example, reflection on the content of what is remembered. An example of this is provided in chapter 3, where I gloss a famous scene from the novel *À la recherche du temps perdu* ["In Search of Lost Time" or "Remembrance of Things Past"] (Proust 1919). While having a piece of madeleine dissolved in a spoon of tea, the event of remembering begins. Smelling and tasting the food gives rise to and is condition for remembering what has happened in the past that the author was unable to recall before; and once the protagonist is remembering, he can also reflect on the contents abstracted from the event of remembering.

Remembering includes phenomena such as *reminding, reminiscing*, and *recognizing*. Reminding involves the use of some object, or phrase, which functions as signifier by means of which memory is stimulated from without. Reminders – e.g. the proverbial knot in the handkerchief – already take us beyond the representational approach, for these are "distributed on either side of the dividing line between interiority and exteriority" (Ricœur 2000, 46). Photographs, receipts, diaries, and mementos all are examples of physical artifacts that may remind us of something that has happened in the past. Reminiscing fundamentally is an interactionally organized, collective activity, in which participants communicate and reproduce

experience generally in some narrative form. Reminiscing thus is a collective event distributed across participants and time. Recognizing, too, cannot be located in the person alone but constitutes a relation of person and environment. For example, there is recognition of a person (my acquaintance) on the street by another person (me). My acquaintance and I both are part of the event of recognizing, which therefore cannot be reduced to my neurons doing some form of coding and storing. Objects play an important role in social relations where remembering is at work or where remembering and forgetting are part of the ongoing topic; and places, too, are important aspects of the social organization of the past in the present, such as graveyards or war memorials. All of this points to some form of discursive organization of remembering. Remembering and forgetting are events that are cogredient with the conversational work that have past events as their topics: Remembering involves the construction of stories in which protagonists, often the speakers themselves, are emplotted within events. Importantly, the narratives not only retell past events but also actively take into account the current (narrative) event and the identities of the participants – stories are told in the present, *for some current purpose*, and therefore are marked by past, present, and future. The past and future come to be irremediably intertwined in the present.

In the following, I begin by situating the importance of the phenomenon of remembering in the context of consciousness, a phenomenon that remembering makes possible. In subsequent sections, I take an extended look at four types of remembering: corporeal remembering, reminiscing, reminding, and recognizing. I then discuss the presence of the past as a phenomenon at the crossroads between corporeal and social memory before attending to the role of artifacts and recurrences as ingredients in remembering. Throughout my account, readers should keep in mind that everyday and scientific talk about remembering and forgetting generally take the individual as the unit of analysis. In the transactional perspective, the relevant object is the unity/identity of person and environment. In other words, remembering and forgetting are characteristics of {person | environment}. In the present instance, therefore, the configuration of the present is such that remembering occurs, involving all those present at the occasion.

Remembering, Consciousness, Learning

> Our investigation has brought us to the threshold of a problem that is broader, more profound, and still more extraordinary than the problem of thinking. It has brought us to the threshold of the problem of consciousness. (Vygotsky 1987, 285)

Near the end of his life – and certainly because he has read not too long ago the German (1932) or Russian (1933) version of the *German Ideology* by Karl Marx and Friedrich Engels (1978) that just had been published for the first time – Vygotsky articulated consciousness in the preceding quotation as a problem that is much more important than those that he had investigated in his last, posthumously published book on thinking and speech. In that book, Marx and Engels used a play of words,

decomposing the German noun for *consciousness* [Bewußtsein] into an adjectivally modified noun, *conscious Being* [bewußtes Sein]. They then tied the Being of humans to their life *process*. That is, Marx and Engels define consciousness as a form of event tied into the encompassing life also considered in terms of events. In the transactional terms developed here and drawing on language developed in and for a philosophy of the act (Bakhtin 1993), we thus find in Marx and Engels the seeds for theorizing conscious Being-as-event as cogredient in life-as-event. There is then only a small step to the realization that consciousness "is the experience of experiences just like experiences are simply experiences of objects" (Vygotsky 1997, 71–72). For there to be an experience of prior experience, the latter has to exist in the present in some form of non-sensuous perception (i.e. not requiring the senses). This form is the event of remembering. Being conscious then is an event in which remembering the past is intersecting with thinking in the present. Without remembering, there cannot be consciousness.

Remembering also is an important facet of reflecting on and learning from experience. "Learning from experience" is a notion often used in the context of a contrast between school and out-of-school (real life) learning to emphasize that the phenomenon is occurring in a practice or on the job rather than in the preparation for it. It is a key ingredient of learning in the workplace. Workplace learning and the problems that exist in preparing professionals for the demands of practice also are at the heart of reflection-in-action and reflection-on-action. The purpose of reflection in the present is to bring past experience to bear on both recurrent and unique occasions in the future. Whether it occurs "in action" or follows action, professionals "think about what they are doing," where they "turn thought back on action and on the knowing which is implicit in action" (Schön 1983, 50). Such turning back on action means that the practitioner – who may also be a school or university student learning by reflecting on what they have done in laboratory tasks or while solving word problems – initiates the being present again of actions that now lie in the past so that they may become the objects of the reflection.

The presence of past action appears to be taken as unproblematic: it does not receive particular attention in the scholarly literature concerned with the phenomenon of reflection in and on action. Yet that the presence of a past action is problematic and requires attention can be seen in domains such as aviation, where pilots – during the one-hour debriefing that immediately follows their four-hour bi-annual training and examination sessions in the full-motion simulator – often fail to recall what they have done or what some of the actual instrument readings or environmental conditions were. Failing to remember incidents, these pilots thus are unable to *reflect on* the relevant aspect of their practice (Roth 2015a). If you cannot remember what you have done, then it cannot become the object for reflection, making it impossible to learn *from* the experiences that you have had. Other examples where recall is at issue easily can be found in situations where researchers debrief teachers and students on what they have done and learned over the past several weeks or months. Yet it is quite apparent that learning from past experiences, past events, through the lens of experience, these need to be present again. Thus, the event of remembering is the lynchpin in the phenomenon of learning from experi-

ence through reflection, where learning means that past forms of action come to bear on future situations as a modified form of action.

One of the problems in understanding the phenomenon of learning from experience is the problematic nature of the notion of experience, a double-barreled word that means different things to different people. Cultural-historical scholars – e.g. Lev S. Vygotsky and Mikhail M. Bakhtin – theorized perezhivanie [(emotional) experience] along the lines of the German Erleben/Erlebnis, a set of terms that refer to how we actually live through – thinking and feel – events rather than how we grasp them after the fact. As such, the term is clearly distinct from "*an* experience," something that has happened in the past and now, "complete in itself, [is] standing out because marked out from what went before and what came after" (Dewey 1934/2008a, 43). Theorizing reflection and, the focus of the present study, its condition, remembering the past, therefore requires sorting out the notion of experience. It also requires sorting out how the past may be present again to guide current action or to allow reflection so that may guide future action.

In *self-action* models, the individual creates a representation of the past situation; and when this representation is present and used in another situation, transfer has occurred. In this approach, remembering exists when the same representation is used in the past and present. In *interactional* models, situations are no longer represented in the mind but are present and ready-to-hand; in artificial intelligence research, the setting is taken as its own representation and indexical pointer systems implement the relation between agent and environment. Such models generally have not theorized how the presentations of one instant in one setting have relevance to another instant in another setting, "making it difficult to theorize stability and long-term growth to the extent that a representational approach does" (Roth and Jornet 2013, 471). In *transactional* models, the different presentations of a thing are part of the same analytic unit, where the present also includes the transformed past presentation. The theoretical categories *experience* (Dewey) and *perezhivanie* (Vygotsky) provide the solution to the problem of the presence of the past – without actually articulating what and how the past is (made) present in the present. Both the English and the Russian terms are based on the unity/identity of person and environment, which always has intellectual, practical, and affective characteristics. Perezhivanie also translates as *feeling*, a term that plays a central role in a transactional approach and always includes the "subject," the datum felt, and *how* the datum is felt (Whitehead 1929/1978).

An indication of the lack of attention to the phenomenon of remembering is an important recent publication in the learning sciences that focuses on reflection as collective practice (Jornet 2016). The process is conceived of as some form of talking back to the future. That is, the issue of reflection may be situated precisely in the same place (crossroads) where remembering also occurs. But reflection cannot happen unless a past event is prehended in the present, where it is apprehended in non-sensuous perception, and this being born into the present is itself an event. Remembering then makes possible reflection: Remembering provides the materials that become the object of an in reflection.

Corporeal Remembering

> In a living body of a high type there are grades of occasions so coordinated by their paths of inheritance through the body, that a peculiar richness of inheritance is enjoyed by various occasions in some parts of the body. (Whitehead 1929/1978, 108–109)

There have been suggestions of an organic basis to memory and anticipation generally (Dewey 1929). The phenomenon manifests itself in the movements of the body that remember themselves without requiring a presence in the mind – such as when we never forget to ride a bicycle without having to spend a single instant of engaging in reflective thought. All the movements felt while exploring some material thing with the senses, all the positions the body has been taking, can indeed be repeated at will in the absence of the object. The corporeal movements (i.e. events) provide conditions for remembering associated verbal descriptions. The sensing movements thus constitute a form of memory properly speaking (Maine de Biran 1859). Smell and taste function in a similar way: smelling or tasting something may evoke remembering not only the smelling and tasting of the past but the entire surrounding events that could not be called back into consciousness deliberately (Proust 1919). Yet in the psychological tradition, the forms of knowing with and through the animate body tend to be denigrated in various ways: as "rote" (e.g. memory) or as "merely physical" as distinct from mental-intellectual. This tradition completely fails to understand that the very origin of intellectual (conceptual) feelings are physical feelings, a fact that has led philosophers to recognize that the body (ground) of sense is the sense of the body (e.g. Nancy 2000). This is so because "we essentially arise out of our bodies which are the stubborn facts of the immediate relevant past" (Whitehead 1929/1978, 129).

In the European continental philosophical literature, a distinction has been made between the (material) body (Ger. *Körper*, Fr. *corps*), which denotes any material, generally lifeless thing, and the animate body (Ger. *Leib*, Fr. *chair*), which lives, acts, senses, feels, and suffers. Because of the reality of events, the transactional perspective is consistent with the notion of *corporeal* knowing as distinct from knowing that is *embodied*. Any knowing – past experiencing projected into the future – has an organic basis, because, as seen in the example of the experiment with kittens (chapter 4), knowing a physical feature or thing is tied to having moved about in the world. This organic basis is recognized in the notion of *feeling*, which originally, in ontogeny, has physical character and later conceptual, intellectual, and conscious character (Whitehead 1929/1978). Feelings integrate the physical, affective, and intellectual aspects of experience – a fact that Vygotsky might have arrived at had life given him the opportunity to pursue his emerging ideas surrounding the concept of *perezhivanie* [(emotional) experience, feeling].

The organic basis of remembering is quite evident in aviation debriefings, where pilots and examiners alike are moving bodies, arms, and hands while talking about what has happened earlier. When examined pilots are asked to talk about some part of a movement sequence, they often fail until acting out the entire evental sequence of concern until they get to the part of interest (cf. Roth and Mavin 2015). This is

also the case when pilots are asked to assess other pilots and, in the course thereof, require a particular part from the standard operating procedure. They indeed act out the procedure from the beginning until they get to the part. For example, while talking about a go-around procedure – which follows when a pilot announces that the aircraft cannot land for some reason (fog, something on the tarmac) and has to climb again – pilots and examiners often are going through the flight sequence of body movements and associated cockpit talk. When pilots are asked about some step in this procedure, they often do not respond immediately, but begin the go-around procedure from the beginning, articulating what the procedure states, and moving as if they were actually doing what they do in the aircraft during a go around procedure (Fig. 8.1). Just as during an actual flight, a pilot might announce "Go Around" and simultaneously make the movement that in the actual situation pushes with the thumb the go-around button on the power lever (Fig. 8.1a), rotates the aircraft to required attitude, moves power levers to ramp, and announces "Flaps 15." Flight examiners talking about this kind of event often also act out the part of the second pilot, who would have been moving the flaps from the 30° to the 15° setting (Fig. 8.1b), have checked the rate of climb on the relevant instrument on the dashboard and announced, "positive rate of climb." The pilot currently in charge of flying would have been verifying the rate of climb and would have been announcing, "Gear up, check power." The pilot currently monitoring the flight would have been selecting gear up (Fig. 8.1c), checking target torque for a go-around, and then setting the heading (Fig. 8.1c).

In the give-and-take of debriefing meetings, acting out the movements required for a particular procedure is an integral part of replying. There frequently are situations where examiners and pilots act out together what was done and seen. In the gesturing, their respective acting and perceiving are alive in the presence of the movements corresponding to what they have been doing during the flight; this form

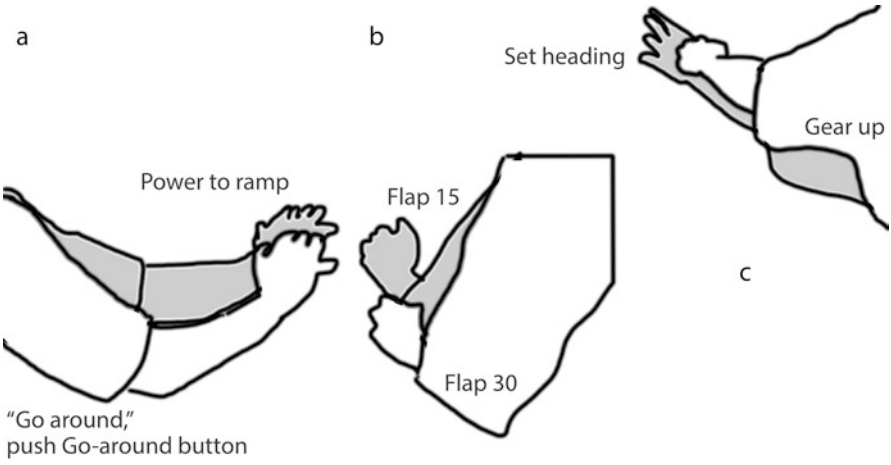


Fig. 8.1 Series of gestures that pilots may use while talking about a go-around procedure that they had flown during the preceding session in the flight simulator – including power to ramp (**a**), moving flap setting from 30 to 15 (**b**), and flicking gear-up switch and set heading (**c**)

Fig. 8.2 The author is recreating typical pilot movements. Top type of hand/arm gestures a flight examiner might use to show the attitudes of the pilot's aircraft during the flight (examination). Bottom Corresponding hand/arm gestures on the part of the pilot, holding the control column making the aircraft roll to the right, level, and left (© Wolff-Michael Roth, used with permission)

of knowing does not exist in another way. For example, a flight examiner might address the issue of flying an aircraft when the aircraft attitude is unusual. The examiner might move hands and arms in ways that are showing the left and right inclination of the aircraft during the actual flight simulation (Fig. 8.2, top). At the same time, the examined pilots can been seen moving hands and arms in the way they had been doing during the examination while holding the control column that was addressing the unusual attitude (Fig. 8.2, bottom). In such a case, the pilots' past movements from the flight come to be present again during the meeting in the present movements. In such instances, we then observe the joint production of the event under question in the different perspectives on the event as seen from the flight examiner and the pilot. The hand, arm, and body movements would be those required to regain control over the aircraft and to return it to its normal attitude. The movements thus are offering a first-person perspective. The flight examiner would be articulating the associated third-person perspective by means of hand/arm movements that exhibit how the aircraft was presenting itself to an outside observer. Importantly, this presence of the movements is not produced by means of a *re*presentation-thing or the enactment of some mental schema, that is, by some other means (representation). Instead, these movements are making themselves present again – just as those movements required riding a bicycle are present again even in occasions when we have not ridden one for two or more decades.

Focusing on the animate body requires us to think and theorize in terms of events, for the body is alive and an understanding of its aliveness requires categories that capture being alive. As shown in chapter 2, events relate to other events in ways that give rise to time and space. When the animate body is moving, it is intimately related to the places in which it has been moving, orienting itself, and inhabiting. Events *take place*, they occur in specific places, and this specificity itself is constitutive of memory (cf. Casey 2000). Places and actions are not independent: the latter are solicited by things that have their place (e.g. fingers and keyboard) and that are transformed by acting. As *living* creatures, we are inhabiting a world-as-event with our animate bodies, a world that we are perceiving (intellectually) comprehending because it is comprehending (containing) us – a direct consequence of the percipient and thinking events being cogredient in and constitutive of the encompassing duration. We are living and experiencing events, and past events are becoming present again as events. From the perspective of body movement, "we can see better how it inhabits space (and, moreover, time) because movement is not limited to submitting passively to space and time, it actively assumes them, it takes them up in their basic significance" (Merleau-Ponty 1945, 119). Because of their bodies, humans inhabit and exude space and time. Thus, at the end of his life, Sigmund Freud (1999) has had the insight that the human psyche (mind) is not metaphysical at all, yonder time and space, but has the qualities of an event in being extended (i.e., physical) and temporal without actually being aware thereof. It is not surprising that place and space also have important functions in remembering as observed, for example, in aviation debriefing meetings.

Special opportunities arise when there are artifacts (even photographic depictions thereof) from the original event available during the debriefing event. In aviation debriefings, for example, posters are mounted in the debriefing room featuring the cockpit of the aircraft type flown by the pilots. When required, pilots or flight examiner may move to the cockpit poster and act out a movement sequence in reference to the instruments and actuators shown. A pilot who has forgotten an instrument or has had difficulties articulating a particular aspect of a standard operating procedure may be taking up position in front of the cockpit poster. This then is setting up a three-dimensional space in which work-related movements now, in the debriefing exchange, also become symbolic movements. Unlike the movements discussed above, those produced in front of and with respect to the cockpit poster come with additional opportunities for remembering. These opportunities arise from the relation of the movements to specific aspect of the physical environment (space). Participants may articulate where and how to orient in the case of a change in the aircraft's elevation. Knowing therefore is not represented verbally, and the parts of the instrument to be attended to are not articulated. Instead, pointing movements orient the gazes of participants to the relevant place on the panel, where the pilots can find – now and in future situations in the simulator and actual aircraft – the most reliable information on the change in altitude (i.e. on the vertical speed indicator). In the presence of the cockpit poster, dispositions are enabled that are more similar

to the original event in the simulator (or on the aircraft itself), where and when pilots gazed at a relevant instrument (cf. Roth and Jornet 2015). Indeed, what actually happens may be a mixture of these two attitudes, where pilots both relive the reading of the instrument but also live it anew within the horizon of the analytical attitude that orients the debriefing meeting. With artifacts or instruments that were part of the past event, an aspect of the past more easily is experienced as present again, especially when the changes in the relevant phenomenon or instrument are small. These materials then set up perceptual opportunities that exist across the two settings, the flight simulator and the debriefing meeting room. It is this being present-again that constitutes remembering. There is therefore also an aspect of recognizing something, a phenomenon presented and discussed more below.

Under certain circumstances, reflection is concerned with understanding for the purpose of changing actions and dispositions. That is, the purpose of debriefing is to "break habits," to erase a certain memory and make place for another memory. In such instances, remembering what has been done actually is for the purpose of forgetting it. In one study (Roth 2015b), I describe the hand/arm movements of a pilot, who, during a go-around procedure, has failed to move the power lever to maximum position but instead remained at an intermediate position until reminded by the flight trainer. At that point the hand moved forward to bring the lever into the correct, most-forward position (Fig. 8.3). The flight examiner, also functioning as a trainer, and the pilot moved their hands and held the power lever in the incorrect way as it had been done during the flight. But they were not doing so for the purpose of achieving a durable disposition; instead, the apparent purpose was that of accenting the wrong movement and thereby making it visible. The instructor followed by the pilot then repeatedly moved their hands and arms in the way that it *should* be done during the flight situation under discussion. We might thus gloss what has been happening as a making present of an incorrect past action for the purpose of contrasting it with a version of the movement that would have been correct in that past occasion and that also should be occurring in any future occasion of that type. In that occasion, the second, correct movement was contrasted to the immediately preceding, wrong movement – which still needed to be present to that the contrast could exist.

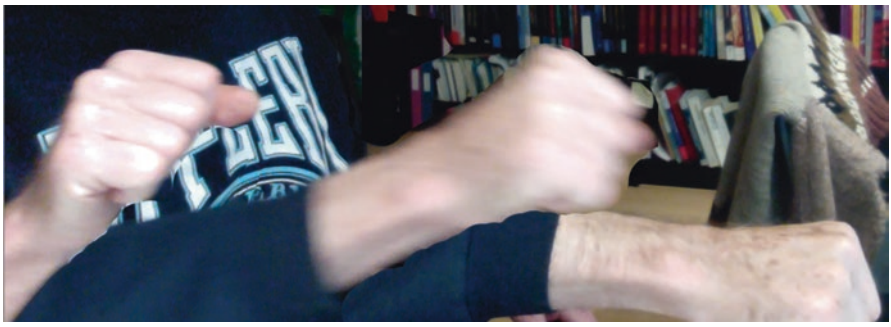


Fig. 8.3 The author makes the hand/arm movement that moves the aircraft's power lever through the notch (middle) and forward to the ramp during a missed approach maneuver. (©Wolff-Michael Roth, used with permission)

In high-risk industries, such as aviation, where any error might lead to the endangerment or loss of lives, considerable time is spent in debriefing with those aspects of flight events that potentially increase the risks. To be able to reflect on what has been done, even the inappropriate actions are to be remembered for the purpose of analysis intended to prevent those actions to recur. That is, there is a process of remembering for the purpose of forgetting. This may not be easy because corporeal memory is durable (e.g. the proverbial knowing to ride a bicycle). This durability is apparent when pilots switch into an aircraft of the same type – for which they are already licensed, that is, for which they have been "type rated" – but where the cockpit has been slightly modified (Roth et al. 2015). Serious aviation accidents have been attributed to the inappropriate body movements of pilots after switching between the two aircraft – e.g. as in the crashes of Lao Air QV 301 (which killed all 49 people on board) or of TransAsia Flight GE 235 (which killed 43 of the 57 people on board).

In such instances, remembering something during a debriefing meeting would be for the purpose of forgetting, doing what ought to be done rather than what actually has been done. The persistence of corporeal memory in instances such as the crash of TransAsia flight – where the pilot shut of the left engine as he had done in all of his training experiences even though now it was the actually live one – can be gauged from the fact that it may take considerable training before pilots abandon past movements to perform the required movement at a satisfactory level. The durability of corporeal memory, of course, has great advantages. Because of it, any kind of craft competence "accomplishes itself on its own" the more it is mastered so that "the past does not have to be remembered – it has transformed into a pure present" (Fuchs 2000, 76). But this durability also has a negative side: it is hard to change a particular behavioral sequence because it requires forgetting not only the actions but also the much more fundamental dispositions to act in this way. In the above-noted switch between two versions of the same aircraft, a multitude of errors may occur because of the durability of corporeal remembering (Roth et al. 2015). The purpose of the additional training for flying the different aircraft version (i.e. "differences training") is to erase those memories. The process always includes situations in the debriefing room where the wrong behavioral sequences – functioning like kinetic melodies – are made present for the purpose of assisting pilots to forget and replace them with kinetic melodies more appropriate in the new aircraft version.

Corporeal memory often is treated as mere mechanical reproduction and rote memory. In the case of aviation, pilots have been observed failing to find a switch or dial after having moved to a different version of the same cockpit (Roth et al. 2015). This appears to suggest that the movement is the result of rote memory. But this cannot be the case, for the movements take into account where the aircraft is at the time. As a result, the movement simultaneously is highly accurate in spatial terms and flexible in temporal terms. It has its own characteristics every time it unfolds under the conditions of the occasion. Acting inherently makes present; but it is also part of the transformation, as can be seen when actions improve. Such movement sequences include those related to actuators (e.g. power levers, flap levers, buttons) and instruments that they would look at; the pilots also verbally articulate what they or the other

pilot would say (rather than talk *about* it). That is, the same movements have symbolic function in the debriefing room but are doing work in the cockpit.

The preceding discussion exhibits both the problem of making an experience present again and the practice of making it present in drawing on the same movements that are doing the work of flying. These movements, therefore, present themselves and are not represented in the sense that this term is used in psychology (i.e. as *standing in for*). Here, the movement with symbolic function is conflated with the work-related movement that constitutes the genetic origin of the former. The movements are present precisely in the way they are – should the pilot experience again some such occasion in the future. Importantly, the previously experienced movements (including work-related speech) are not just present as objects of another experience. Instead, experience is present in and through the actual *performance* of the work-related movement rather than because it is represented. It is the experience itself again. The performance of a work-related movement felt in its in-the-courseness is contemporaneous with remembering of the experience, whereas a represented movement clearly is that of a past experience. Experience, therefore, is manifested as both present and past. In the former case, it is a first-person perspective of experience, whereas in the second case, we relate to our past experience from the outside, from a third-person perspective. As seen in the following section, during reminiscing, the two perspectives may come to intersect such that we begin remembering a forgotten event when someone else talks about what we have done (third person).

The present analyses exhibit the role of movements in spatial configurations in making present the past. The spatial configuration is the result of the relation between the body and cockpit poster (an inscription), and has been shown to be an important aspect in the constitution of gesture-supported inscription related talk. Importantly, these gestures are not simply generic. My research in the field of aviation shows that symbolic gestures do not merely describe the work-related movements but also are highly accurate in terms of spatial range and distribution. The movements are so accurate that pilots will miss, when they are asked to fly the same aircraft with a slightly modified cockpit, where a lever or switch has been relocated by only 5 centimeters. This accuracy therefore is similar to that between hand and arm movements and geography characteristic in the situation of aboriginal peoples in Australia and Africa. Hand and arm and whole body movements and orientations that do again what has been done before are an important feature in the present context, where the aim of remembering is to make a past or an intended experience present so that it may serve as a point of discussion in debriefing or interview. In this section, we see how kinetic-perceptual aspects become an integral part of the presence of past experiencing. The kinetic perceptual aspects come with sensations and feelings; together, they are "given to no 'memory' properly speaking, to no representation, to no thought: it is the self-movement of a power to grasp that is revealed to itself in the pathic auto-donation of an originary corporeity" (Henry 2000, 206–207).

Reminiscing

> [Remembering] is an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organised past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. (Bartlett 1932/1995, 213)

Information processing and computer metaphors of thinking have led to the conception of memory as a simple problem equivalent to putting a parcel in a specific place in a storage room (locker). Information is said to be "stored" in the form of propositional networks that represent conceptions; "retrieval" corresponds to the activation of specific nodes and the spreading of this activation to associated nodes. The phenomenon thereby is thingified and made to resemble the ways that engineers talk about what happens inside the classical computer. As the example of Descartes shows, using a machine metaphor to describe the conduct of a living person is fraught with many problems. Thus, in the introductory quotation Bartlett suggests that the available evidence points to remembering as a constructive endeavor rather than an issue of mere retrieval. As noted above, before Bartlett the event of remembering was described in a often-cited scene of *Remembering Things Past*, where the taste of a piece of cake soaked in a spoon of tea leads to a sense of recognition from which, in a creative act, the individual finds himself "in the face of something that is not yet and that only he can realize, and then bring into its light" (Proust 1919, 66). This section elaborates on four aspects of reminiscing – theorized as *remembering together* and *in words* (Casey 2000). These four aspects pertain to the nature of the recalled events (highlights), the narrative structure of reminiscence, how narration occasions remembering, and the tenuous nature of some memories. They are often observed in debriefing – e.g. when teachers are talking about their recent or more distant practice or when researchers are talking to students or teachers about curricular activities that have occurred some time back.

Highlights Versus History

From the stream of experiencing-in-occasion, some permanences (things) and some (micro-) events eventually come to stand out. Experiencing-of-the-occasion tends to be inchoate, filled with distraction and dispersion, and frequently is simply experienced as ordinary. In considering the data that I collected over three decades of research, it is apparent to me that reminiscing tends to focus on (or begin) with *extra*ordinary phenomena and (micro-) events. What stands out and constitutes the content of reminiscing has the qualities of a dramatic event or an event with dramatic component. Across the different contexts of debriefing that I have researched, collective reminiscing focuses on events that stand out because of their dramatic nature, for example, when a biology teacher attempted to show students how to do

predict the outcomes of a breeding experiment using a Punnett square, but then made an error. A large part of the debriefing meeting that followed – including six participants (four teachers, two students) – concerned this error. In another situation – where researchers debriefed students and their chaperon who had participated in an innovative environment-based science curriculum that had taken place one year earlier – the participants first and principally remembered situations with dramatic features. A student recalled an aspect of her scientific fieldwork because she "just about fell in [the creek that was the focus of her research]"; she related remembering another aspect of the past because "the tree fell on us – just about." Another student notes, "I just remember the tree falling, just about falling in, and all of the coliform." In Fragment 8.1, the eight-grade student Michelle and the chaperone of her research group at the time (Stuart), reminisce during an interview situation about events that have occurred almost exactly one year earlier; and it is precisely dramatic occurrences around which remembering occurs.

Fragment 8.1

	1	M:	and like the dirt samples and sand and figured out how moist it was, and the plants around it and the tree fell on us just about ((*laughs*)).
>	2	S:	yea ((*laughs*)), just about. I had forgotten about that
>	3	M:	((*Laughs*)) you remember that it scared me.
>	4	S:	I was, what's going to happen here? ((*laughs*)). no.
	5	M:	I was hiding behind big, big trees. if it falls on me, it's falling on the tree first.

Michelle notes a tree almost having fallen on them (group + chaperone), which Stuart remembers there and then even though he "had (just about) forgotten it." There was something scary about the event, and Michelle recounts hiding behind big trees. That almost falling tree, an event that followed the dirt sampling and moisture metering conferred an affective-dramatic dimension during the experiencing-in-the-occasion, making this field trip stand out and be an easily remembered event. A story line is developing, which exists for all participants and, as such, requires being theorized as event in which constitutive parts fall to different constitutive participants.

In another study, two teachers who have been doing everything together in the same science classroom – i.e. who have been "coteaching" – meet in the afternoon together with researchers to talk about their work. In the context of talking about how much they learn from one another, a mere mention of the name of one student is enough to make reference to and then account for what was happening while one of them (Bridget) was questioning the student and the other (Christina) was then intervening because of a sense that the questioning was challenging the student too much. In Fragment 8.2, the simple naming of a student suffices to refer to and initiate the discussion of a brief moment from a three-hour elementary school science lesson. In a sentence construction not unlike *that* dinner in Paris dinner that Dewey (1934/2008a) remembered, Christina refers to it as "*that* … interesting encounter."

Fragment 8.2

1 B: cause I used to sort of say– okay, like daniel today, I learned something from you about that
2 C: yea, that's true, that's interesting wasn't it, that was really an interesting encounter.

In yet another situation, when the researcher asked the teacher at the end of an eleventh-grade physics lesson what stood out, she referred to a particular (six-minute) exchange with a student, as the result of which the student was to change the nature of her research project. The student, in turn, also referred to the same event as standing out from this lesson, stating that beginning her project anew "sucks, it's really annoying because I had everything planned and I knew what exactly I wanted to do, and it's like, when I first got [the project], I was like, 'Yes, this is the want that I want to do out of all of them', and now it's sort of [finished]."

In my research on debriefing in aviation, pilots were explicitly asked prior to entering the debriefing meeting to state what was standing out for them; and the same was asked of the flight examiners. In instances often characterized on the part of the examiner as involving only minor issues, pilots experienced difficulties remembering much specific detail at all. Little from the examination situations could be made or became present again. In other instances, the participants referred to different situations; especially less-seasoned pilots tended to differ from the flight examiners in picking out what was particularly relevant to be debriefed for the purpose of learning. But when something particularly dramatic has occurred, all three participants (two pilots, examiner) remembered the same event(s), such as when a pilot initiated a wrong turn repeatedly entailing corrections on the part of the second pilot. Indeed, during the interview, the pilot to whom the error was attributed stated having failed the examination, expecting to be taken off regular duty, and having to enter retraining *because* of that wrong turn (Roth 2015a). At other times, all participants independently articulated the same event as standing out. For example, in a simulator session that generally went very well, especially for the pilot who was undergoing certification as a commercial pilot, the pilots might have programmed the flight management system. But then, to generate some extra time, they might have decided to fly another circle before making the final approach to the airport. In the process, they could have forgotten to program into the system that they were doing another circle. As a result, the flight management system would have activated the system for landing, for which the pilots had not been ready and specific actions remained to be completed. This created a series of difficulties, and the pilots were forced to extract themselves from the situation, that is, fly a go-around procedure. This would have added to the stress in the cockpit unit, which is further increased by the additional workload that was now placed on the system. That is, such an aspect would have stood out from the four-hour session because the pilots found themselves in trouble and therefore needed to do something out of the ordinary to bring the aircraft back into safety zone. While the pilots were reminiscing, the earlier situation was becoming present again in sufficient detail for them to be able reflect on it.

Highlights in experiencing are marked by strong affective qualities associated with them. The dramatic aspect has been resolved. It is not about *having an experience* that is occurring right now; instead, "*an* experience" can be had, if at all, when looking back when a particular event has come to a close. As apparent from the aviation debriefing data, when only minor flaws were observed on the part of the examiner, fewer aspects are noted on the part of the pilots as memorable: Everything had been more or less ordinary, and therefore did not stand out. There is therefore an affective quality associated with potential harm (falling tree, falling into the creek, stressing a student, or failing an aviation examination). Some form of imagery and re-experiencing similar feelings certainly are integral to reminiscing because of the corporeal nature of affect. But affect, as different from affect talk, essentially is not a mental but is a phenomenon of the animate body and thus requires being thought by means of eventual categories (Being-as-event).

Debriefing meetings conceived broadly generally include the discussion of a number of events. There are therefore two temporal dimensions: the event unfolds in time (i.e. has beginning, middle, and end) and is situated before and after other events. In the case of highlights, these could be from anywhere within the larger historical context of the earlier occasion. Thus, in the situation involving Michelle, Jane, and Stuart, the talk was marked by highlights, and there was no specific temporal order to when the event had occurred over the course of the four-month curriculum that they had experienced together. In the case of aviation debriefing, the accounts also follow the historical event of the examination as a whole. Pilots and examiners tend to talk about the events in the same temporal order that they have actually occurred. Debriefing sessions tend to begin with the first flying event and produce an account of it from the beginning to the end, they then go to the next event, producing an account of it, and so on. Flight examiners emphasize that the historical order allows them to remember better, and the order of the notes they have taken further supports this (temporal) organization of the debriefing meeting. It has been suggested that such ordering facilitates and is facilitated by episodic memory; and in airlines where the debriefing meetings are organized semantically (conceptually) around the components of the human-factors based evaluation model, pilots often failed to remember what they had done.

The Narrative Quality of Reminiscing

Memory experiments traditionally have asked participants to recall words or phrases under a variety of conditions. Collective remembering concerns events, aspects of which classical cognitive psychology has dealt with in terms of episodic memory. In fact, when we are looking for something, we often retrace what we have done before and where we have been in attempting to remember where this something might be. In such situations, we are literally placing ourselves where we have been in the past; but we may also attempt to do so by imagining the places and times. Other approaches to the phenomenon – emphasizing that people-in-situation rather than

the brain remembers (e.g. Vygotsky 1989) – focus on the cultural-historical resources available for the constitution of narratives. Thus, episodic accounts are not simply produced but "what can be said about one's past and how it can be made intelligible are fashioned by the rhetorical conventions of the time" (Gergen 1994, 80). Autobiographical and historical accounts, because they are designed to be intelligible for the specific recipient(s), are subject to constraints. Thus, debriefing participants produces accounts characterized by the specific, narrative emplotment of people (actors, heroes, patients) finding themselves in particular *chronotopes* (literally time-spaces) that are formally constitutive categories of narrative genres (Bakhtin 1981). The notion of chronotope with its implication of events that take place in characteristic spaces and times therefore is an appropriate category in the context of remembering generally and reminiscing specifically. Cultural genres available and used constitute the structure of what is remembered rather than some thing in itself encoded in the subjective mind.

We may think of chronotopes as familiar ways in which storytelling unfolds. That is, the telling of events, itself an event, is organized by familiar, oft-experienced ways of organizing people, things, sequences, places, and so on. Those narrative recurrences function not unlike the cockpit posters, by providing a cogredient event that constitutes a supportive condition for the narrative event. As exemplified in the preceding subsection, in debriefing meetings among teachers, the name of the student may suffice for those present to know which event in the classroom they are talking about and what the relevant details of the particular occasion were. In the meeting, the name serves as a trigger to set off the event of remembering. But the occasion remembered, "that interesting encounter," which unfolded over a period of time, could not be present again as a whole in a single word or in the few seconds of the verbal references (e.g. those made in Fragment 8.2). Consider what followed when the researchers, who were present in the classroom but who had not witnessed the event referred to in Fragment 8.2, requested a description.

Fragment 8.3

> Christina: He made this thing, and what Bridget and I have been working together on is to try to ask questions to pull out more, from the kids; you always wind up pull out more; … so Bridget had asked him some questions and he had changed something underneath to make it stronger and I sort of came in and didn't know what she had talked about, and she was trying to get him to think about building a top on the bridge, and, because I knew the kid better than Bridget did, I wanted to stop, because I thought this was enough for that kid, I thought he had done this magnificent thing … and I sort of barged in and did it.

In this account from a lesson on bridges and the forces that act therein, Christina accounts for the dramatic event where she "barged in" and continued (closed out) the questioning of the student Daniel. The remembered event took place over the course of a brief temporal span and in a specific locale – thus marking the chronotope. In this story, Bridget is the main protagonist, and Daniel something like a patient undergoing questioning, a form of treatment designed to "pull out more," which was to allow him to articulate his capacities and his thinking, and, in so

doing, lead him to learn. There is a particular plot, which may be expressed in the following gloss: Bridget is trying to extend Daniel's thinking, but the child is at the limit of his capabilities, so that Christina, who knows the child better than her coteacher, intervenes. In this way, Daniel "could be proud" of "his magnificent thing" rather than feeling "put down [by] this powerful person, the authority figure."

In the preceding section, a reminisced event involved a tree (almost) falling on the protagonist Michelle; it was apparently witnessed by the chaperone present at the time. In that same interview, the three participants in the science curriculum reminisce about a particular situation involving the traversal of culverts. In Fragment 8.4, the plot involves (a) a chaperone not wanting to let the girls go through the culverts ("for insurance" reasons), (b) some of the girls eventually traversing them "every time," and (c) another one refusing to do so. The possibility is raised that the group might not have conducted the planned water test that was the purpose for going on this fieldtrip.

Fragment 8.4

1	S:	and we went through the culvert. I remember that.
2	M:	that was fun. lisa wouldn't go through. she was too much of a chicken. she was afraid of snakes.
3	J:	I tried to go through every time.
4	M:	but he ((*turning toward Stuart*)) wouldn't let us.
5	S:	that's right. I kept saying it was for insurance, well it was.
6	M:	but then finally he let us go through and then we did it like four or five times in a row and like did we, I don't remember if we even tested the water that was going through the culvert.

Although there is a clear narrative structure in the accounts of past events (experiences), these stories are mixed with considerable explanation. As a result, the narrative event may be much longer than the actual event that had been experienced and that is brought to live in the narrative. The narratives may include, as in the case of Bridget and Christina, not only a description of what happened but also an explanation for *why* the event unfolded in the way it did. In that case, the two teachers talked about what else they did and attempted to foster, their conversations in preparation for the lesson; and in the account of "that interesting encounter" they used all this to explain why Bridget was pursuing questioning and why Christina jumped in to stop it. The three individuals reminiscing the environmental curriculum also included reasons and causes that were not and could not have been apparent. That is, description was accompanied by explanations, so that the making present of the past came to be interwoven with reflections on the past. Jane and Stuart remember that another student did not follow them through a culvert: "Lisa wouldn't go through. She was too much of a chicken. She was afraid of snakes." Here, being a chicken and being afraid of snakes are the explanations that account for Lisa's refusal. Sometimes what occurred later actually contributes to constituting what happened earlier (non-

occurrence of considering ramifications). Here, too, there is a narrative structure to the account, where protagonists act within an unfolding plot. But, in a characteristic manner, the knowledge of subsequent conditions not previously available now becomes part of the plot presentation – they did not give consideration but could (or should) have added them at that point ("there").

Aviation debriefing meetings especially are marked by the characteristic times and spaces when and where they take place. Time, place, and sequence typical for the events debriefed order the way in which talk makes occasions present again. Take-offs and landings are occasions with high workload and where things go wrong in very specific ways. For example, engine flame out and engine fire frequently occur (in simulator exercises) just prior to the critical acceleration phase or immediately after taking off from the runway and beginning to climb. Landing, too, involves characteristic troubles, such as the impossibility to land requiring a "go around." How to act in such situations is described in the manuals containing the standard operating procedures, sequential statements of conditions and required actions. If there are mental schemas, then they exist precisely in the narrative forms of telling events rather than in the minds of the speakers. There are characteristic actors, air traffic controllers, ground personnel, passengers, and flight attendants; and there are characteristic places, such as airports and their alternates, geographic and weather constituting features (e.g. winds). All these make for the ways in which stories of events normally unfold occurred, including who did what and when, and who failed to address one or more specific issues. Thus, even if something had been forgotten, the patterned ways of telling stories enables those involved in reminiscing to do some "filling in" because of the typical ways in which particular events unfold.

When there are no or few opportunities for the development of narratives on the part of those debriefed, the talk during debriefing is often experienced to be over the heads of the pilots. This is clearly apparent in aviation debriefing, where one of my studies shows that more than half of the meetings have examiner-to-pilot word ratios between four and ten to one (Roth 2015a). The study suggests that there are few opportunities for pilots to actually recollect, which is especially apparent in one airline I remember where examiners referred to factual matters rather than more elaborated narratives. Pilots familiar with *facilitated* (i.e. pilot-centered) *brief* and extended examiner briefs tend to feel that the former works better. Owning the debriefing situation because one has the time to talk through one's experience is linked to a commitment to the outcome of debriefing. My research shows that there are tremendous learning opportunities when pilots are provided with more than two hours for an hour of simulator training. As a result of my research, some airlines actually changed their debriefing protocol, providing pilots with more time to talk about the events in the simulator session. The response from the pilots was so positive that the airline engaged my research team to conduct an experimental study investigating the effects of increasing the length of debriefing while correspondingly decreasing the amount of time spent in the simulator.

The narrative form constitutes a cultural-historically specific template that is part of the "technology" of remembering generally and reminiscence specifically. Its origins date to the pre-writing times of traditional cultures, where certain elders

maintained the memory of the past in the retelling of creation and heroic events (e.g. the Iliad, Odyssey, or aboriginal dreamtime stories). Indeed, the narrative is responsible for telling temporality (flowing) and the temporal (historical) nature of the event. As shown in the case of Christina and Bridget, the configuration of a narrative event includes judicative acts of grasping the remembered occasion together with reflection upon and interpretation of it.

Something Forgotten is Returning

Reminiscing, collectively talking about the past, is dialogical through and through. In contrast to monologic talk, which reifies the truth, dialogical talk *develops* the topic and leads to the *emergence* of new ideas (Bakhtin 1984). Emergence is typical for evental categories of the transactional approach (Mead 1932). When flight examiners talk *at* pilots, fundamentally telling them how they have done and retelling observations they have made, the talk is monologic in nature. Whatever examiners are saying is to be taken as the truth. Counter-narratives are virtually absent (Roth 2015a). But one might anticipate the collective talk of reminiscing to provide opportunities to remember what apparently had been forgotten. Consider Fragment 8.5, where the interviewer (R) challenges the chaperone (Stuart) about his claim that he remembers a lot. The reply makes apparent that he remembered (recognized) the event *once it was told*. That is, the story told by another person provides the seeds for the becoming present of something that he apparently had forgotten.

Fragment 8.5

	1	S:	I remember a lot of things.
	2	R:	But you didn't remember the tree falling.
>	3	S:	Well once she told me it, how could I forget?

In the research on aviation debriefings, I found that pilots often remember little when they emerge from the four-hour simulator sessions. They tend to be tired because of the intensity of the simulator sessions, requiring the pilots' attention to such an extent that their consciousness of the details of the sessions appears to vanish. In that context, many occasions can be observed where pilots remember aspects of their flight even though they immediately before indicated not remembering (Roth 2015a). Thus, pilots may respond negatively to the query whether they remember some aspect of an event that occurred during the flight. The examiner may then begin narrating back what the pilot had done until being interrupted by the pilot, who may note that s/he now remembers and begins describing what had been done. That is, something another pilot or the flight examiner says may produce a condition where remembering occurs. An example of this is when a student in a debriefing situation says, "The researcher said something about the math yesterday, and then I remem-

bered that from our like polygons and stuff." There is indeed a sequence of events, beginning with an initial event of remembering concerning an incident on the day before, which then becomes a reminder of some mathematical concepts used in the task at hand.

There is no guarantee that a description of an event leads to remembering. As seen in the context of aviation debriefings, even extended exchanges may not get pilots to remember what had happened even though the event occurred less than a four hours before. Whereas in aviation debriefings it is apparent that pilots in such situations fail to remember – e.g. because they may not have been conscious of it – in other situation, the question may arise whether a person fails to remember or has not been there to witness and therefore could not have remembered. Such a situation occurs in Fragment 8.6, where the students Michelle and Jane reminisce together with their former chaperone (Stuart). The two young women have already started telling what had happened, when they ended up on some private property where the owner angrily approached them even though their teacher previously had negotiated access to the creek via this owner's property. In the course of the exchange, it becomes evident that Stuart first states having forgotten the event, then questions whether he actually had been there, and states that he would have remembered the event. With further detail about the situation, he states recognizing who the property owner must have been, which gives him a clue so that he then affirms that he had not been present in the occasion.

Fragment 8.6

	1	M:	she was like, what are you doing there? we were like ahhh, you gave us permission. oh yea, go ahead.
>	2	S:	I had forgotten about that. was I there at that time?
	3	J:	I don't think so.
	4	M:	no.
>	5	S:	I think I would have remembered that.
	6	M:	yea she came out and went, what are you doing here? and her dog was behind her.
	7	S:	who, where was that?
	8	J:	mount newton crossroad, or something like that.
>	9	S:	oh, I know who that is. oh, that happened, oh, I wasn't there, good thing.

In the course of reminiscing, participants may be led to recall what they thought to have forgotten, but it may also become apparent that they fail to remember (for one or another reason), or it may become apparent that they could not have remembered the event because they had not been present in the first place. This also shows that there are uncertainties about the events, which arise from uncertainties about the process of remembering.

Narrating the Past Being Present

Memory, remembering, and forgetting are phenomena that appear on all sorts of debriefing occasions. However, more so than in other contexts, forgetting is of particular importance in the context of aviation, where the intensity of the simulation makes high demands on workload and attention and where pilots emerge completely exhausted from their training and examination in the simulator. This presents a challenge to debriefing, for how are pilots supposed to remember when they are ignorant about something that they have done, especially when the flight examiner has deemed it to be inconsistent with company standard operating procedures. In the foregoing subsections, I describe how remembering occurs in the narrative event that allows the past to become present. That presence of the past is not a thing but an event and has to be modeled as a parallel to other percipient events cogredient in the duration (Whitehead 1919). In remembering, the past is present as micro-event cogredient with the perception of the present occasion (debriefing). The past appears in non-sensuous perception that runs concurrent with the sensuous perception of the debriefing event when it occurs. The event of narrating the past implies presence of the past as event; but it does not imply that the past precedes and is the cause of the telling. As the two events unfold, they intersect, narrating giving rise to presence, and presence giving rise to narrating – much in the way that this has been said about thinking and speech (Vygotsky 1987). What is remembered predominantly tends to be in the form of events that are dramatic and have been associated with affective colorings usually stronger than they occur during ordinary life. Narrating is a type of event that mobilizes actors, patients (who undergo), and plots to constitute accounts that shape and are shaped by those present. Narratives – though they sometimes enable the stimuli that allow the event of remembering to begin – cannot ascertain that participants actually remember; indeed, as shown above, participants (e.g. Stuart) may be unsure whether something has happened and they forgot (partially) or whether they actually were absent and could not witness what was happening. Uncertainties about the event itself and uncertainties about the process of remembering tend to be marked as part of the narrative account.

The narrative unfolding of reminiscing constitutes the memorable event but also requires some fundamental form of remembering that provides the person with the sense of actually having lived and undergone the recounted event. That type of presence often is corporeal, relating to ways in which we have moved and the reoccurrence of the feelings that we have had. Thus, it is not just that narrative requires recalling past events but that becoming present is enabled by narration, which is apparent especially when narratives are produced collectively. Any part of a narrative event may stimulate remembering, which thereby is an event within an event; and this may occur on the part of speakers and recipients alike. Aspects of events may be marked as uncertain without affecting the continued production of the narratives. Indeed, what is initially marked as uncertain may gain certainty (we have the sense or feel of greater certainty); but participants may continue without seeking to establish certainty, sometimes marking that the precise facts are not of present

concern. The particular opportunities of events of narrating events derive from the temporal character of their occurrence, which reproduces the temporal nature of the event narrated – though there is a great range of the relative durations. Thus, for example, the incident remembered may be brief with respect to the amount of time participants in debriefing spend in recalling, recounting, and analyzing it, whereas in other instances, longer stretches of event time are rendered in very brief statements and, in the extreme, only indicated by a single word that denotes an event by means of a characteristic recurrence (object, person) within the event.

The observations suggest that it may be important for those debriefed to participate in the production of the narratives. As seen especially in the case of the aviation debriefings, listening to the examiner describing what has happened provides no assurances that the pilots actually remember the event from which they are to learn and improve their practice. If the participants do not remember, the narration may just as well be about someone else so that any learning would not actually be from their (own) experience. Forgetting an event and not having been present are indistinguishable when there are no other features of the situation to ascertain one or the other phenomenon. It has been suggested that memories begin with an uncertain feeling that derive from a current perception, which then are affirmed through a constructive process that amounts to a narrative account of when that or a similar perception has previously occurred (Proust 1919). The present section shows that verbal accounts, too, may lead to the emergence of a feeling that something has occurred in the past. The vagueness may continue to exist, in which case the narrative contains hedges that mark the uncertainty with respect to the factuality or the process of remembering.

Reminding

The preceding section notes that there are situations where something forgotten may return. In some instances, there is an explicit invitation to remember followed by an initially brief description (that possibly increases if remembering does not occur), which eventually may lead the person to remember. The narrative thus allows both reminding and recognizing to occur. Reminding here is understood as the work done that "induce[s] the actual or potential remindee to do or *think* something that he or she might otherwise forget to do or think" (Casey 2000, 93). Although reminders are created to anticipate the possibility of forgetting something in a future situation, one of the important functions of reminding is that it stimulates the presence of the past. For example, a postcard from friends in Australia may remind us of the various visits to the country. Thus, the artifact, functioning as a reminder, is part of the event of remembering. Here again, remembering is a characteristic of the {person | environment} unit as a whole.

In aviation debriefings, the most prominent reminders exist in the form of the notes and marginal codes that flight examiners produce during the examination so that they have something that jogs their memory and they find themselves feeling

that they remember an event. The notes flight examiners make during the examination sessions are not copious, generally between two and five pages for a four-hour session: just enough to trigger a memory or a thought (Roth 2015a). For examiners, written notes constitute an important means for remembering, for they are caught between manipulating the simulator so that it presents the pilots with specific circumstances, observing the pilots, and creating opportunities for recalling events in the debriefing meeting. The notes then structure the meeting event, for flight events tend to be debriefed chronologically as they have happened. In some airlines, the debriefing meeting may be treated as a forum in which the examiners communicate their assessment, which is supported by the description of exemplifying situations. During the debriefing, they first communicate their assessment of a particular examination component, then look at the notes, locate one or two instances with the marker "DM" for decision making and use whatever they recorded to reconstitute the event in the present. My interviews with pilots show that they tend to find it more difficult to remember events when these are presented in such a random access approach.

Reminding occurs frequently in aviation debriefing settings – as in flying itself – where pilots and examiners use a range of acronyms and phrases for (a) noticing what pilots failed to have done during the simulation flight, (b) including specific descriptions in the accounts of simulator events, and (c) acting appropriately in future situations. When pilots are asked to provide an account, they are held to do so while adhering to the acronyms or phrases. For example, the phrases "aviate, navigate, communicate," "pitch, power, performance," "power, attitude, configuration" (also as P-A-C), or "pitch up, power up, clean up" all are phrases designed to remind pilots to act appropriately during emergency situations (cf. Roth 2015b). Such phrases tend to make use of a recurrent feature, such as alliteration (the three "p's") or rhyme ("-ate," "+ up"). Other reminders exist in the form of acronyms, including the T-DODAR (time, diagnose, options, decide, assign, review) of British Airways or the 5P (plan, plane, pilot, passengers, programming) and DECIDE (detect, estimate, choose, identify, do, evaluate) models of the U.S. Federal Aviation Administration, and the FATE (fly, analyze, take action, evaluate) or GRADE (gather information, review, analyze, decide, evaluate) acronyms used in other airlines. In most cases, not only do acronyms serve as reminders, but they are themselves constructed such to be easily remembered. There is a clear future orientation in examiners' instructions intended to allow pilots to act appropriately without having to reflect on the spot. Flight examiners talk about planting a seed or a memory, because when an event happens, there is no time for thinking and reflecting about what is to be done. Consider the example of the acronym (F-, T-) DODAR.

Some airlines use emergency response decision-making models, which are indexed by means of acronyms such as (F-, T-) DODAR. The "fly" component may include a sequence of actions or checks, such as deciding to use autopilot or hand fly, speed, power management, and configuration. In debriefing situations, examiners encourage pilots to recount events in view of the model depicted in a list or flowchart form, which frequently is placed on the table between pilots and examiners. Pilots would then go through the items, often tracking each item with a finger or pen and, simultaneously, and account for what they have done. The text or

drawing serves are reminder that enables remembering, including recollecting actions that have been omitted during the examination. It is this missing that now becomes the topic of the exchange with the examiner. That is, an item in the model, when readers get to it, becomes a reminder for what has been done or missed. In the latter case, of course, the purpose of debriefing is not to recall and perpetuate the incorrect sequence but to bring about a change in practice so that in the future it differs from the event that the pilots have recollected. In this situation, remembering is enabled by means of recurrent features of habit. The recurrence in the acronym thus functions like the chronotopes of narrations, providing a base beat to what is happening fostering the occurrence of specific events required for securing the safety of an aircraft. Such models have a prospective dimension in that the pilots, during an emergency situation, are to act according to the events indexed by the acronym. It is therefore also to be used as a reminder – though not in its material instantiation – when pilots fly, especially those new to the emergency response model encapsulated by it. Flight examiners encourage pilots to actively remember the acronym and then to act by it. Indeed, the ultimate purpose of the training is to get pilots to act in emergency situations without having to invoke the acronym reminder. Thus, acting as if they were following the (F-, T-) DODAR model without actually having to rely on the reminder distinguishes good pilots from what examiners consider average and low performers. This is not unlike speaking grammatically correct without having to consult one's knowledge of grammar.

Verbal mnemonics constituted an integral part of an innovative curriculum around physics and engineering concepts that I had taught and investigated. In that study students often invoked the names of two students, Lana and Riley, which were connected to particular ways in which levers had been found to function. "What Lana [Riley] said" or "Lana's [Riley's] law" served as reminders that started verbal elaborations of the ratio or multiplicative strategies for predicting and explaining the behavior of levers. Thus, even in the case when students had forgotten and thus did not make use of one or the other strategy, the simple invocation of one or the other name often enabled the unfolding of remembering: the students remembered the mathematical strategy associated with the relevant student's name.

The classical example of the reminder, the knot in the handkerchief, shows how an abstract object-thing may serve as a reminder for something completely different. In some of the aviation debriefings, the concept map of a human factors model (a hierarchical concept map with six concepts, three on the bottom, two in the middle, and one on top) was used as artifact during the debriefing meetings. There is no evidence in my research that this model actually assists pilots in remembering. The human factors model is part of the flight examiner discourse. Even though pilots may use the same words that appear in the concept map (e.g. situation awareness, management, knowledge, workload, or decision-making), the theoretical discourse associated with them is disconnected from the particulars of their work. Typically, therefore, flight examiners might talk about the "knowledge" of a pilot and use several examples from the preceding simulator session. As far as I have seen, these concept maps therefore did not support the episodic, corporeal memory and associated associative processes that allow pilot practitioners to evoke associations and reconstruct what has happened. In the case of P-A-C (power, attitude, configuration),

the device in itself apparently is no less abstract – sounds, letters – and yet they directly relate to the movements that have to follow a go-around call, where the pilot flying needs to increase power, bring attitude to something like 8°, and configure the aircraft for extraction from the situation toward safe altitude. Whereas pilots do point to maps, action models, handbooks, and other artifacts, during my research they have not been observed doing so in the case of the human factors model.

Recognizing

Existing research suggests that recognizing differs from explicit memory. In the latter, a *re*presentation of the past occurs. In recognizing, on the other hand, one and the same thing (a face, an object) is cognized so that "we live the coincidence of past and present at a single point in time" (Fuchs 2000, 78). Recognizing is an event in which the congruence between some aspect of a past event and some aspect of the present event occurs. The two events intersect, the percipient event and the event of feeling: "This. Here. Again." In the evental approach of transactional psychology, we understand the presence of the past in terms of a non-sensuous perception, and what is cognized in the present in terms of sensuous perception. Recognizing is the congruence (intersection) between the two percipient events, one sensuous the other non-sensuous. That is, recognizing constitutes the presence as much as it reconstitutes the past. This living of the coincidence of past and present is most strongly felt in the event of a *déjà-vu*. In debriefing meetings of all kinds, artifacts in particular may allow individuals to recognize something even though immediately before they indicated having forgotten an event or aspect thereof. Recognizing includes two fundamental but not mutually exclusive dimensions (Casey 2000): (a) *availability*, which makes an entity accessible to a movement of increasing specificity, from a vague sense of familiarity to the full acknowledgement of its identity – and (b) *consolidation*, a movement in which the recognized character of an event (entity) obtains its own identity.

Fragments 8.7 and 8.8 contrast two ways in which the past is present again: in the event of reminding and that of recognizing. The examples derive from a research project, where the researchers debriefed students about an experimental curriculum on chaos theory. When the researchers talked about curricular artifacts that were not present during the interviews, the talk often led to statements that included questions, hedges, and other markers of uncertainty. In Fragment 8.7, the researcher provides a reminder, which solicits a compound reply moving from a question, to an uncertain memory, and to certainty.

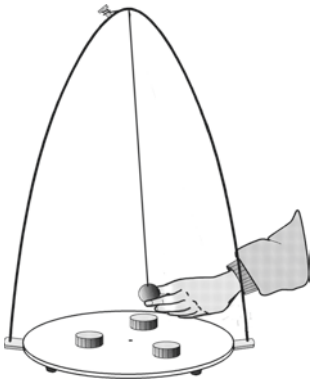
Fragment 8.7

	1	R:	during the subsequent lesson, the teacher projected a colored image.
➔	2	J:	was that so? I believe yes, oh, yes, this is true.

The student articulates uncertainty about whether something actually had happened – projection of an image – but then moves to articulate greater certainty. We do not know whether an image actually comes to be present for the student. The situation changed when the researchers used artifacts from the experimental lessons. Immediately preceding Fragment 8.8, the researcher reminded the student of the lessons with a pendulum and has asked for an explanation of the phenomenon. The student replied, saying all sorts of things that were not quite clear. The researcher then pulled the pendulum students had used during the science lessons, held the pendulum bob, and requested a description of what had been observed 4 weeks earlier. Here, the presence of device afforded a percipient event that is one part of recognizing something that was cognized in the past. Indeed, "without the presence of the past in the immediate present there would be no keeping track of what we are doing (including thinking)" (Dewey 2008b, 131). The two associated perceptions are not different, for during the lessons, the teacher had held the bob in the same way. Upon recognizing the recurrence, other aspects of the past experience often recur in the present, exemplified in this study by means of the appearance of the description of the pendulum movement, here provided by means of the index finger making a figure-eight-like movement in direction of the base of the configuration that the three magnets constitute.

Fragment 8.8

1 R: can you begin by describing what the movements of the pendulum look like? when we let the pendulum go, what do the movements look like?
2 S: yea, the movements are, if we were to record them, which we have done with the computer, yea, then they almost look like, we read about this, almost like a butterfly. ((*Makes figure-eight type index-finger-hand movements in direction of the pendulum.*))



In this context, the student was remembering another investigation, in which a computer program modeled the pendulum movement that students had used to investigate the effect of infinitely small variations on the ultimate resting place of the bob. It may be because artifacts enable remembering in the form of recognizing that these have such an enormous impact on interview talk. Students may have forgotten "how to do this [problem]" but, provided with the materials, note, "Oh, I remember," and then solve the task. A student, watching a peer begin illustrating a solution using a pulley, in recognizing realized, "I know, I know, I did it the wrong way, that's not how I wanted to do it." Past research shows that the presence of

artifacts may radically change student responses, followed by very different interpretations concerning the presence or absence of misconceptions (Schoultz et al. 2001). Rather than misconceptions that mark children's talk in the absence of a globe, they were observed using correct scientific discourse about the earth and the planetary system.

Already Plato had recognized the special role of technology in remembering (i.e. writing), which he accused of diminishing the art of remembering. Today, it is accepted fact that "technology has supplied publicly available (but entirely mechanical) mnemotechnical aides that displace the burden of memory from individuals to machines" (Casey 2000, 9). One important device for making a permanent record of some event is video technology. Interestingly enough, there is little evidence for an improvement in debriefing outcomes when video is used versus not used. However, there also is little known about how the video influences debriefing practices and the effects it might have on cognition generally and on remembering specifically. It appears self-evident that videotapes, which recorded events in some form, make these events present in the same form that they were recorded.[1] The databases that I scoured for this chapter do not reveal any evidence that the reality of the event as shown on the video was questioned when those reflecting on practice used video. Participants tended to take the video as a manifestation of what really happened. In aviation debriefing meetings, even examiners sometimes defer to the video as an objective and impassioned representative of what really happened. This is so even when individuals describe what they have done differently then what can be seen. In such instances, a person might say, "I can't believe I said/did that." I remember one particular instance, where I was following up on a discrepancy between what a pilot said to have happened and what the video showed during the debriefing meeting. In that case, the pilot did not change his account and in subsequent discussions continued maintaining the original story. It was only after I repeatedly pointed out with the aid of transcriptions what was said during the training session in the simulator that the pilot finally accepted to have missed an item from the standard operating procedure. The specific case was the announcement that some event had occurred as indicated by the relevant instrument, when in fact the event had not occurred; and the pilot thought that the standard operating procedures had been followed when the flight examiner pointed out that it actually had not been followed. That is, after seeing the event again on videotape, the pilot did not recognize the mistakes he had made during the flight situation.

Among pilots, the issue of forgetting is most salient and is of particular significance given the short period of time that has passed since the original event. When pilots are asked about some event, they tend to comment in similar ways, for example, by saying that they would struggle identifying those parts of the standard

[1] Importantly, video technology does not record events as events. Instead, each image is something like a cross-section of all events in the occasion, where the camera itself is a recurrence. As distinct cross-sections, the images therefore bear only an external relation as things rather than the kind of inner relations that we have in overlapping events or different phases of the same event where the earlier one passes into the later one.

operating procedure that they had missed during the flight simulation. In my experience of debriefing situations in the airline industry, video often does assist pilots not only in remembering but also in becoming aware of what they may not have been aware during the flight situation.

Videotapes are also common in research with teachers, where they constitute a means to make present specific past events and, in so doing focus the debriefing discussion on whatever offers itself to be seen in the recording. Consider the following fragment, in which a teacher (Chris) and researcher watch the videotape that had been recorded 4 months earlier to the day. Even before beginning the video, Chris noted that he "needs the refresher." The two were watching a stretch of the video – which, as the subsequent talk exhibits, concerns the interplay between the two teachers teaching the science class together (Cristobal being the second). This interplay is seen in the video when the second teacher (Cristobal) walks away from the classroom front during a period when Chris, a teacher in training, apparently is in charge of the occasion. The researcher makes an apparent move to contextualize the video clip for the teacher (turns 3, 5). Out of these evental forms – the research reminding Chris, the video as a source of recognizing – some remembering begins, for Chris is asking about other parts that had been part of the same lesson.

Fragment 8.9

1 R: what I wanted, just to sort of tune us, what I wanted to do is play about two minutes from that lesson and then start asking or let you talk about it. that sounds good to you?

2 C: good, cause I will need the refresher! ((*Chuckles*.)) ((*Video is started.*))

a S1: it don't get hotter than number nine.
b C: ((*Laughs*))
c S2: the fire, the fire
d what I'm saying is that fire doesn't get much hotter than the oven itself.

3 R: I'll stop for a sec. I think what it was, you talk about metals and about them not being liquid, and then there is something– you are talking about the stove. I think just before that, you explained to them about the stove.

4 C: uh hm, hm.

5 R: and uh, and then cristobal comes in and explains something with the torch. and that's just, that sequence.

> 6 C: has the student asked the question about leaving something on the stove yet? or is that after?

> 7 R: it– that may have been right there, just before.

The offered query (turn 6) can be understood as an event whereby a story is presenting some aspects of the original occasion: talk about a torch, the oven/stove, which, as the student in the video states, "cannot get hotter than number nine [the number on the dial]." In the exchanges between Chris and the researcher, more and more details of the lesson are becoming part of the present in the way described under reminiscing.

At the Crossroad of Corporeal and Social Remembering

> The animate body *becomes* memory, and memory *becomes* the animate body. (Summa 2011, 183)

Corporeal memory and representational memory have been and continue to be treated as two different forms of memory. But there now exist attempts to explain these in terms of one single system that does not divide consciousness. Even classical psychological research has returned to intuitions of phenomenological studies that recognize the constitutive nature of a single system. In contrast, there exists a tradition to focus on the essential nature of the animate (living) body in voluntary memory and thus the irreducible unity of the two forms. Remembering, more than constituting consciousness of bygone events, is "an effort to reopen time on the basis of the implications contained in the present"; and in this effort, the living body constitutes a "permanent means of 'taking up attitudes' and thus constructing pseudo-presents" (Merleau-Ponty 1945, 211). Not only does the animate body exist in time and space, but also time and space exist through the animate body (see chapter 2). The past therefore is always also present, and a line of separation will be far in the distance. In this move, we pay sufficient attention to life "to encompass in an undivided present the entire past history of conscious perception – without doubt not as a simultaneity but as something that is at the same time continually present and continually moving" (Bergson 1911, 30). It is like with a melody that constitutes a perpetual present from beginning to end. But this perpetuity of the melody does not signify immutability, just as indivisibility does not mean instantaneity.

As noted above, even Freud came to suspect that the human psyche is extended, that is, exists in the habits of the living, animate body. Without the animate body, we would not feel and could not have the sense that whatever appears has indeed been part of the past. As the preceding sections show, mere talk does not bring the past into the presence – Stuart did not know whether he had actually been present when the narrated event had happened and pilots often relate to the examiners' accounts as if the pilot talked about were someone else. The sensing and feeling that we had been there is precisely of corporeal nature.

In the analyses presented in the preceding sections, two main aspects stand about with respect to how past events are made present to become "*an* experience." A first aspect concerns *the importance of the acting out of movements (kinetic melodies) as part of the debriefing work,* which allows pilots not just to reflect upon prior events

in an intellectual sense, but also to perform and undergo those events anew in an animate way that implicates them as whole persons. Even flight examiners do not recall individual items from the standard operating procedures specifying how to fly in a particular emergency situation. Instead, triggered by some event (a call, signal, environmental condition), a *kinetic melody* – a sequence of connected actions (e.g. turning dials, moving levers and switches) and perceptions – is set off in the cockpit by some trigger and then unfolds on its own without requiring conscious awareness of its constituent parts. Kinetic melody is good term because a melody inherently exists as an event. It cannot be reduced to a thing or to a sequence of independent things – even individual notes we experience as events rather than as things, and we would never have the sense of harmony unless two or more sequentially ordered and extended notes simultaneously are present in experience. The two passages overlap and this is the origin of the sense of hearing a major third, a minor third, or a fifth; and it is the origin of hearing a more bright and cheerful cord, whereas the hearing of minor scales are associated with feelings of tragedy and sadness. Pilots know and recognize procedures in the way we know and recognize melodies (Roth et al. 2015). The consequence of this way of knowing is that pilots do not recall individual steps but instead, the kinetic melody as a whole has to be set off for the event to be present again. Even flight examiners tend to return to the beginning of a procedure and then perform it as a whole to stop whenever they reach the relevant part (e.g. Roth and Mavin 2015). The relevance of these findings for instructional (design) purposes therefore lies in providing evidence for the importance of performing kinetic melodies rather than merely observing them. The instructional context may provide important resources that either trigger or provide contextual support to the making present of experience.

The second important aspect of remembering work exists in the discursive elaboration of whatever nuclear seed sets off the event. Sometimes, certain situations in the past (highlights, drama) appear to be remembered very quickly. At other times, enabled by something another person previously has said (i.e. arising out of the preceding saying), an artifact seen (cogredient in the debriefing duration), or a corporeal movement felt, the past becomes a cogredient event in the present duration. The discursive elaborations are not arbitrary but constrained by the relevant genre – e.g. the biographical orientation when students and their chaperon reminisce, the technical orientation of the aviation debriefing, or the knowledge-oriented talk in curriculum debriefings – each coming with its own characteristic protagonist–plot configuration. There are typical and familiar ways of telling stories that become part of our conduct and that shape how we tell and understand our lives (Lave and Wenger 1991). Chronotopes, which constitutes events in terms of times and spaces, have an important role in remembering, both because of their indexical nature and their spatiotemporal organization of the event. That is, remembering work is enabled as well as constrained by the irreducible relation between knowing a language and knowing one's way around world. Once the students and their chaperone noted the creek or the culverts, the freedom that the plot of their narrative can take is more limited: crossing the culvert might be daring but accomplished or it might have led someone to fall into the water; you dare going through the culverts or you chicken

out. Once made the topic, the chaotic pendulum invites certain events to be talked about (e.g. movement, direction, ultimate rest); and in the flight simulator-based examination, there are particular stages of flights (e.g. take off, landing) that often are more eventful than others.

The second important aspect concerns *the joint nature of the work that is involved in bringing prior experience to bear on current experience*. It is the result of the transactional exchanges that remembering occurs across the {person | environment} unit, which would not normally be present to the consciousness of the person who had actually been there. In the transactional approach, which is founded on the premise of the unity/identity of person and environment, remembering is not something that one can ascribe to the person but is a quality of that unit in its entirety. Likewise, remembering is not something that happens in some metaphysical world, but involves the qualities ascribed to mind and body. As the result of the relation between participants and facilitators (including examiners), the different phases and parts of events come to be named. Once the flight simulator event and the contents of the standard operating procedure are present, the two can be compared as part of the relational event – intellectual, affective, and praxeological – in and of which both facilitator and participant are part. The standard operating procedure then becomes a relevant and significant part of *an* experience that stood out from the stream of experience.

Debriefing and reflecting on practice are organized settings in which remembering the past, what has happened and what was done, seen, and felt, is at stake. It may be advantageous to conceive of remembering in terms of multiple intersecting events: They are spontaneous and involuntary sensations resurfacing from the past and, initially felt as something familiar, are translated into something explicitly remembered; and discursive accounts trigger the resurfacing of spontaneous and involuntary sensations. Mnemotechnical devices may be used to stimulate spontaneous and involuntary sensations. This constitutes a particular disposition or "attitude." In this disposition, some fragments of the past constitute starting points with and surrounding which the "the event is reconstructed on the basis of the relation of this specific bit of material to the general mass of relevant past experience or reactions, the latter functioning … as an active organised setting" (Bartlett 1932/1995, 209). The explicit part of the recalling event then is an inherently social construction (even when the individuals were to reflect on their own) that justifies the attitude that has given rise to the construction.

Corporeal remembering is durable, which may lead to contradictions because events come to play out in ways that they have done in the past when something else should actually be happening. This was the case in the cited TransAsia flight accidents, where a kinetic melody was unfolding different from the one should have been unfolding – i.e. the one related to the second engine. The contradictions of corporeal memory also are apparent in a reported case where a pilot was conducting a procedure from memory, and in repeating the announcement of a particular situation ("up trim") was not verifying whether the live engine *actually* was up trimmed – which it was not (cf. Roth and Jornet 2015). Thus, in the flight simulator, the pilot moved along with the kinetic melody (in aviation lingo, the "memory items"),

thereby manifesting the presence of memory, but the associated verification of the instrument were not actually taking place. This situation was to be discussed in the debriefing, where, of course, the memory of the procedure as it should be flown is present again. But what is not present – and cannot be present – is what the pilot had forgotten to do. That is, the two kinetic melodies – one of how the procedure *should* be flown and the one related to what *actually* was happening – intersect and affect each other. I was able to investigate one such situation where an aircraft in Myanmar had crashed, leaving two individuals dead and many severely injured. The pilots recounted the flight to the investigators, which was consistent with the way that the procedures describe the approach. But what they were thus "remembering" about the actual flight was inconsistent with the information from the flight data recorder.

Artifacts, Recurrences, and Remembering

Classical psychological studies, using as unit of analysis the brain (mind), are not concerned with the role of artifacts in remembering. Indeed, artifacts immediately decenter the investigation requiring an expansion of the unit of analysis to include the physical and the social (cultural, historical) context. In cultural-historical psychology, for example, it is the person stimulating the brain – to think, to remember – from *without* by means of artifacts; and this type of stimulating activity has its genetic origin in social relations with other persons (Vygotsky 1989). A quintessential example of this way of remembering is the knot in the handkerchief, where the appropriate unit of remembering is {person | handkerchief}. Alarm clocks, public (sculptures, statues, fountains, monuments, museum exhibits) and private memorials (graves, photographs) all testify to the use of artifacts to impede with forgetting to occur. They testify to remembering being a characteristic of the {person | environment} unit that is more than the addition of the two abstractions (person, environment). In this chapter I exhibit how the recurrences that we call artifacts are part of remembering in its reminding and recognizing modalities. Whereas artifacts are pervasive in aviation debriefings, they are often absent in educational studies when students or teachers are debriefed about their previous experience (e.g. conceptual change studies). In part, this absence can be understood in the context of theoretical paradigms that situate knowing and remembering in the brain (mind) rather than in the relations characteristic of the {person | environment} unit.

In the sessions that I have seen in the course of my research career where some technology is available to replay recordings of previous events – such as the debriefing tool in aviation – the participants directly refer to what could be seen during the actual event. As participants are gazing at the instruments and materials from the past appearing again in the present, they are enabled to perceive (again) what and how they were seen in the past. Artifacts stimulate and enable *recognizing*, which may lead into other forms of remembering. The artifacts thereby are available to the same type of percipient events (e.g. reading an instrument or instruction from a manual) that also unfolded during the flight on the simulator. The participants did

not have to represent what they had seen; they not only read what presented itself but also knew where to go to find if they were need some information. The debriefing tool makes present the flight instruments featuring what they featured in the simulator session. This presence then affords specific instruction on a particular issue. The photorealistic cockpit poster present in all debriefing rooms provided similar opportunities. I have frequently seen how these cockpit posters were used and referred to, for example, when a pilot could not name some instrument or could not remember some operational sequence. Standing in front of the poster, pilots or flight examiner are made it possible to draw on recognition, for the poster affords pointing to parts of the cockpit or moving through an evental sequence over and against the image supplied. This photographic detail of the cockpit image then has a similar function in allowing an event to exist again in the present.

It is a well known fact that practitioners unfamiliar with video debriefing often feel embarrassed seeing themselves; and they sometimes make comments of the type "I don't believe I did this." A question therefore has to be raised about the degree to which video supports recognizing and other modes of remembering. If teachers, pilots, and others see themselves acting in a way for a first time, then this is different from remembering what they have done and undergone at the time. This may mean that additional work is required to tie what can be seen and cognized to whatever is available from the event through other modes of remembering. If such ties are not made or impossible to make, then practitioners likely will be viewing and analyzing a performance that might as well have involved another actor. That is, no learning from experience in the strong sense would occur. This may indeed require different modes of inquiry and reviews of the literature into the efficacy of video.

Some artifacts have mnemonic function in reminding events. They come in the form of lists or diagrams, but may also exist in verbal form. The devices make use of rhythm, rhyme, alliteration, distinctive name, and other features that support remembering. Artifacts and tools that are used in the event and also are present in the debriefing situation serve as reminders or allow participants to recognize aspects that they have been aware of and lived (through) before. Thus, for example, when pilots move through a checklist in their quick reference handbook, they do again what they have done during the flight simulation. They may recognize that they have gone through the list before and recognize the list items. But the items may also function as reminders for what they should have done in that the pilots remember *not having done* the item. That is, during the flight simulation, they were unaware of having skipped the item and now they remember having skipped it – for reasons known or unknown to them.

Artifacts considered as things are located and extended in space. Their perception – predominantly vision and touch – requires movements from the corresponding organs and from the person as a whole. Such movements, repeating for all practical purposes identical movements that have unfolded in the past, thus constitute corporeal remembering. There is then a constitutive relationship between the encompassing space and intellectual comprehension. The spatial and orientating function of artifacts particularly stands out in the case of the cockpit poster allowing

pilots and examiners to take their place with a space that is clearly marked out by the movements toward specific instruments and actuators that are characteristic of the knowledgeable pilot. The artifacts may also facilitate the taking of a position and, thus, the taking of an attitude and the appearing of a disposition that already characterized the original event. The function of position, disposition, and attitude is especially apparent in attempts to find a lost object ("What was I trying to do, in the process of doing?") and even go through habitual movements (padding pockets where we habitually place the object) and familiar places in an effort to "jog our memories."

Artifacts may also have an important function in remembering when students are debriefed about some (science) curriculum. Curricular artifacts support recognizing, and may also remind participants of aspects that they have done or gone through and would otherwise have forgotten. These results are consistent with existing research on the role of artifacts in interviews about conceptions, which shows that the misconceptions apparent in studies without artifacts are not present when artifacts are used (Schoultz et al. 2001). Indeed, one study in the learning sciences shows that when learning is assessed in paper-and-pencil form and different social- and artifact-based debriefing modalities, the observed performance differences between normally high achieving students and learning disabled students may completely disappear (Roth et al. 1999). Debriefing conversations that make use of practical situations (i.e. artifacts) and involving small student groups afford addressing the problem of ecological validity, matching the forms of cognition in debriefing meeting with forms of cognition during the science lessons. Artifacts – i.e. recognized recurrences across different events – may support recall when they evoke corporeal remembering, for both acting with and perceiving artifacts enable an *immediate* presence of the past.

Video constitutes a special tool for allowing the past to appear in the present. The literature on the role of video on learning through shows that evidence for the role of video in learning from debriefing is inconsistent. Whereas there is some evidence that videotape may have a catalytic function in debriefing, the question whether it aids in remembering has not been answered. Although debriefing assists learning when compared to situations where there is no debriefing, there is not consistent additional effect that could be attributed to the use of video. Techniques such as having specialists from other disciplines comment on past practice may not assist in learning from experience if the different modes of remembering are not supported. The evidence from aviation debriefing shows that pilots often see something that they have not been aware of while flying either in their own performance or in that of their peers. For example, teachers or pilots might observe themselves for a first time, realize that they "make mistakes when they are speaking," which they have "never listened to and heard before," and thus "noted for the first time." There is a need for future research to investigate how an individual may come to own the performance seen, and whether learning should be considered to be from experience rather than learning in the first place. It may take considerable amount of practice to realize the intended change of behavior. If the participants do not remember events, as seen in the case of aviation, then they see something in the video for a first time.

No remembering has occurred but a first perceptual constitution of something. The participants might have as well watched someone else and talked about the performance of another person. Thus, watching the video may not be so different from listening to some other person talking about an event.

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Part III
The Transactional Personality

> The personality = an aggregate of social relations. (Vygotsky 1989, 68)

> An actual entity is at once the subject experiencing and the superject of its experiences. It is subject-superject, and neither half of this description can for a moment be lost sight of. … An enduring personality in the temporal world is a route of occasions in which the successors with some peculiar completeness sum up their predecessors. (Whitehead 1929/1978, 29, 350)

The first part of this book is dedicated to the articulation and development of the foundational ideas that are required for thinking phenomena of interest to educational psychology from the evental lens of a transactional perspective. In Part II of the book, I extended the foundational ideas to some of the core phenomena that would appear in any study of learning conducted by an educational psychologist. This third part is devoted to the continued becoming of the individual, who is growing while being part of events, aspects of which become immanent in the person and leave lasting traces that shape future events in which the individual is part. The person here is theorized in its inextricable unity/identity with the environment, on the one hand, and in its inextricable unity/identity with its own historical life-as-event, on the other hand. There are thus no mental things in little storage boxes of the mind, there is no fixed self-identity, and there are no characteristics that could be ascribed to the person outside of the environment with which it forms an irreducible unit.

With respect to the individual person, many present-day studies focus on *identity*, which is ascribed to individuals (e.g., "his teacher identity" and "her science identity"). Even cultural-historical studies build theories in which identity, Self, and mediation – all notions consistent with a thing-oriented approach take a central place despite all the concurrent talk about practice (e.g. Holland et al. 1998). In contrast, some anthropological studies in New Guinea and studies of psychiatric cases had led to the conclusion that classical psychological phenomena, such as dependency, aggressiveness, or pride, are not individual at all. Instead, all these "words have their origin in what happens *between persons*, *not* in some something-or-other *inside* the person" (Bateson 1979, 133, underline added). In the quotation, I underscore the verb *happen* to emphasize that relation is not a thing but an event, and the "psychological" "characteristics" therefore are abstractions that point us to

events rather than to qualities of person-things. Events and their appearance in experience, integrates over person and environment so that "the character of an organism [always] depends on that of its environment" (Whitehead 1929/1978, 110), where we understand the environment as nexūs of the various families of events that constitute it.

Vygotsky, as seen in the introductory quotation, flagged an avenue for his theoretical advance to come by making reference to the Marx and Engels (1978) position on the essence of humankind: it is to be found in the ensemble of societal relations. Throughout this book, I emphasize that relations are not things, like the sticks connecting two or more balls in chemical models of compounds. Instead, relations are events. Before Vygotsky and Bateson, George H. Mead already had suggested that self and personality are the result of relations, where the self is stimulating its own social conduct and attitudes by playing out the parts that this social conduct calls out in the generalized other. The ensemble of relations constitutes the personality in a process that does not finish but continues to change right into the final phase of life. The formation of personality begins in the family and other groups that the child enters (e.g. at school). Playing, which progresses into playing games, is an important aspect of a child's life constitutive of personality because it is here that the sense of the generalized other has its origin. "What goes on in the game goes on in the life of the child all the time. He is continually taking the attitudes of those about him and on whom he depends. … Such is the process in which personality arises" (Mead 1956, 237). Mead, much more so than Vygotsky, provides the theoretical means for understanding the (continued) development of personality arising from participation in the different spheres of the life of society. This continued unfolding of the person from the evental perspective taken throughout this book also is apparent in the second introductory quotation. If being part of an event means intersecting with others and the material world, the subject-as-event involves change and novelty how ever short the phase of an event that we want to consider. Any subject therefore also is the result of the event. It is not so that in development, "the child becomes an adult" – an absurdity because "adult" is a state attributed to the child (Bergson 1908, 338). The phrase is absurd as it is based on the same cinematographic take that is used to understand evental phenomena in general (see Chap. 3). Instead, from the transactional perspective, in which persons are but different and irreducible aspects of the unfolding situation as a whole, we better say, "there is becoming of the child into the adult" (338). In this version, becoming is the subject of the phrase, and child and adult are but states abstracted from life in the way a photograph is. The life of a person cannot be reconstructed from all the still photographs that might have been taken. This is so because the central phenomena – development, becoming (including novelty and emergence) – are absent. The movement of development and becoming cannot be reconstructed because it is more than the series of positions.

The double nature of persons – as subject of an activity to which they also are subject and subjected as a result of which they are becoming in unforeseen ways – is captured in the notion of the *subject-superject* (Whitehead 1929/1978). When a person is viewed in terms of the notion of life-as-event, then personality is a specific

route of (overlapping) occasions. The traces of earlier occasions come to bear on future occasions such that the later occasions sum up their predecessors. But personality needs to be thought in terms of the unity/identity of the person and environment, that is, what we see as characteristic belongs to the {person|environment} unit.

A person, as superject, continually emerges. In Chap. 9 I develop an analogy with gardening (my hobby that supplies me with much of what I eat). In growing vegetables, flowers, or trees, the gardener also grows, and both gardeners and plants become immanent in the other – as can be seen from the fact that visitors to my garden attribute a "green thumb" to me. My green thumb is immanent in the plants that populate the garden; but the green thumb is the continuously emerging result of plants letting me know what they need to do better. This move toward the gardening analogy thus allows us to capture theoretically that both growers-makers and their materials grow (old) together and become immanent in each other. As gardeners prune their trees, they become immanent in the life of the tree (e.g. its shape, its productivity, and so forth). But that pruning is a function of the tree itself, which the gardener is addressing through pruning. Whatever the gardener brings to pruning is the result of having been through pruning events, himself shaping and being shaped by the events; and in such pruning events, the trees have become immanent in the gardener. In each pruning event, the tree is becoming a little more like its gardener and its gardener is becoming a little more like the tree. Such a conception of *becoming-form* can be found for example in the biography of the Nobel-winning geneticist Barbara McClintock, who understood herself in conversation with the world. McClintock used a language that exhibited the subject-become-object relations, such as when she said that one has to have "the patience to 'hear what the material has to say to you,' the openness to 'let it come to you,'" in other words, "one has to have 'a feeling for the organism'" (Fox-Keller 1983, 198). In this Chap. 9, I use an episode from a mixed second- and third-grade mathematics curriculum to describe and theorize becoming (natural) form and the immanence of things in human beings.

Whereas Chap. 9 exhibits learning and development in terms of becoming-(natural) form, Chap. 10 is concerned with becoming-like-another-person, that is, with how our conduct comes to resemble the conduct of others especially when we work with these others over longer periods of time. From the evental perspective of the transactional approach, the duration experienced by the self and the duration of the other's self *intersect* (Schütz 1932). In Chap. 3, verbal exchanges are used to show how in speaking, the other is already addressed; speaking does not externalize some self but in being *for* the other already takes the attitude of the other. The event of {speaking|listening} intersects with both (all) participant-related lives-as-events, and thus is common to them. The phenomenon of speaking is evidence "for the Other within oneself" (Mikhailov 2001, 17). When people work in the same situation, such as when two (or more teachers) teach together, then there is a double attitude – toward the students to be taught and toward the other *with* whom a teacher is teaching. In such occasions, my research shows that and how the participants become like the respective other. It is like a resonance in which the two or more people enter. This resonance is not something that exists within persons but is some-

thing that is written all over the occasion where it can be witnessed by participants and onlookers alike. In Chap. 10, I provide evidence from a series of studies on coteaching, where two (or more) teachers take joint responsibility for teaching. In so doing, teachers become like the other, and they do so in intellectual (cognitive) terms – e.g. the nature of questioning – and corporeal terms (e.g. intonation of particular phrases, coverage of classroom space, tics). I draw on materials from a chemistry lessons to show how certain rhythmic features come to resonate across speaker and audience and across different modalities. The upshot of this is that the other with whom we intersect in social relations become immanent in us and shape what we bring into exchanges with others in the future – leading to attributions of specific personal qualities.

Chapter 11 deals with the body–mind problem, which all forms of constructivism, precisely because of their concern with the (mental) constructions of social and material reality, inherently fail to address. Even Vygotsky, who had started writing about the body–mind (psychophysical) problem as the central, unresolved phenomenon of psychology in general, actually was perpetuating it. In his last written texts and notebooks, he noted the psychophysical problem as an issue that he needed to address in the future. Vygotsky had realized the intellectualism in his own early work, which he then began to overturn. When he wrote in the last paragraphs of *Thinking and Speech* (Vygotsky 1987) that language is in practice consciousness for others and for the self – which is actually a quotation from *The German Ideology* (Marx and Engels 1978) – he had articulated the seed for an important part of a theory. Thus, consciousness exists not in some ideal immaterial netherworld but, in the event of speaking, is part of the everyday world-as-event that we inhabit. When Vygotsky made his move from ideal word meanings to the sense-giving field, the accented visible but not the visible, he formulated a parallelist approach. In a note from late 1933 or early 1934, that is, only months before his death, Vygotsky recognized this parallelism: "Our analysis … was mistaken … there is no unity but rather parallelism and correspondence" (Vygotsky, in Zavershneva 2010, 49). Mead, on the other hand, had already developed an approach that has overcome the body–mind dualism and parallelism. He had done so by making sure the theory of mind is consistent with evolution shaping the human species prior to the emergence of mind and culture, where mind (consciousness) and culture then constituted advantages to the survival of the species: "Man certainly arises in nature, and his experience is that which belongs to nature itself; this does away with the old dualism of the Renaissance" (Mead 1938, 642). Once we step into a transactional perspective, the body–mind problem has disappeared, because we focus on events that form intersecting bundles of fibers, strands, and threads. Some of these have the quality of thinking (an event) that is never severed from other events that are material in nature. In this chapter, I show how an evental analysis works in the case of a tenth-grade high school student presenting to her groupmates the design of an experiment involving static electricity. The second part of the chapter is dedicated to the articulation of a change in which transcriptions are produced and read so that analyses can move from an intellectualist reading of (learning) occasions to one in which the psychophysical problem has been overcome.

In the final Chap. 12 I make a case for realizing a transactional approach by analyzing the drama of life *in terms of the event of drama,* which thereby eschews any reduction of situations to individuals-as-things. Vygotsky was sowing the seeds for a transactional cultural psychology of education, but unfortunately it was but a seed. Indeed, in his notes and fragments, there are many ideas that do not fit together. For example, in the fragmentary text "Concrete Human Psychology" from about 1929, he writes about personality: "The dynamics of personality = drama, *sociogenesis is the one true perspective, i.e., mechanisms are created in the environment.* … The personality as a participant in a drama" (Vygotsky 1989, 68). Yet his subsequently written works, including much of *Thinking and Speech*, reflects an intellectualist stance and not at all drama. Even though in his notebooks he considered his early work as intellectualist and as not having overcome the body–mind problem, he continued to separate the internal and external. This separation is the basis for and product of individualistic psychology in which the social appears at best as *inter*action – one action follows another. Thus, he said in the lecture on the environment given shortly before his death: "*the child's higher psychological functions, his higher attributes which are specific to humans, originally manifest themselves as forms of the child's collective behavior, as a form of co-operation with other people, and it is only afterwards that they become the* ***internal individual*** *functions of the child himself*" (Vygotskij 2001, 90). Mead, on the other hand, emphasized the continued presence of mind in the world, even though it may have become invisible in the unquestioned common ground. Thus, whenever required, it will be made visible in the collective behavior not only of the child, as Vygotsky intimates, but in the cooperation of older students and adults as well. He may indeed have a first inkling of that idea when he wrote about the "*renewed division into two of what had been fused into one*" (Vygotsky 1989, 58). He did not pursue or get to develop this line of thought – even though in the same fragmentary text, he calls for psychology in terms of drama and for considering the personality as a participant in a drama. The advantage of thinking about psychological phenomena in terms of drama comes from the fact that drama always *takes place* – is a spatially situated and temporal phenomenon – involving (dialogical) relations among people. It is thus a means of creating a transactional theory for cultural psychology of education, because "one must grasp the whole plot of a drama to comprehend the import of the details" (Mead 1938, 468). Drama – like the group of which a popular diction says that it has *its own dynamic* – cannot be understood as the result of individual private minds one acting after another. Drama plays itself out in public and is a public, social event sui generis – though the participants in drama, being attuned to the event, may undergo some experiencing (thinking) that is not public. But in participating in a public event, we are already taking the attitude of the other. Paraphrasing Mikhailov (2001) we may say that there is nothing inherently other that is not already our own, and there is nothing our own that is not inherently other. Drama is and has been a primary means for presenting and "enter[ing] into the attitude and experiences of *other* persons" (Mead 1972, 257). Psychology in terms of drama is a concrete rather than idealist human psychology. By its very nature, drama is transactional. Neither Vygotsky nor Mead developed the idea of psychology as drama any further. The

articulation of a dramatic (transactional) psychology of education offered in this chapter therefore is based on the works French psychologist and philosopher George Politzer (1928, 1929) where Vygotsky had first read about this idea.

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Chapter 9
Growing-Together

Hands-on activities and project-based learning are at the heart of many school disciplines. Educational psychologists, too, emphasize the need for children and students – especially those with difficulties in reading – to learn through practical work. As a teacher, I had not been different scheduling 70% or more of classroom time to student-centered activities, where data of some sort where collected or students engaged at their own rate in whatever the curriculum outlined in broad terms. Later, however, I was beginning to take a more critical perspective, wondering about how doing something with your hands was to contribute to conceptual understanding, which, by all accounts of the going constructivist narrative, existed in the form of abstract concepts organized in conceptual frameworks. Having been a middle and high school science teacher for a dozen years, I was beginning to ask others and myself pointed questions including: "How does turning the tap on a burette during a titration help high school chemistry students learn about acids and bases generally and about pH specifically?" or "How is turning the burette tab related to writing out a formula such as $pH = - \log[H_3O]^+$?" Clearly, at their very heart such questions concern the psychophysical (body–mind) problem. Standard educational psychology, concerned with the development of the mental, has not been able to provide any useful theory about the relationship between practical activity and anything that might be denoted as mental or conceptual.

Important in the work of the later Vygotsky is the recognition that concepts (or word meanings) are not stable but develop.[1] Any cultural psychologist of education interested in learning therefore should be interested in taking an evental stance, basing learning theory on a theory of events and their relations. But Vygotsky retained his intellectualist stance almost to the end of his life, so that even his last completed work published posthumously, *Myšlenie i reč'* [Thinking and Speech] (Vygotskij

[1] Vygotsky wrote about concepts as if these were things, some features of the mind. While discussing his work, I continue using the term. In a transactional theory, however, there would be events of employing concept words on specific occasions, themselves thought as events irreducible to things and structures.

W.-M. Roth, *Transactional Psychology of Education*, Cultural Psychology of Education 9, https://doi.org/10.1007/978-3-030-04242-4_9

1934), does not account for the relational nature of words in speech. Thus, for example, he suggests that scientific concepts begin as verbal definitions, and they become concrete when, included in some organized system, they descend to the concrete phenomena that are represented by the concept. Here, scientific concepts are defined outside any relation that a person has with the social and material environment: How, we should ask, can a verbal definition make sense when it is abstract and thus relates to nothing? And then somehow the definition descends to the phenomena and becomes concrete. Vygotsky suggests that the higher psychological functions develop when adult teachers, somehow participating in what is happening, assist students. It is apparent to the reader familiar with the work of Vygotsky that the concept of the *zone of proximal development* is looming here. In the educational psychology literature, this concept is associated with that of *scaffolding*. The latter term is used as a proxy for help, support, or assistance. Like the scaffolding used in house construction, the learning scaffolds are outside the students assisting whatever development goes on inside them. The scaffold is like the proverbial ladder that we can kick away once we have reached the top or higher grounds. Whatever might be constructed on the outside, in the public forum of the meeting with the teacher (parent), then has to be internalized.[2]

Current work in educational psychology, including that work flying the banner of the sociocultural and cultural-historical nature of knowing, has not moved beyond the psychophysical problem that Vygotsky pointed out in his own work. A key source of the problem exists in thinking in terms of entities: people, tools, and things. Thus, mathematical or scientific concepts tend to be thought-things or tool-things that are used in school or in everyday life. Meanings are more of those things that somehow are constructed and associated with the concept-things.

A very different understanding of learning and the relationship between doing and psychological activity (e.g. knowing, understanding, or thinking) arises when we theorize these phenomena in the evental terms of events. As hinted at in Chap. 2, we can then think of a person in terms of a family of events in which some evental forms are ensemble effects – like the new phenomenon of depth perception is an ensemble effect arising from two eyes and experiences of moving. The person never is disconnected from its environment. Instead, the environment, too, is thought in terms of events, some of which are connected to the person because of events that are common to both. Experiencing also is not a thing but an event cogredient within the current duration. A conversation no longer is thought in terms of exchange of word-things but as an event where two or more persons have something in common. When a child or student does something – looking at a configuration of objects on the floor gathered in groups on colored mats or moving around tangram pieces – then there is not a stable environment but an unfolding event. Rather than separate, environment and student are thought of in terms of events that are all cogredient in

[2] Recent analyses of Vygotsky's work show that he had scarcely used the term internalization or interiorization. These terms rose to importance in the Vygotsky-related literature because of Western scholars, who developed conceptual frameworks very different from those that Vygotsky had intended (Yasnitsky 2019).

the duration. As shown in Chap. 3, having a conversation then means becoming intertwined; and in such intertwining, each person becomes somewhat immanent in the other. Similarly, and to be developed here, when a child or student plays with or investigates material objects and phenomena, an intertwining occurs that results in the immanence of the materials and objects in the person and of the person in the material. The two associated forms of events may be denoted by the terms *person-becoming-thing* and *thing-becoming-person*. Both are irreducible part of an overarching category that I denote by the term that makes for the title of this chapter: *growing-together*.

Growing-together is a productive analogy that retains the two qualities of events – time and space – and, thus, is a productive analogy for thinking the transactional approach. On the one hand, growing-together captures that two or more processes of growing approach and come closer to each other. On the other hand, they come closer because they are growing together, simultaneously moving on and heading into the future. The analogy thus emphasizes the spatiality involved in two or more events in the same duration and the temporality involved in the passage from past to future. There are further opportunities arising from the use of the analogy. Growing is both transitive and intransitive. Gardeners say, "I am growing tomatoes and sweet peppers," thereby articulating an agential quality associated with being a gardener. But these same gardeners will say that the plants are growing (well), thus using the verb in an intransitive way. Gardeners who grow vegetables also grow a quality of themselves: they become better gardeners. Gardeners thus are growing together with their plants. In the process, they anticipate what needs to be done to keep plants healthy and produce, a fact that we may express as the growing of plants having become immanent in the gardeners. Such gardeners – i.e. those whose plants are thriving – are said to have or referred to as "green thumbs"; the greening of the thumbs occurs in the growing of greens. But something from the gardeners is immanent in the plants that are grown as a consequence of their own preceding growth and continued growing. In all of this, gardeners live, grow old, and grow wise. The analogy thus also troubles the going discourses in our field that exclusively focus on agency – how students "construct" knowledge, concepts, meaning, identity, and so on – failing to acknowledge that growing also has intransitive qualities and the quality of being affected by all the other events that are cogredient in any duration.

Most school activities do not involve growing plants. But students are *doing* and *making* things. Both verbs, however, do not have the same expansive field of connotations. I thus qualify any relevant verbs using the term *growing*, which yields, among others, the descriptive term *growing-making* in the context of the tangram activity that is featured in the case study below. In the growing-making of geometrical shapes from tangram pieces, we observe both changing objects and changing configurations and changing students. Rather than thinking about objects and students as self-identical things that somehow are changed by whatever forces that the theorist prefers, a transactional cultural psychology of education theorizes what is observed in terms of events in which change is endemic – any duration, however small, includes the novel and the old. The system as a whole thus is self-moving and

does not require external forces. The approach taken here is consistent with the insights from pragmatic philosophy, which does not ask for the meaning of words (language) but how words have their place (are used in) ongoing activity (Wittgenstein 1953/1997). Language-in-use is a form of game – thus language-game – played in ongoing events in which the practical activities of human beings unfold and where it does all sorts of things simultaneously (e.g. relating people in their relations to the world).

Trajectories

The purpose of taking a transactional perspective is to get movement back into theories of knowing and learning, to take knowing as a living enterprise that needs to be approached through the living. The transactional approach means taking life as flux that needs to be thought with figures that retain the flux rather than with categories that allow us to com*prehend* only when all movement and therefore life has stopped. The distinction made is that which has been denoted by the difference between Being (Ger. *Sein*, Fr. *Être*) and beings (Ger. *Seiendes*, Fr. *étant*), between *Saying* and the *Said*. This section is concerned with exhibiting new ways of characterizing learning activity that do not decompose events into things that then require forces to produce movement and change but to theorize learning activity in terms of events. This also means that we need to characterize the trajectories of events and how, from the movements described, we obtain useful understandings of living people (students, teachers) and the creative products in which they leave characteristic traces. In this chapter, I draw on fragments from a second-grade mathematics classroom, which had been recorded as part of a project that focused on the role of the body in learning. The curriculum consisted of tasks involving material objects; and the children were asked to provide accounts (by drawing or by talking about) of what they have done. In the classroom episode there was a visiting early childhood education professor from Brazil, who engaged with the children while holding one of the cameras. The episode below was recorded during a task that asked children (here exemplified by Misha and Mikki) to make different shapes – e.g. squares – with the tangram sets they had been given.

How the Search for a Boat Ends in a Square

Students inherently cannot intend the learning object because they do not know it, and if they already knew what the curriculum to be learned foresees, they no longer would need to intend learning it. But students may intend doing something and, in the process, learn something else that was unintended but emerged as a collateral product in and from the activity (e.g. Holzkamp 1993). In the course of the lesson observed, numerous unintended shapes resulted, such as an irregular pentagon and

an irregular hexagon. An event of this type happened after Misha decided to build a boat. In the occasion that unfolds, Misha picks up two triangles, brings them together at their base (Fig. 9.1a) and says, "That makes a boat." But in the end, a square will have emerged from her hands. This episode therefore begins as one of those occasions where the living curriculum transforms and even overturns the intended curriculum, creating new, unforeseen opportunities for learning. In the video, we see both hands together with the shapes move upward and overhead, then they return back down again and a third triangle comes to be picked up and placed next to the two other triangles. After she has picked up the third triangle, we can hear her make a statement while picking up the third triangle, "and that goes into the boat."

Initially we see the three shapes brought together while still in the air, and then come down onto the table where they join into a single configuration with a short side of the third triangle touching a short of one of the other two (Fig. 9.1b). The third shape then rotates (Fig. 9.1c) to stay for an instant in a new configuration with an empty triangle in the middle (Fig. 9.1d). One corner slides along the base of the first (Fig. 9.1e) until the lower part of the hypotenuse touches the short side of the second triangle (Fig. 9.1f). The right hand begins to cover one triangle, whereas the fingers of the left hand move towards the other two triangles (Fig. 9.1g), at which point, the hand pushes the first triangle slightly away (Fig. 9.1h) as if a new intentionality had emerged. The happening that follows will have left this triangle aside, even though it had been the central shape in the original boat design.

Following the movement separating the first from the two other triangles (Fig. 9.2a), we then see Misha's hands pick up two more, smaller triangles (Fig. 9.2b). The first of these can be found in three different positions related to the

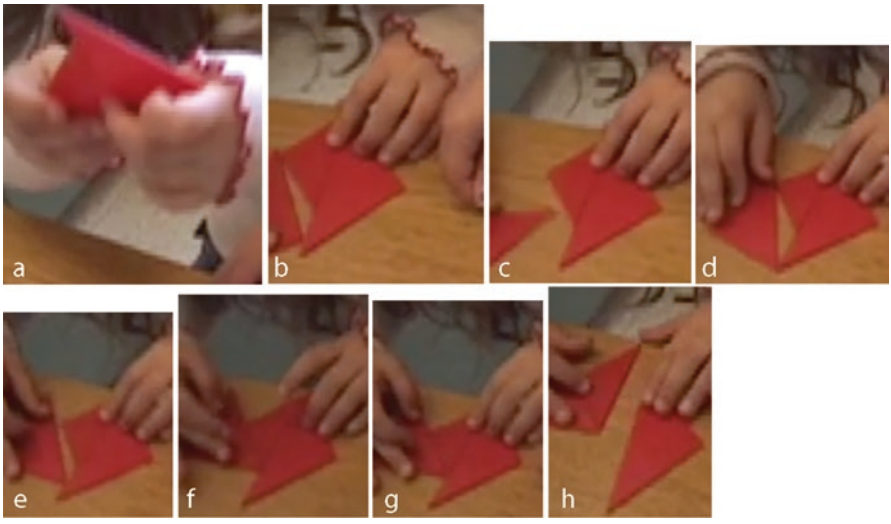


Fig. 9.1 Some of the video frames exhibiting the early part of a movement named to be the making of a boat (from tangram shapes)

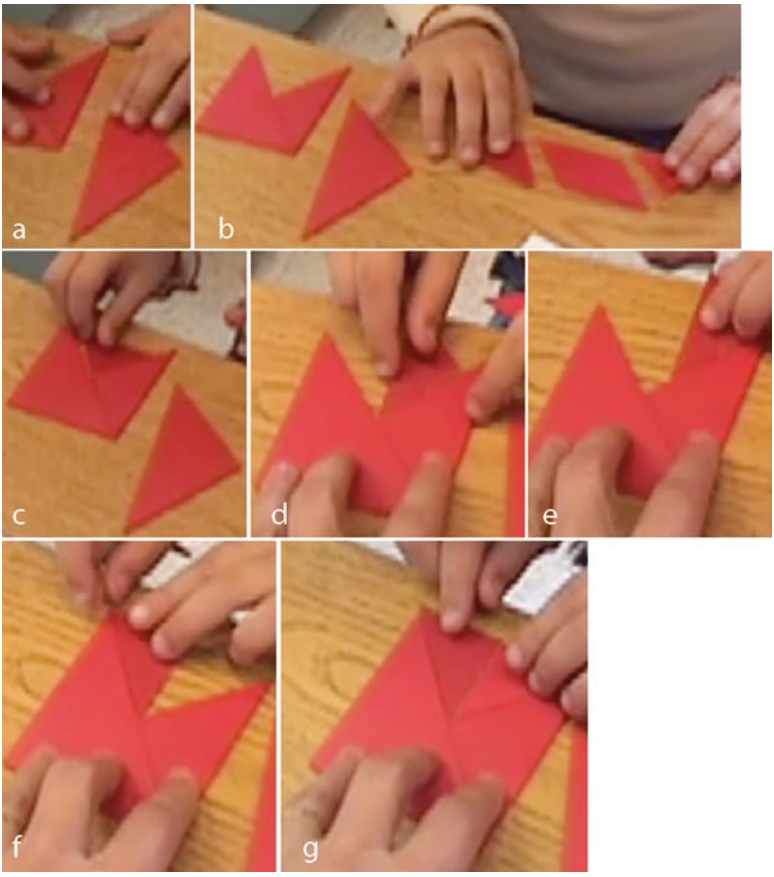


Fig. 9.2 Some of the video frames exhibiting the early part of a movement, which will have been the making of a square

figure formed by the second and third triangles (Fig. 9.2c–e) before finding a place in which it will have stayed for the remainder of the episode (Fig. 9.2f). That is, just as the hands seem to be placing the second of the small triangles, the movement stops and it pushes the already placed triangle into a new location (Fig. 9.2f). The second of the two small triangles first rests above the configuration, rotates in Misha's hands, and then comes down to fall into what will have been its final resting place (Fig. 9.2g). Misha's voice is heard again some time later, just after a configuration has come to be completed, saying, "I got a square"; and the event has Mikki respond, "I know." There is therefore a temporal delay between the movements of hands and triangles right up to the emergence of the square and the subsequent conscious realization that the preceding movements have resulted in a square.

We can hear the voice of the early childhood teacher educator visiting the classroom on that day and videotaping this episode. However, the voice appears in a voice-over, as the video provides no evidence that Misha is actually attending and

replying to it. The voice says, “Almost, almost.” A little later, when the first of the two small triangles descends towards the configuration, we hear “Okay, let’s see.” Again, “Almost” and then a hand comes forward holding the second and third triangles while Misha’s hands move about the first of the two smaller triangles. Just as the first of the smaller triangle is finding its resting place, the voice goes “Oh, Oh” and “interesting.” And when the final piece finds its resting place, we can hear “Interesting. Oh, you made another one. Very (serious?)ly.”

In this situation, what after the event will have been called a square emerges from a series of movements associated with talk about a boat. We see a movement from two to three large triangles, the third to be added in relation to the theme of the boat; and then the first triangle comes to move aside when two other triangles are found in a configuration that itself has emerged over the course of a number of changing configurations. That is, what will have become the basic configuration that then is completed to form a square is itself the contingent outcome of an evolving set of movements and emergent configurations. However, there is no evidence whatsoever that would support the claim that Misha was *constructing* a square, acting upon the triangles for the sake of producing a square in the way that Marx and Engels (1962), quoted by Vygotsky (1997), describe human builders imagining the end product in contrast to bees and spiders. Instead, the constellations emerging from the movements offer up possibilities for percipient events that are abstracted into (con-) figurations. What is happening is not goal directed, transitive only in the sense that the shapes are moved so that perception can find something to work with. Such actions are sometimes termed *epistemic* because, from the perspective of the human participant, they have no other purpose than to change what is available in perception for the purpose of seeing what the movement gives. From cognitive and computational perspectives, these external actions allow perceptual figures to become apparent that otherwise would be hidden. Cognitive scientists suggest that epistemic actions are produced because they allow the agents to get by without mentally rotating the shapes so that the configuration *is found* in the environment as a consequence of the action rather than being its prerequisite. Of course, in our transactional perspective, which acknowledges the unity/identity of person and environment, it does not matter where we wish to locate some aspect of the phenomenon because it inherently will be *within* our unit. This approach therefore allows us to understand that it is in the final constellation involving three large triangles that something new could be seen in which the first of the large triangles no longer was necessary. The part configuration became a new whole configuration toward which subsequent actions were oriented.

Generativity and Bifurcations

When we take a look at what happens in slow motion, we notice that the movements themselves are unpredictable from the perspective of the onlooker. In fact, from Fig. 9.3a–d, we see the right hand move until it completely covers the right-most

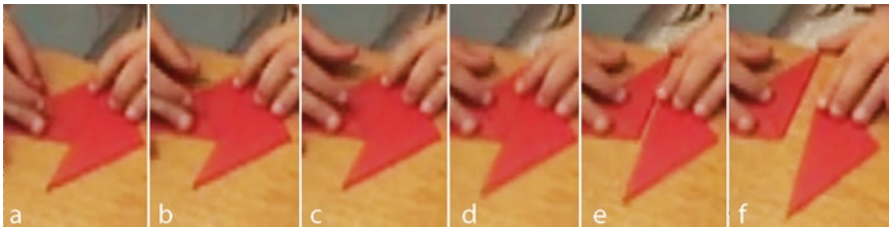


Fig. 9.3 Slow motion study of the emergence of a new configuration

triangle (from Misha's position) when the left hand also begins to move and, in so doing, moves the first triangle away from the other two (Fig. 9.3e–f). The possible is what can be anticipated from the given. Just prior to becoming visible, the new form, which will have evolved into the square, was part of the realm of the invisible. In this instance, de-formation becomes deformation. The *de*formation is more than just the possible change that is realized when the first triangle comes to be separated from the other two. It is in fact part of the creativity of the event that generates new configurations. In the transactional approach, creativity (novelty) is integral to passage (e.g. Mead 1932; Whitehead 1929/1978).

In the duration, the left-most triangle comes to be separated (Fig. 9.3d–f) from the other two, followed by an orientation towards a collection of additional shapes (shapes that Mikki had just worked with), from which Misha picks two smaller triangles that she begins to locate one in what might be seen as an "empty triangle" (Fig. 9.2c). As the following considerations reveal, an interesting movement occurs here that might all too easily be overlooked. Just before and right up to the breaking away of the first triangle, there existed a configuration (Fig. 9.4a). This configuration of three triangles was a figure against the ground, itself unarticulated. For the new two-triangle configuration to become salient figure against everything else, the first triangle itself has to become part of the ground. In the video, there is no evidence whether there was first a separation of the triangle and then the salience of the two-triangle configuration (Fig. 9.4b–c) or a change in perceptual salience followed by a separation (Fig. 9.4d–e). The subsequent movements of triangles is consistent with an intentionality where it is the "empty triangle" (Fig. 9.4f) that is the salient figure rather than the two-triangle configuration (Fig. 9.4c, e). In either way, there are two gestalt switches, each entailing a change in intentionality: for the emptiness in the two-triangle configuration to become figure everything else has to become ground. Each new figure still unseen immediately before could not have been intended precisely for this reason – it is unseen and thus unforeseen. This is so because intentionality and the perceptual salience of the object as it is given in conscious awareness presuppose each other (Husserl 2004). To see the figure again, the perceptual flux has to fulfill what is already *fore*seen (i.e. seen before).

How does such a gestalt switch occur, especially a gestalt switch that could not have been intended because what will have become visible was invisible before? The currently unseen events are making for the perceptual ground give reality to any percipient event and the figures that it abstracts. This is so because perceptional

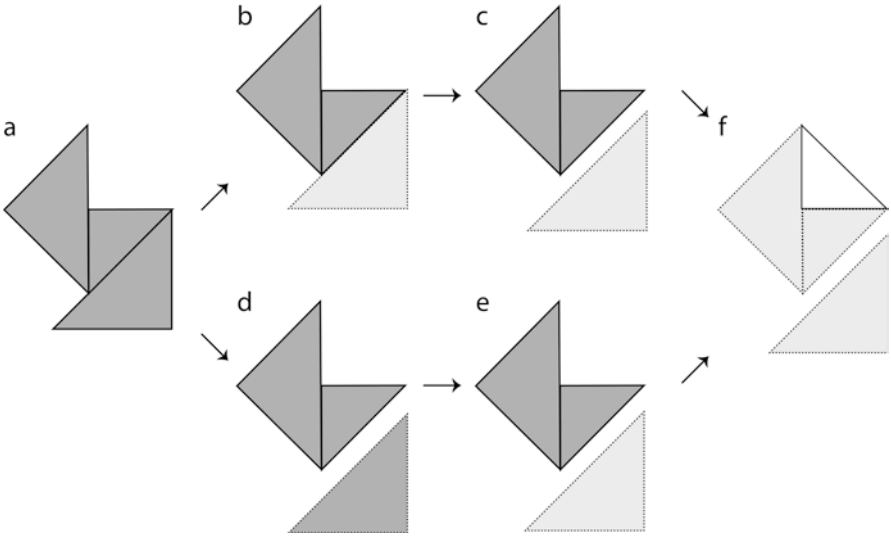


Fig. 9.4 Trajectories: emergence of a new figures, first by the retreat of part of the old figure into the background – either taking pathway (b) and (c) or (d) and (e) – and then in the appearance of a negativity (f)

intentionality, based on past events and experience, always aims beyond itself such that we see a cube even though only aspects of the cube are currently seen. That which is seen is accompanied by the non-seen implied in the seen. Here, the possible constitutes the changes in percipient vents when the cube is infinitesimally moved. But the virtual is the totality of other cubes and perceptions surrounding the one actually seen. The analyses of painting may help us out, especially when it recognizes that the painters themselves have to step back to see what some stroke with the pencil or brush yields. Such analyses suggest, first, that the figure traces itself from itself as it appears. That is, there is a movement from the strictly unseen to the new figure. This movement occurs via the (back-) ground, which itself, being out of focus and indistinctly surrounding the figure, points to the invisible. From the perspective of the visible, the background is the unseen; it is that against which the salient figure appears in the percipient event. "Gestalt switch" is another way of saying that the background, the unseen, is not added to the figure, but that the new figure emerges from the unseen which itself retreats. That background-as-event itself shows nothing but is presupposed in the percipient event and present in the figure.

Right up to the instant when the two-triangle configuration emerges as salient, Misha cannot intentionally orient towards it. If Misha *finds* something in the configuration that provides a new opportunity, then it is because the configuration gives itself. Because there was no prior instance of it that would have directed what Misha was doing, the configuration *gives itself* as a result of the particular constellation of the four triangles. The new form, heretofore unseen and therefore unforeseen,

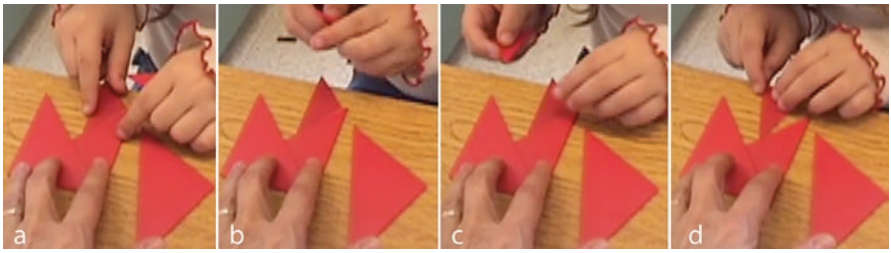


Fig. 9.5 Trajectories: the movement of placing the second small triangle (**a**–**c**) stops, allowing another movement to occur in which the first triangle changes its place (**d**)

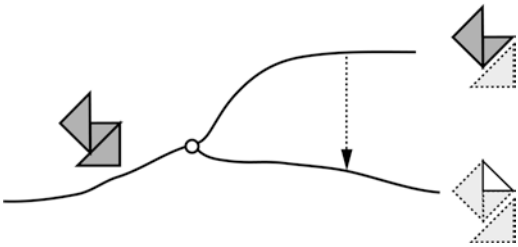


Fig. 9.6 Trajectories: the movement of observable, which leads through two gestalt switches, in terms of catastrophe theory. The paths are projections of the three-dimensional folds that are at the core of this model

suddenly is emerging, an insight in sight. For example, when we take a slow-motion view of the emergence of the final placement of the first of the two small triangles, we see that it arises while the movements already are oriented toward the placement of the second small triangle. Thus, the first triangle appears to have found its place (Fig. 9.5a), the right hand moves upward to receive the second small triangle from the left hand (Fig. 9.5b). The right hand descends as if to place the small triangle (Fig. 9.5c), then stops, moves the triangle further into the palm freeing up the fingers to work together with the left hand in moving the first small triangle across the gap so that its hypotenuse meets up with the open half of the hypotenuse of the large triangle (Fig. 9.5d).

The birth and emergence of new forms (morphogenesis) can be described in terms of catastrophe theory, which also has been used to describe the historical evolution of new psychological forms generally and conceptual changes more specifically. Thus, the situation in Fig. 9.4 can be described in terms of a bifurcation (Fig. 9.6), where a new perception suddenly and unpredictably arises, here involving two paths of development, one in which the two remaining triangles are viewed positively (Fig. 9.6, top), the other one where the configuration is seen as missing something to make a new (square) configuration (Fig. 9.6, bottom). These two switches would be two elementary catastrophes, the first in the form of a bifurcation and the second in terms of a (gestalt) switch from a positive to the completion and negative. Thus, the two forms are existing simultaneously in two systems at once: (a) in the bifurcation point, the system simultaneously exists both as one-state and two-state system and (b) in the transition between branches (indicated by the arrow in Fig. 9.6), the system is on two branches simultaneously. This capacity to be two

things at once is the sociality of nature: Sociality is "the situation in which the novel event is in both the old order and the new which its advent heralds" and it "is the capacity for being several things at once" (Mead 1932, 49).

From External Forces Between Things to Event-Internal Creativity

Traditional attempts to capture such events consider consecutive stages of a figure, such as the changes in the configuration that are observable on the different frames of the video (Fig. 9.5). The difference between any two stages is taken to be the result of an outside force (e.g. agency, cognition) that transforms one configuration into another. In the present, this outside force would be Mikki, acting upon the structures of her mind or enacting particular schema, depending on whether a researcher takes a constructivist or enactivist perspective on mathematical learning. We never really see a (mathematical) cube; we ever only see a face or constellation of faces. However, to know this perception to be associated with a cube requires knowing what will happen if we move the cube a bit. We encounter a similar phenomenon in Chap. 4, where I cite the research with kittens that act upon edges and steep inclines only if they have moved in the environment before but do not act if they have been pulled around and shown such features. That is, in the case of the cube this movement is already included in seeing the geometrical figure when in fact only some aspect of it is given. When Misha's hand move with the triangle from Fig. 9.2e–f we might easily be tempted to suggest that she already anticipated what would happen if the smaller triangle were to be turned around the tip pointing away from her by 45°. Saying so, however, would lead us to reason teleologically, that is, we would use something known only after the fact to explain what happened before. This so because this hypothesis becomes less likely when we look at the episode as a whole, where the triangle is in movement until finally staying in a place. The previous constellations will have been intermediate, as would have been the final stage if perception had not revealed something special about it. Such an approach focusing on things that change, however, does not allow us to understand becoming as event. To do the latter, we need to move from thinking in terms of things to thinking in terms of events, where the specious present is the movement from what has been and is known to what will be and is new.

Any possible next state of the triangle during a later duration is merely a concretion of the creativity of the event, which, as any event, always constitutes the actual and is the fundamental unit of becomingness (Whitehead 1919). Consider the movement in the overall flow that will have taken the three triangles into a configuration from which one will come to be separated (Fig. 9.1d–h). Figure 9.1d does not merely constitute a specific configuration; and it does not merely constitute a configuration in transformation. The actual change is a realization arising from the creativity of passage (i.e. event), which is the movement from previously estab-

lished fact to novelty. The force no longer mysteriously comes from the outside. Instead, this form of thinking returns life to itself: we are thinking learning practices in their very aliveness.

In the lesson fragment, it is not that Misha constructs something. What we observe is an event in motion until, at some stage, something appears to offer itself to her in perception, at which point the orientation in the movements changes. It is when something new offers itself that Misha accepts it to work further with whatever she has received. It is at that point that a shift appears to have occurred in which a new figure arose from the ground. Something like a gestalt-switch from the boat that she had initially announced to the square-to-be that she subsequently will have discovered as the outcome of the movements. Educational psychologists often use "constructing" or "inventing" to describe the sort of event observed in the episode. However, there is a contradiction inherent in the idea of invention, for it is the arrival of something possible; but if it was possible, the invention is not new – the possibility preceded its actual production. One therefore has to think invention in terms of the creative nature of passage, which includes surprise and even the frustration of antecedent expectations. Invention is the coming of something that was unseen and, therefore, unforeseen. This is precisely what we observe in the event, for the square remains, up to its appearance, unforeseen. This new configuration, this other, is not constructed but as something emergent was unforeseen until its coming.

The Revelation

> All forms that I ever used arrived "on their own," *they placed themselves complete in front of my eyes* and all that remained was for me to copy them, or they formed themselves already during the work, often taking me by surprise. (Kandinsky 1913, xvi)

Theorists with constructivist, embodiment, and enactivist bents tend to think learning in terms of agency. The painter Kandinsky, on the other hand, emphasizes the passive aspects of his painting, where he received the forms that had placed themselves before his eyes. For Kandinsky, the artistic work arises from chaos, where, in the performative of the work, world is produced. Events bring forth the new and heretofore invisible and unseen. Revelation – such as the one that Misha experiences when she suddenly recognizes the square in front of her – happens in and to the animate body, characterized by affectivity without the distance that the seeing of familiar things *as* things implies. That is, this revelation, the seeing of something not seen before, is a phenomenon of pure affect and, therefore, has little to nothing to do with construction (of something as something). There is no interpretation because there is nothing to be interpreted. The figure (configuration) gives itself, in the events of insight and revelation. The problem of all constructivist approaches is that they intellectualize life. That is, in the constructivist approach the individual is at a remove from the seen, which it apperceives through its constructions. A painter once expressed the two approaches by means of an analogy of how a street scene is seen and experienced: through a window, where the street is some-

thing on the other side, separated, and that we look at and understand indirectly; or (b) by stepping out of the door and into the street, where we actively participate, are immersed in the pulsating life of the street (Kandinsky 1926). The painter's reflections on art may serve as an analogy to educational psychology: We observe it through "the firm and hard glass, which makes the *inner* relation impossible, or by stepping into the work, to become active in it and to experience its pulsation through all senses" (11). The sciences are looking at the world from a remove, as if from above, rather than placing themselves in the midst of a *there-is*: "in the situation, on the grounds of the sensible and the modified world as it is in our lives and for our bodies" (Merleau-Ponty 1964, 12). This body of ours is silent but underlies our words and acts. In the transactional approach, thinking is an event that is not separate from the body-as-event, for both are real events, always actual and divested of possibility.

To say that Misha "constructs a square" is inadequate to account for what is happening, because at this instant neither the educator videotaping the event nor the child know what will come of these actions. The assertion "Misha constructs a square" can be made only after the actions have yielded a square; the assertion is a form of Whig history or teleology. It is an after-the-fact attribution of cause and effect derived from the evental sequences and abstracted outcomes. We know this to be the case from subsequent actions, in which both girls express surprise. At the instant of what will have been concluding this episode, Misha can be heard as manifesting surprise and satisfaction. She has come upon something that in part has resulted from her actions. To come [Lat. *venīre*] upon [Lat. *in-*] is to invent (Ger. er*finden*) to find something (unexpected). The etymological roots of the word go further back, to the Proto-Indo-European $g^{w}\bar{a}$-, $g^{w}em$- to go, to come, to come to the world, to be born. That is, in the process of invention, something (inherently new) comes to be born that had not existed before. Mathematics is born again in and through the movements and the *un-intended* movements that these have brought about in the world. Invention is not only a coming upon, but it is the coming or arrival of something important, literally an *advent*. In advening, the configuration *square* offers itself up as a gift to be received. Misha's is a re-invention, a finding again of what the tangram shapes make possible. This event of finding again is, in its unfolding, similar to that of the historical first invention, emerging on a ground of proto-geometrical experiences that come from being in the world. We notice here that the transactional approach inherently is cultural and historical.

In this occasion, Misha comes to understand that she has made a square, one of the figures that were part of the intended curriculum. Rather than saying that she constructed the square, we might be better off theorizing in terms of her knowing the result when she sees it, much as the molecular biologist James Watson knew he was seeing the rungs of the DNA ladder when, after "shifting the bases in and out of various other pairing possibilities," he "suddenly … became aware that an adenine-thymine pair held together by two hydrogen bonds was identical in shape to a guanine-cytosine pair held together by at least two hydrogen bonds" (Watson 1996, 207). That is, Watson could not construct this part of the DNA precisely because he did not know how it was composed. He had been researching DNA for years with-

out finding its structure. But when he was pushing around the geometrical figures, he recognized that he had found the structure when he saw it in the configuration on the table before him. Thus it was not Watson imposing a preconceived notion upon the (initially cardboard then metal) shapes in front of him but the shapes and their identity anteceded his awareness. There was therefore a diastatic instant where his actions preceded the revelation of the pairing and its result as a pair. These are the two faces of invention, the action without awareness of what was happening and the subsequent recognition of the result, and, with it, the recognition of the doing as a particular form of action: the pairing *as* pairing.

Important in both the episode with Mish and Watson's description of his discovery is the temporal delay between the events including their actions, which preceded knowing what the hands will have produced for the eyes to see, and the recognition of the result as constituting a particular novel form (form-identical pairs of bases, a tangram square). That delay, including the novelty that emerges, lies at the very heart of temporality and time. Time is a quality that arises from the relation between events and the awareness of the event – as apparent in the Marx and Engels quotation provided in Chap. 8, consciousness is conscious being. Time is the relation between Being (*Être*) and consciousness thereof.

The Revealed

When Misha is at the point of naming (i.e. "I got a square") the event including her doing is over, naming and the ending of the doing are one, what is a continuing emergence when they move the shapes, is "assassinated" at the moment that the square becomes a square. And then, there is (has to be) a new beginning. Theorizing in terms of entities, forms, deforms the mind. At the instant of naming, at the instant of pointing to a thing, *generativity* no longer exists. Thus, there is a dynamic where "every spatial element is understood as the point of termination and as the effect of a movement of research and creation at the interior of a process of incessant transformation" (Henry 2004, 243). The two aspects, termination (result) and event (Being), must not be conflated. In the transactional perspective, we are not interested in things or points, but in the matters that are alive. At the first instant, such statements and intentions may appear strange. But, as a little reflection will show, that naming kills off or is possible only after life has stopped. Being-as-event, the flow of living life, has given rise to beings, the things (e.g., language, concepts) that stand out from the flux. These things (beings) relate to Being like the Said relates to the Saying, or in the way the photographs that make a videotape relate to the living. In the expression, mute Being manifests itself and its sense but otherwise, in immanence, it is not grasped (Klee 1980). Identity, knowledge, mathematical ability, competency, so many things frozen in time affording the theories of moving only through artifice, tricks, external devices in analogy to the photographs that once run through the movie projector produce the *semblance* of movement. Some of the major philosophers of the late twentieth century – including Jacques Derrida, Gilles

Deleuze, and Michel Henry – have attempted to breathe life back into our ways of thinking about and theorizing human affairs and activities. Anthropologists, too, have thought of ways that would help us understand that thinking life in terms of things freeze them, miss them, like when the flow of a river is thought in terms of the fixed bridgeheads when in fact we need to consider the flow itself (Ingold 2011). Life does not come back when we think of it in terms of *embodiment* and *enactment;* but it does when movement is allowed to return to its own (Sheets-Johnstone 2011). To get movement back into learning theory and educational psychology, we have to turn to transactional approaches that theorize events in terms of evental categories. In corresponding accounts, humans are only but nevertheless constitutive part of the units considered (i.e. events).

Becoming-Hexagon

The preceding section shows how events unfold along trajectories the particulars of which arise from the generativity of passage; and this inherently is the movement from the factual and known to novelty. The specious present has this quality of passage, reaching into the past and future simultaneously: being conditioned by and arising from the preceding phase of the event and projecting itself into the impending future. The preceding account left unarticulated the relation between the cogredient events that make the passage, for example, the relation between Misha, understood in terms of a family of events, and the tangram pieces. In this section, I show how we can understand the traces left in the life of a student by those explorations with the tangram pieces. I show how Misha is becoming-hexagon with the shaping of the tangram pieces into a hexagonal configuration. At the same time, this material configuration comes to be recognized as an expression of Misha. In other words, we observe an event of material-becoming-Misha.

Preceding the events surrounding the hexagon, Mikki and Misha had already made a few shapes, and drawn the outline of the whole and of the composite parts on large sheets of paper. The camera is focusing on Misha (left from observer), and brings Mikki (right from observer) into focus when Misha abandons the pieces in front of her and orients to a shape that has issued forth from Mikki's growing-making. In the following analyses of the lesson fragments, I restrict myself to what can be seen and heard – rather than invoking purported and supposed intentions or (mental) abilities – in the pursuit of an ethnographically adequate account that uses only what the research participants themselves make available to each other.

Looking Back: Having-Become-Hexagon

In the transactional approach, we theorize school lessons as events through categories that have evental rather than thing-like quality. Words are indexes pointing to objects that are abstractions from the events in which they mark recurrences. Words

and objects, qua things, are abstractions; and they are so in a double way. First, the events in which they are part or that are indexed have to be concluded (at least temporarily), for a word or object could not index an event of the future, which is inherently open to accident and thus to becoming another kind of event. The word and object, used in this way as things, no longer have evental quality and, thus, are abstractions from events (Whitehead 1919). We notice these aspects in the following episode, where Misha and Mikki, after moving about the shapes from a tangram set for a while, come to denote the configuration that has emerged from their growing-making by the term hexagon. The event, consisting of parallel and consecutive phases (including moving shapes and unfolding configurations until the growing-making) eventually comes to an end leaving the shapes in a temporarily fixed configuration.

The camera is following Misha, when the viewer can hear a very loud out-breadth on the part of Mikki, which is taken up in the offered query "What is it Mikki?," constituted as such by the a reply "I don't know but" that is associated with the left-hand index finger moving over the shape. The visiting childhood educator standing near the two girls can be heard saying, "Oh, this is another shape. It's a different one." Mikki states, "I think it is a different kind, pretend this is (*gesturing right part of* Fig. 9.7a) the shower and this (*pointing to left part*) is the, part of the house" (Fig. 9.7b). Misha, in turn, says, "No, I think it is," and then begins "one, two, three, four, five, *six*" while pointing to the vertices. There is a pause during which Mikki squarely looks at Misha, who then continues: "You made an ox." She stops, which makes space for Mikki to state, "Oxagon." "No," Misha says getting up from her seat; and while she is walking away, her fading voice can be heard to say something like "heragon." In returning, she is saying, "Hexagon. We made a hexagon. A hexagon." The childhood educator's voice, with rising intonation that invites hearing a question says, "A hexagon? Why?," which is affirmed as a question in the reply, "See," followed by another counting out of the "six corners." The adult voice can be heard to state, "But next try another one."

In this brief fragment from classroom life, we observe two forms of growing-making in an overall event of becoming. The first form of growing-making is concluded when the tangram pieces have come together into an ensemble in a particular

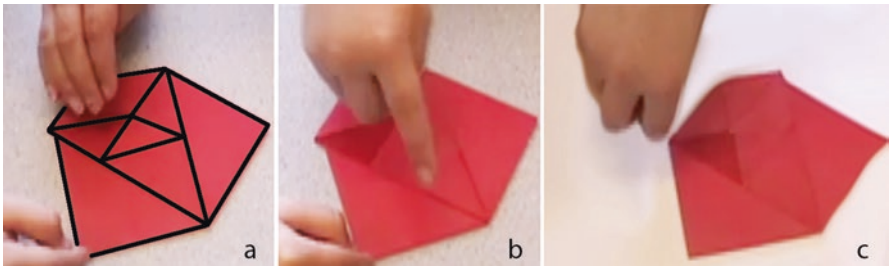


Fig. 9.7 (**a**) Mikki's hand points to part of the figure while she says "Pretend this is the shower" (the outlines of the figures are shown by added black lines) (**b**) The hand circles the square part while Mikki says "and this is the house." (**c**) Mikki counts and then says, "That's a hexagon"

form that now becomes the explicit focus of attention. We think of this coming together in terms of the fiber-strand-thread analogy developed in Chap. 2. Here each shape is thought in terms of its lifeline, which, in the present situation, is a particular trajectory in time and space. The different lifelines come together until some taken-as-final configuration has taken shape as each piece weaves its way through its relation with other pieces. That is, the first movement is concluded in the coming together of the seven shapes into a configuration that is now becoming-interesting-thing. When viewed as events, each of the seven shapes indexes related events, which we may think of in terms of their changing spatiotemporal place. The second form of growing-making is concerned with the becoming-what of the thing, a making that we observe on the plane of naming: becoming-shower-with-house, becoming-oxagon, becoming-heragon, and becoming-hexagon. Naming here is an event poorly captured in the name ultimately chosen. But in searching for a name, the children themselves are growing until settling into a consistent way of naming what they have made. That is, in that process of growing-making the hexagon, Misha and Mikki have themselves been growing while a habit of a particular naming was establishing itself out of a multitude of naming. And here we have not even considered the changes in the biological events that make their bodies, the ensemble effect of which are indexed by such terms as affect and intellect.

Projecting into the Future: Becoming-Hexagon-Again

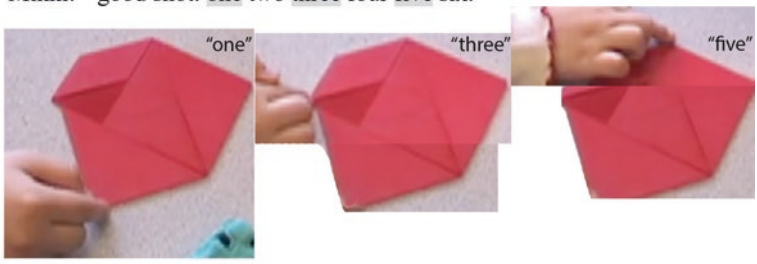
Having made something does not mean that we can do it again. This is not only so in the case of children in a mathematics classroom but also in the case of engineers, who may successfully build one device that continues to work all the while failing to construct a copy thereof. But projecting into the future is based on past experience, which, in projecting, also is present in some form in the present. The past event, in some form, is present again as a non-sensuous percipient event, and is part of projecting into the future. These issues arise in the second-grade mathematics lesson when Misha and Mikki engage in making the shape again. We return to the two girls.

"How did you make that shape?," Misha says, and then states, "On this paper." Mikki begins with the larger triangles, then two pairs of hands get involved, and finally only Misha's hands are seen placing and moving the tangram pieces. She also says, "We are making that hexagon again." Mikki comments something like "I don't know it," which finds its reply in an emphatic "*You made it,*" where there are separate emphases on each syllable. The emphatic *you* allows hearing an attribution of the growing-making to Mikki, and in the relation between the two turns can be heard something like a reproach glossed in the transactional responding, "You don't know it, but *you* made it." Having made the hexagon here is taken to imply that the maker should be able to make it again. But apparently, the maker's movements have not yet become-hexagon, in which case the requested hexagon would be forthcoming without or with little delay. Mikki has not become-hexagon – like a gardener has

not yet become a green thumb – and thus the hexagon cannot become-again. So the two girls continue growing-working with the pieces before them, growing-placing some only to remove them again, placing others, turning and sometimes removing them, until, eventually, the two apparently assess what has issued forth from making (see offprint in turn 1 of Fragment 9.1). In the end, the two girls come to conclude that what they have produced is something else, not the same but something different, though it is also of hexagonal nature – as apparent in the statement "it's a different *hexa*gon," where we hear an emphasis on the *hexa*, the six-fold pointing and counting. Even though the configuration is different than what has resulted from their making before, it is seen as *hexa*gon and attributed to be *part* of the category hexagon.

Fragment 9.1

1 Mikki: good shot. one two three four five six.



That's a hexagon.

2 Misha: one two three four five six. ((*While pointing in sequence to each of the "corners."*)) It's going to be different.

3 Mikki: yea, it's a different *hexa*gon. it's *part* of *hexa*gon.

In the end, the two girls use a pencil to trace the shape as a whole and within it the individual tangram pieces, holding up the resulting diagram of the "hexagon" that they have grown-made. Misha and Mikki then begin to walk about and to orient towards something else. At this point, analysts employing existing learning theories would have seen and focused on the two forms that have grown from having been part of the event (Fig. 9.2). Many analyses in the field of educational psychology, classical or the one of cultural-historical orientation, accept what children (students) have made as expressions of their thoughts or concepts (conceptions). They might then have disapproved of the two girls becoming-hexagon.

Those concerned with the learning of concepts might have focused on inadequacies in the children's making, suggesting that the figure they made could not have been a hexagon, which can readily be seen when the lengths of the sides are given in terms of a unit length of 1 for the shortest side (Fig. 9.8). It is apparent that $1 + 2 \neq 2\sqrt{2}$ ($\approx 2.83 < 3$). They would have noted that Mikki pointed to the highlighted corner while *failing* to see or understand that there is another, inside corner right next to the one she counted. The early childhood educator standing next to the two girls engages with the children in ways that seemingly point away from the

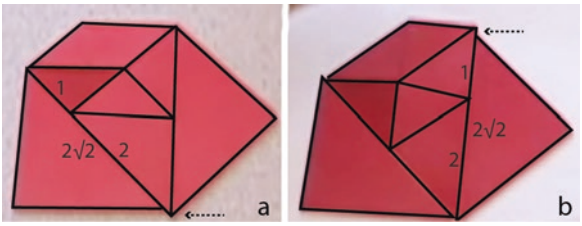


Fig. 9.8 (**a**) The first hexagon, the original, which was attributed to Mikki. (**b**) The result of making the hexagon again, which is different but still a hexagon. In both figures, the "errors" that a mathematics educator or psychologist would have noted are indicated by means of dotted arrows and can be derived from the shown unit lengths of the different pieces

becoming-hexagon, which is evidenced in her taking some of the pieces away producing a configuration that might have initiated the event of becoming-square. She also talks about "doing another one" and about "doing a square." But, as artists, artisans, tradespeople, technicians, and engineers know, when working with actual materials, everything is about tolerances (tolerance?). Coming-within-tolerances is the name of the game, not attempting to achieve the unachievable ideal. In any event, mathematics historically evolved when increasing refinement of artisanal practices led the early Greeks to talk about limit objects, which, because they could never actually be achieved, were considered to be (Platonic) ideal forms existing as such only yonder, in a metaphysical world from where they somehow have been inherited (Nietzsche 1922). For all practical purposes, the end of the present event was one of becoming-hexagon and an important generalization had occurred to the children – even more important than achieving perfect shapes – about the nature of a hexagon: having six corners (vertices) whatever the shape and size might be. The words are tied to and index growing-making-things, which here is the event of the coming together of different shapes into hexagons. In the saying of "hexagon," an exchange is happening that is the relation between Mikki and Misha in their relation to the shapes-become-hexagon against all the other events that allow them and the hexagon to become figure against ground.

Dissipative Events

It takes little reflection to bring into awareness the fact that throughout our everyday lives, things do not exactly happen as they appear in plans, whether we explicitly state them or whether they are implicit in some vague sense of what we want to do. What is to become a glass of tea in the microwave to be heated may end up as shattered glass and pools of water when the trajectory was not quite right to make it into the opening of the oven. Dishes become chipped, glass is shattered, nails are bent, an ankle is sprained: The list of things that do not happen as intended is infinite. In the transactional approach, we may think of this phenomenon in terms of *dissipative*

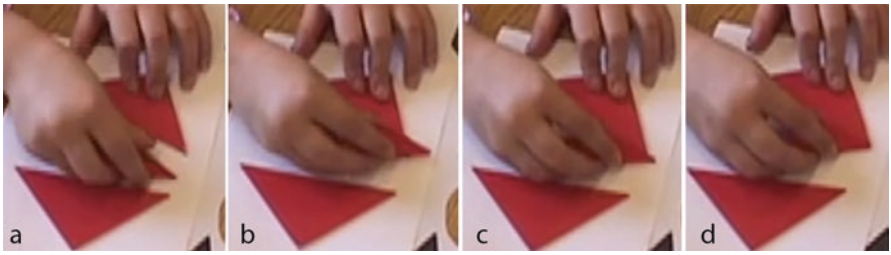


Fig. 9.9 Mikki's hands and some Tangram pieces during an event named "doing the hexagon again"

events in which projected trajectories come to be reshaped in unintended ways that emerge in and from passage. All sorts of dissipative events may be occurring that prevent the event of the becoming-again-hexagon.

The ideal actually has a history. In mathematics for example, Euclidean geometry was born in the latter phases of an increasingly skilled practice of perfecting the surfaces and shapes of everyday material forms. However, geometry's forms exist only as idealized limits, because neither materiality nor material practice permitted absolutely perfect form. Any builder or machinist knows that plans represent ideal conceptions that in this way never translate into material form precisely because of its materiality – if we only look close enough, even the drawings of the plans are not perfect. Consistent with such experiences, life is as much about the events undoing form as about the growing-making of aggregates, assemblages, and configurations that arise from the intertwining of materials. The dispersive events are just as powerful as those that lead to aggregates and assemblages; and it is only when we understand these dissipative events, the ways in which a phenomenon to be learned can be lost, that we come to understand a scientific practice. But it is precisely disaggregation that allows new aggregates, neoformation, or constitution and reconstitution of form. In the flow, consistency is itself subject to dispersive events from within that are working against becoming-form. In the following, I exhibit but a few of the many instances where dissipative events in the becoming-hexagon-again can be observed. The descriptions emphasize the fact that becoming-form is more than a constructivist imprinting pre-existing (ideal) form into available materials. Instead, becoming-form is more like processes of growing-making, which are always entwined with the event of nature that dissipates the efforts of the gardener (e.g. sudden cold snaps, prolonged drought, changing soil conditions, weeds).

The first example from the becoming-hexagon-again shows an aspect of real life that learning scientists tend to forget in writing about learning. Here, we observe one hand holding a triangular shape in place as the second piece approaches (Fig. 9.9a), first overlaps falling on top of the first (Fig. 9.9b), then sliding in a place with the hypotenuses aligned (Fig. 9.9c), before the smaller rectangle comes into a resting place as the two triangles slide along each others' edges until the vertices form one new vertex (Fig. 9.9d). Without the steadying on the part of the left hand, the other could not be brought up close without making the former slip away. The

Fig. 9.10 It is precisely because the resistance is low that a very different direction comes into the flow, when additional and unforeseen forces come to enter the scene (early childhood educator)

resistance on the paper is not sufficiently large, and pieces slide (easily), sometimes far too easily. That is, there are dissipative events that work against growing-making, disaggregating materials and makers. From this arise both opportunities and constraints for what will be becoming in the future: because whatever is happening now is the beginning of what emerges and evolves in the future.

An important part of classrooms are the adults that are present, including teachers, teacher-aids, and others. In research taking sociocultural perspectives on teaching and learning as well as in classical treatments of educational psychology, we often find the notions of *zone of proximal development* or *scaffolding*. But the presence of adults, including specialists such as professors of childhood education, does not inherently contribute to bringing about events in which the desired phenomena are happening. Instead, the events where adults are present may be of dissipative nature – and this even if they before or after voice their best of intentions. Indeed, my own early research showed that the words and phrases a teacher may utter, though consistent with the disciplinary canon, may appear in unexpected ways in the making of statements that no longer are consistent with this canon (e.g. Roth and Roychoudhury 1992). The presence of adults or "more advanced peers" does not necessarily contribute to becoming-form and instead contribute to disaggregation. In the following example, we observe not only how removal of a piece changes the shape of the remaining aggregate, but also how there is a disaggregation as the present form changes when the early childhood educator (Maria) becomes involved (Fig. 9.10).

Fragment 9.2

1	Maria:	OH, (1.1) look ((Fig. 9.10a)) at here ((Fig. 9.104b)) you can have another ((Fig. 9.10c)) (0.6) another.
2	Misha:	but we are trying to [make it] again
3	Maria	[square]
4	Misha:	we're trying to make a [hexagon] again
5	Maria:	[oh, okay]
6	Maria:	okay
7		(0.9)
8	Misha:	I am making a hexagon again.

In this fragment, we note additional evental movements along different lines of emergence, disaggregating what has come together thus far. As these lines of emergence enter the event, we observe the disappearance of configurations and the appearance of what have become the beginnings of new configurations resulting from the new growth-paths ("if the children had followed or obliged the adult"). This path might have led to a different aggregate in the form of "another square." As seen in the preceding section, such (literal) coming-apart may bring about the beginning of a different becoming, or the becoming of a move off into a different direction. In this figure, not only did a small triangular piece come to be in a place from where it (was) moved away again (Fig. 9.10a, b), but also in the process of moving away, the whole antecedent configuration comes apart (Fig. 9.10c), it has disaggregated. The additional person and associated lines of development have a dispersive tendency, taking apart what had been projected as the becoming-hexagon-again of the seven tangram pieces. But there is opposition ("we are trying to make it again"), a movement in the direction of holding together the lines of development rather than only some of the pieces, allowing the seven pieces and the girls to grow together and correspond, in the hope of a hexagon-again.

The slipperiness of the material, with a tendency to disaggregate, comes once again to the foreground after Misha and Mikki announce producing on paper the outlines of the pieces that have collected into the hexagon. There are dissipative micro-events during the period of transcribing form onto a sheet of paper, which does not come with the ease of photocopying, but involves hands holding the tangram pieces together so that the becoming-hexagon-again doubles up in a process becoming-hexagon-again, once again (Fig. 9.11). It comes apart, is recollected, and then taken apart, making space for the pencil to touch the paper and fix the design. It is quite apparent that none of these dissipative events and the working against them have been recorded in the diagram, which therefore does not represent all the movement (gestures) that have gone into its growing-making, as other recent theories – e.g. the new materialist, enactivist, or embodiment approaches – would suggest.

Once we start thinking about the different tangram pieces in terms of their material histories, that is, as events the relations of which are the source of spatial and temporal qualities of experience, then we begin thinking in terms of seven strands the fronts of which continue to grow, like the shoots of a kiwi vine, coming together forming configurations that appear and disappear again. (It is not the self-same configuration that changes into something else, which would be an approach that would

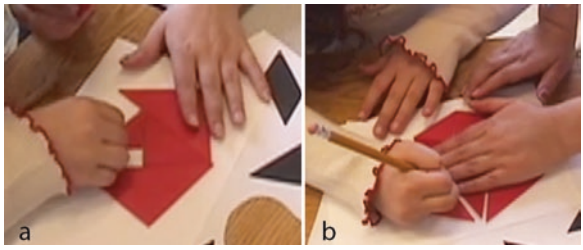


Fig. 9.11 It takes all sorts of hands to keep the material flow somewhat in check ("Oh, man, this is hard"): (**a**) While the form is growing. (**b**) While the outlines of shape and pieces are drawn

theorize based on things, here the configuration.) We have a living, generative figuration, an event that only after the fact we may denote with any certainty to have been a becoming-hexagon.

Person-Becoming-Thing, Thing-Becoming-Person

> How individuals express their lives, so they are. What they are thus coincides with their production, as much with *what* they produce as with *how* they produce. (Marx and Engels 1978, 21, original emphasis, underline added)

In the introductory quotation, Marx and Engels posit an inner relation between production and human nature (what humans are): these are two manifestations of the same. A philosophy of process arrives at the same result, for it recognizes that "*how* an actual entity becomes constitutes *what* that actual entity is. … the *being* of a *res vera* [true fact] is constituted by its 'becoming'" (Whitehead 1929/1978, 166). In an anthropology of making, the quotation finds its equivalence in viewing makers as *thinking from* the materials in the hands; in a phenomenology of movement, this amounts to saying that a dancer or athlete *thinks through* and *from* the animate body, which is the ultimate center and ground of experience. In other words, thinking and doing are concurrent events – both are cogredient in the larger event that they contribute to constituting what it is. But the doing cannot be the content of the thinking because it does not yet exist in finalized form, for the *what* of the doing is available only after the fact. Educational psychologists pursuing a transactional approach already know one collateral result: in performance, the characteristics of person and environment cannot be separated. This is so because to know the contribution of personal characteristics to performance, one needs to know the characteristics of the environment as it is perceived and toward which the performance is oriented; but to know the contribution of the environmental characteristics to performance requires knowing the personal characteristics, which determine the selection of relevant structural features and objects (Snow 1992). The shortcoming of Snow's way of thinking about transaction lies in the fact that he considered only external manifestations and objective structures. He should have considered these to be abstractions from events and therefore only bear incidental relation to each other. In the following subsections, I develop the idea of growing-making mathematics, which comes with growing-together in a process of becoming-thing.

Growing-Making

In this chapter, I propose to take the transitive verb "to make" and its synonyms often used in educational contexts (e.g. to construct) as a modality of "to grow." To resist tendencies to read "making" in the transitive manner described above, I create the compound *growing-making*. To say that children are growing-making shapes

from tangram pieces then is to say something like a gardener is growing trees. Although the gardener can assist the trees in their growing, the gardener does not cause the tree grow or to carry fruit; it would grow without the gardener. Here I suggest that as trees grow, so do shapes (square, hexagon). In the way the gardener grows in growing trees, children grow in growing-making form (e.g. geometrical shapes). Growing is not something determined by the willful human agent, but is a form of corresponding (as in exchanging letters). As the gardener and her trees grow together (e.g. pruning becomes more and more adequate), they also come closer. As the gardener comes to more closely meet the needs of the trees, the trees come to express the character of the gardener. Watching the videotapes from the elementary classroom, we observe a process that is more like how gardeners grow things than turning a mental image into material form. What grows from the children's involvement with the materials depends as much on what they do as it does on the shapes of the tangram pieces and the different aggregative and dissipative forces. We indeed observe pieces coming together becoming-hexagon. But the children are becoming-hexagon as well, as they find themselves having grown-made hexagons.

In the transactional perspective, the person is only one member of an event family and, therefore, cannot be in control over it. Thus, Misha and Mikki cannot be completely in control over what emerges from their doing, an aspect easily understood with the gardening metaphor. As an experienced hobby gardener I know that there is a different form of engagement where the end result is only partially of my doing. Although, for example, careful pruning will improve the quantity and quality of my apple trees, what I harvest in the end is not under my control, even if I am tending to the trees in the course of the growing season, pouring some water here, adding some organic fertilizer there, thinning out the congested areas, doing some summer pruning, and so forth. The trees, (my) bees, sun, weather of that summer, and so on all contribute to a successful harvest. Because in gardening the true nature of the relation between humans and materials is more explicit with respect to the outcome of their mutual engagement, growing is a suitable verb to express the relationship. Making can then be viewed as a modality of growing. Growing is an apt verb, for it also allows us to describe those occasions when little or nothing appears to spring forth from our efforts. Even the best of gardeners knows that in some years, none of their work may bear fruit.

The verb to grow comes with further theoretical affordances. For example, it is used in the context of human knowing and life generally. To grow is to learn and to develop; and sometimes we grow tired of something. "We grow old together" is an expression that quite adequately describes the life of a couple, and "I grow through this experience" is another way of saying that I have learned. I grow as I garden, that is, grow vegetables and fruit for the meals we eat, and in the process I grow as a gardener. "Grow[ing] into the knowledge of their predecessors" (Ingold 2013, 110) is a much more apt expression for how our own practices come to look like those of our parents. In growing together, there is a coming-and-going, a continued becoming, doing and undoing of form – there is corresponding. Corresponding is to be read here as in continued answering rather than in establishing a mathematical (functional) relation between the (fixed) elements of two sets (i.e. a mathematical

mapping). Thus, in growing-making things, we "bring the movements of our own being into close and affective correspondence with those of its constituent materials" (85). Corresponding does not express an isomorphism between the mental and the material, not *con*formity of different elements (human, non-human) in relation. Instead, corresponding invokes an emergent dialogue at work: the tangram pieces grow into something in the hands of the growers.

In the first instance, the two girls find themselves as having grown a hexagon; in the second instance, where they say making the hexagon again, they find themselves having made something different – though it still is a hexagon. Growing-making allows us to understand that there may be unforeseen results. In the garden, it is possible to find oneself growing mystery fruit (vegetables) as new forms of squash that have characteristics of zucchini (summer) and spaghetti (winter) squash simultaneously, may result from the event of gardening. In the same way, the children in this classroom grow forms. They do not initially know what they have grown, what has grown in their hands, and it is only after some search that the "shower with house" and "oxagon" are discarded and "hexagon" has emerged from their conversation as an appropriate name for the fruit of their labor. As in the case of the square, the girls have grown something and they only subsequently find out that what they have done has made an already known figure. In the end, the process of growing-making is "not so much as an *assembly* as a *procession*, not a building *up* from discrete parts into a hierarchically organized totality but a carrying *on*" (Ingold 2013, 45). This carrying on is path-dependent, where a step follows upon and arises in and out of the one taken before, and leads to the one that is taken some time hence. Growing-making leads to a non-causal view of making, which is a form of itineration arising from the following of materials, a flow of material and consciousness rather than a concatenation of steps.

Growing-Making: Corresponding Lines of Becoming

> The manner in which humans produce their means of subsistence first of all depends on the nature of the found and to-be-reproduced means of subsistence. (Marx and Engels 1978, 21)

Marx and Engels posit an integral relation between modes of making and what is made. This aspect of making, where makers follow (the flow of) their materials and only then produce with or reproduce them is central to theories of becoming. Before they can engage in growing-making, we (humans) follow the pieces to where they had been before and gather such materials; and the proximal availability of *these* rather than other pieces is just as important to the becoming-hexagon as the shaping movements of the children's hands. Misha and Mikki can be seen to look around for pieces that they might correspond with the form growing under their hands. In following Misha and Mikki, we observe a process of something taking shape, which is more than some abstract putting into place of the shapes. Instead, actual handwork corresponds with the different pieces, each not merely a shape but an abstraction

from an event on a path of coming into relation with others. These paths of movement are lines of becoming; when they come together, in corresponding with the hands of the makers, a larger form arises. A line of becoming is a *line of flight* that is not understood considering the points composing and connecting it. Instead, the line "passes *between* the points, it only pushes through the middle, and it moves in the direction perpendicular to the points initially distinguished, transverse to the localizable relation between contiguous or distant points" (Deleuze and Guattari 1980, 359). We can learn from this quotation that the lines of flight do not connect the maker and the made but instead constitute lines of becoming that describe generative movements that sweep away maker and materials only to give rise to something new. For this reason, it is inappropriate to speak of the subject of activity, as if it were a self-identical thing before and after some change; and we should instead speak about a *subject-superject,* which also denotes what arises from the event after it has passed. The notion marks passage, where any "actual entity is at once the subject experiencing and the superject of its experiences (Whitehead 1929/1978, 29). The direction of the line of flight is perpendicular to the line that is connecting points, like the intransitive growing of trees and gardeners is perpendicular to the gardener's transitive orientation towards the materials that will result in vegetables or fruit. When each tangram piece is considered not as an object of a transitive action but in terms of an intransitive movement, its line of flight, then the larger forms emerge as a set of pieces comes together in particular ways are the result of particular correspondences that also include the processes of becoming (lines of flight) of the growers-makers. These different lines, those of the pieces and of the girls, come to be entwined for a while (Fig. 9.7e); and it is this intransitive entwinement rather than the transitive operation of the subject upon the tangram pieces that provides a description consistent with continued becoming. This process is one of becoming-hexagon, whereby the seven tangram pieces come together into hexagonal form, and the two girls grow in their familiarity with, and thereby becoming, hexagons.

We may approach the different tangram pieces in terms of their lines of flight rather than as objects. Larger forms grow when multiple lines of flight aggregate as a function of the ways in which they correspond. Any outcome is the result of a growing-form. Such an account is intransitive, orthogonal to that emphasizing the transitive relations between subjects that manipulate objects according to their mental images (or constructs). Like Gothic cathedrals, which emerged from the masons' work like patchwork quilts rather than like jigsaw puzzles assembled from precut pieces, the children's hexagon has emerged from the corresponding of pieces into an emergent whole. Even though educational psychologists might critique the girls for not observing perfect geometrical properties, some fruit has grown from their labor – in a double sense of their own awareness and what is out there on the table. In the end, Misha and Mikki show around a pencil drawing on paper of the shape that they have grown-made. These are but temporary end points from which all the different lines of flight that have led there are no longer recoverable (e.g. the dissipative events arising from and with Maria's involvement). Interpreting the movements that must have or most likely led to their becoming inherently misses all the false

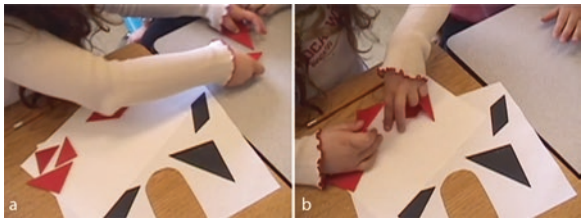


Fig. 9.12 No growing/making is possible without the gathering of materials. (**a**). Gathering of remains of another "era" to be used in (**b**) growing-making a hexagon again

starts and erasing movements that are no longer visible and therefore accessible; it thereby misses capturing the actual thinking related to and cogredient in the event. A dynamic account requires us to show how this stability has emerged in the face of "the variability of matter – its tensions and elasticities, lines of flow and resistances – and … the conformations and deformations to which these modulations give rise" (Ingold 2013, 25).

Growing-making is impossible without materials. To understand the growing-making of mathematical form, we also need to pay heed to the movements that bring together the lines of flight in a sheaf from which new form emerges. We may associate this with the ambulant and nomadic sciences, which "subordinate all their operations to the sensible conditions of intuition and construction, to *follow* the flux of matter, to *trace and link up* smooth space" (Deleuze and Guattari 1980, 462). All of this happens in passage, where novelty surges in every specious present. We observe the abandonment of what apparently was one project, the gathering up of new materials (Fig. 9.12a), the cleaning away of the previous aggregate of pieces (Fig. 9.12b), and the start of what will have been the beginning of a new movement that will have ended in another hexagon. This event of making mathematics, as all events of making (houses, baskets, pottery) requires following the materials to bring them into proximity of each other engaging them in a process of becoming.

The verb "to follow" gives emphasis to *gathering*, which is an appropriate metaphor because growing-making means gathering up materials (seeds, organic fertilizer, seaweed, water, rakes, spades, or hoes), following the opportunities arising from nature or tangram pieces. Gathering/following means that the gatherers have to go to the places where the materials are, submitting to and corresponding with their lines of flight – such as when the children go for a shape-hunt in their mathematics classroom. To follow and to gather up therefore implies itineration: "to follow the flow of matter, to ambulate" (Deleuze and Guattari 1980, 509). The grower-maker is an itinerant, an ambulant. In following materials, in gathering, the itinerant (sciences) work against dispersion and disaggregation. Thus, from among the many tangram pieces strewn around on their desks, Mikki and Misha follow some bringing them together in the same place, on the same sheet of white paper. The lines of flight associated with the tangram pieces start to align, forming the body of the events to which they are belonging. In forming a larger body from tangram pieces, a second aspect of following comes into play. As gardeners know, tree branches cannot just be cut; pruning to achieve optimal harvests requires following (submitting to) the tree, finding what it needs to grow best and grow the most fruit.

The children, too, submit to the shapes of the tangram pieces, following arising opportunities to grow-make larger forms.

For a particular body such as the hexagon to emerge, all the disaggregating events – those that do not allow the particle aggregates to come together and form the hexagon body – have subsided and have been overcome. Those disaggregating events are dispersive; they are unmaking the aggregates that have been made before. It is precisely in the compositional plane that we find a continual making and unmaking of form. We may learn a lot more about scientific and mathematical practices by studying the disaggregating events in the flow that have been overcome in successfully producing mathematical form, but that have won out in all other cases. There are ample opportunities in these children's doings that exhibit such disaggregating forces; and yet, they end up with another, different shape that still is a *hexa*gon. Whereas they have not reproduced the original one, in the flow of the growing-making of form, a generalization has appeared to Misha across two, temporally distant observations. A becoming never comes as singular, but always comes in a pack – here as hexagons, of which each specific hexagon only is a manifestation.

Modalities of Growing-Together

In this chapter I suggest thinking about learning to think in subject-matter specific fields (e.g. mathematics, science, social studies) in terms of making as a modality of growing. The verb to grow allows us to emphasize the intransitive aspect of becoming and "becoming does not anything other than becoming" (Deleuze and Guattari 1980, 291). Gardeners grow (transitive) plants, but plants grow (intransitive). As I have experienced since starting to garden over 20 years ago, in growing (transitive) vegetables and fruit, I have grown (intransitive). I have grown particularly because gardening has grown on me. I grow together with the things I have grown. My plants and I have grown together. Through my mistakes or with experience, I have learned what the different plants I grow require. Growing and thereby becoming form has happened to my trees as it has happened to me. Thus, the expression *becoming-form* manifests itself in pruning and in the growing of the tree.

In the episode from the mathematics lessons, we observe trajectories of creation and processes of becoming-thing. For example, the square and the two hexagons are other than what the children intended – Mikki and Misha come to know their ways around these particular shapes. The hexagon, an ancient Greek shape, is reproduced in the concrete actions and language of these children. The hexagon only lives in the "possibility of an arbitrary amount of repetitions subject to the evidence of the identity (identity coverage) of the form in the chain of repetitions" (Husserl 1976, 360). The hexagon lives in the event of counting and associated percipient events – the hexagon would be a thing (of the past) only, like a dead language, if there were no longer events in which it appeared as abstraction. In proposing this way of theorizing becoming, we have to consider inappropriate asking whether the children actu-

ally become the hexagon, or represent it in their mind; and it would be inappropriate to ask about the properties of a set of material pieces configured in a particular way. Becoming has to be qualified without making attributions to the constitutive parts of a relation (i.e. Misha or Mikki, the tangram pieces, the hexagon). We might paraphrase Deleuze and Guattari in the present context by saying that the becoming-hexagon of the children is real without making the claim that the they are really ending up as hexagons; and the becoming-other of the aggregate of tangram pieces is real without implying that something other than themselves appears. Thus, at one point we observe as if the tangram pieces were becoming-house-with-outside-shower, becoming-oxagon, and becoming-heragon before it was determined that we were near an endpoint of the process of becoming-hexagon.

Is it so aberrant to think about an event of becoming-hexagon that does not distinguish the students and the tangram pieces as independent elements? Prodigious hunters, indigenous and non-indigenous, often are becoming-prey, and prey is becoming-hunter. This process of becoming can be seen in the following autobiographical account.

One day during the early 1980s, while teaching in a small Labrador village, an aboriginal person who had adopted me into his family invites me to accompany him and two of his sons on the hunt of wild geese. When we arrive at one of the many small lakes in the backcountry, we see a flock of geese. One of the sons, Edward, asks the remaining members of the hunting party to stay put while he is crawling around the shore until he is positioned in line with the geese. We can see him rise up out of hiding, the elbows moving upward like the wings-having-become-flippers of a penguin, bringing the gunstock to his shoulder and the sight in alignment with the flock. At the same time, the geese, in a similar movement, all open their wings in an apparent preparation to fly away. When the explosive sound of the shot has passed, two geese are dead, two more are unable to fly to be subsequently plugged from the water. Did Edward follow the geese? Or did the geese, in their movement, follow Edward? Of course we had followed the geese; and of course he had moved around the shore to get closer and (at least after the fact) to get into a position where all members of the flock were lined up. But did he also follow the geese in his movement, which looked like the raising of wings as a first part of the movement that gets geese to fly? Or did the movements of his arms make the geese follow him by raising their wings? Later, and back in the village, Edward would be celebrated as a great hunter: his single shot had yielded four geese. (My non-indigenous biological father, too, was hunting in that manner.)

In the same village, I was teaching, among other subjects, fine arts. For one of the terms, I had chosen woodcarving. This was another part of a curriculum I designed the underlying idea of which was to get students to learn to attend to the characteristics and qualities of the material that they were working with. I invited them to produce sculptures that felt good in the hand. At first, we followed the materials. The 11–13-year-old students and I went to the estuary beach near the school, where we collected pieces of driftwood that we intended to work with. Back in school, I was talking to them about feeling out the wood and about working *with* rather than against the grain. When it happened that a student had in fact worked across the

grain, I asked this and other students to look at and feel the effect with their hands; and I asked them to reflect on the effort it took to remove what had been done. In the end, they had followed their materials in more than one way; and the material had followed them, into the classroom and becoming the shapes that they had given rise to. Their movements with the knives, rasps, chisels, or sandpaper began to follow the grain; in following, their movements were becoming like the grain of the wood. Following the materials also is an appropriate way of thinking about those often-observed shape-hunts, which, in some mathematics classes, may have as their objects three-dimensional objects, and in other instances focuses on the two-dimensional characteristics of surfaces.

Events Becoming Form

Troubling going approaches to knowing and learning – which give primacy to a transitive relation between human agent-things and the world-thing they act upon, and to theorizing the results of these actions in terms of structures of the mind-thing – the anthropological approach that I articulate here takes a different stance towards making disciplinary knowledge. In the transactional approach, there cannot be primacy to human agency because people are as much subject to events as they are the agential subjects thereof. Events are sui generis and thus cannot be engineered given predetermined pieces that are linked up together. Even though the grower-maker may have some anticipatory imagistic or verbal form while beginning in the process of making, it is not this form appearing in consciousness that creates the mathematical object. The grower-maker is a *caretaker*, who, as per the self-understanding of the aboriginal peoples of the land that I now garden, helps maintain the balance of all living things. In the classroom, it is the participation of the grower-maker who is a caretaker of the mathematical, scientific, or historical object, which in caretaking is handed on to the next generation. Growing-making is *not* to be thought in terms of *agency*, for this concept is precisely underlying the lateral conception of making, from the form of the thought to the form of the product. Form emerges not merely from agency but indeed from resistance, friction, misfiring: makers find their thinking in the emergent object. It emerges in an intransitive process that lies in a direction transverse to agency. Generativity is inherent and learning inevitable in the transactional approach, but stable knowledge and conceptual structures are problematic in the face of a continuously changing world.

In the transactional take chosen here, "the generation of things should be understood as a process of morphogenesis in which form is ever emergent rather than given in advance" (Ingold 2013, 25). This changes how we think (about) the maker, who is not just the agential subject of activity, but as an artisan who witnesses the emergence of form from processes that also constitute the very subjectivity of the subject. Makers are then understood as artisans, "who follow the flow," and therefore are "itinerants, wayfarers, whose task is to enter the grain of the world's becoming and bend it to an evolving purpose" (25). They work based on the incomplete

perception of a witness rather than a god-like perception that comes with the 20/20 vision of hindsight. As witnesses, makers work based on intuition rather than on secure knowing. Makers – thought of as families of events in relation to other events – is integral part of duration. In other words, makers are integral part of the "*machinic phylum*, the natural or artificial materiality, the two at the same time, in flux, in variation" (Deleuze and Guattari 1980, 509). The consequence of this situation is that events can only be *followed*, so that makers follow the materials, both in bringing them to the place of making as following the material in the way it presents itself to their consciousness.

I suggest *becoming-form* as an alternative to common ways of theorizing learning, not only in mathematics but also science, (theater) arts, or writing. Becoming-animal is a different way of being. In the introduction to this part of the book, I mention the example of the Nobel-winning geneticist Barbara McClintock understood herself in conversation with the world, feeling sorry for the grass under her feet screaming back at her. Other McClintock quotations also support that she used a language that exhibited this relations, such as when she said that one has to have "the patience to 'hear what the material has to say to you,' the openness to 'let it come to you,'" in other words, "one has to have 'a feeling for the organism'" (Fox-Keller 1983, 198). McClintock talked about the need of science to "ensoul" the world, and took the position that "'everything is one. There is no way in which you draw a line between things'" (204). Ultimately, one has to become the thing to understand it: "'If you want to really understand about a tumor, you've got to *be* a tumor'" (207). McClintock was waiting for a future science, when scientists "'Where going to have a completely new realization of the relationship of things to each other'" (207). All of these quotations are but expressions of the transactional view and its implications, according to which "the primitive form of physical experience is emotional" and where "the primitive element is *sympathy*, that is, feeling the feeling *in* another and feeling conformally *with* another" (Whitehead 1929/1978, 162), where "another" does not necessarily refer to another human being.

McClintock's account and my stories from the Labrador village are indeed consistent with an approach to experience that does not reduce it to the interior of the human subject but constitutes *experience* as a category that denotes the irreducible unity/identity of person and environment. That is, the thinking and doing subject cannot be understood in itself; instead the minimal unit of analysis, the minimal category of theoretical thought, includes the subject in its identity with the environment. This minimal unit is inherently moving experience, subject-acting-in-environment, which is marked by its irreducible practical, intellectual, and affective character. But such a unit in which the human subject is only one part requires a form of theorizing that no longer emphasizes transitivity but also accords to the intransitive and passive character of becoming. We thus need to develop ways of writing against the grain of the metaphysical cause–effect structure embodied in the subject-verb-object reasoning according to the formula: "It or one, indefinite article, proper noun, infinitive verb" (Deleuze and Guattari 1980, 324). In our context, this would amount to making statements such as this (using small capitals): A MIKKI TO

GROW-MAKE HEXAGON OR A MISHA TO MAKE-TRACE SHAPES HEXAGON. One way of replacing agency is to write events like haecceities: a summer, hour, lesson, conversation. Having the character of events, these haecceities "consist entirely of relations of movement and rest between molecules and particles, capacities to affect and to be affected" (318).

In this chapter, I offer up a transactional approach to becoming in events and through material activity, exemplifying the different approach with materials from a second-grade mathematics classroom. Readers will have noticed that the account no longer is centered on the human beings but considers them as integral parts of events that are only in part of their making. In the account, I highlight in particular the dissipative events that lead to disaggregation, and on the generative aspects of viewing learning in terms of growing-making and itinerating. An important aspect of this perspective would be taking into account temporality, intensity, and their relation to affect. In itinerancy, temporality never is in the (complete) control of the grower-maker; in fact, growing-making also makes time as much as it takes time in what might be conceived to exist condition external to and preceding the growing-making. This temporality has its own rhythm, its own slowing up and accelerating, punctuated by instances of rest or inversion. Growing-making retains this temporal nature of learning events. We can also expect it to retain intensities, and exhibiting growing-making in the face of intensities constitutes another aspect of future research.

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Chapter 10
Oneself Becoming Another

> JE est un autre [I is another]. (Rimbaud 1954, 252)

> To paraphrase Marx: the *psychological* nature of man is the totality of societal relations, *transferred to the inner, having become functions of the individual the forms of its structure.* (Vygotskij 2005, 1023)

Many present-day studies focus on *identity*, which is ascribed to individuals (e.g. "his teacher identity" and "her science identity") and their positionalities. The individuals of interest are said to construct their identities (positionalities) and then, using their personal selves as models, construct their notions of the other. In contrast, the poet author of the first introductory quotation suggests that the I *is* another. Prior to any construction of the other based on the conception of a self, this *I* already is an other to itself. Consistent with this alternative approach is the realization that classical psychological phenomena, such as dependency, aggressiveness, or pride, are not individual characteristics at all. Instead, all these "words have their origin n what happens *between persons*, *not* in some something-or-other *inside* the person" (Bateson 1979, 133). A similar take was flagged by the social psychologist L. S. Vygotsky, who, as the second introductory quotation shows, conceived the psychological nature of human beings, personality, as the ensemble of societal relations. That is, the entire psychological nature of human beings is a function of relations with other people, relations that are characteristic for the particular society in which a person grows up. Independently, G. H. Mead already suggested that self and personality are the result of relations, where the self is stimulating its own social conduct and attitudes by playing out the parts which this social conduct calls out in the generalized other. The ensemble of relations constitutes the personality in a process that does not finish but continues to pass from one phase to another phase of life. The formation of personality begins in the family, other groups (e.g. school). Play, which progresses into game, are important aspects of a child's life constitutive of personality because it is here that the sense of the generalized other has its origin. Mead, much more so than Vygotsky, provides the theoretical means for

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understanding the (continued) development of personality arising from participation in the different spheres of societal *life*.

In the context of a transactional approach, where the minimum unit of understanding and analysis is the event, the poet's introductory statement would have to be rewritten. Rather than there being individuals-as-things, we have to orient toward the continued becoming of the person-subject (I). The event (process) -oriented approach also suggests a more symmetrical approach so that the title of this chapter really needs to be expanded: *I is becoming another in the same event as the other is becoming I*.

The title of this chapter reflects the process orientation of the transactional approach. But if oneself is continuously becoming – passing into another self – and this becoming occurs in the event, then we cannot speak of the subject as if it were a thing ("identity") that pre-exists the event in which it participates. Consistent with the approach outlined in Chap. 2, things are abstractions, and the subject of activity is no exception. Therefore, in the transactional approach, it is better to think of a subject-*superject*, where the second part denotes the outcome of an activity, event, or process. The notion of the subject-superject includes both the experiencing subject and the superject of this experiencing (Whitehead 1929/1978). The evental approach implies that in each specious present, there is continuous passage from subject to superject, which then is the beginning of another subject-superject passage. We therefore theorize the person as subject-superject, which, as such, cannot be reduced to one or the other part. This is one of the senses of the chapter title: the self as continuously becoming another rather than being and remaining self-identical (that under given circumstances may change some external characteristic).

Two phenomena point us to the need for the transactional approach, both related to the same quality of events. We note in Chap. 2 that two events only relate when there is a common event that intersects with both – which is why words like dependency, aggressiveness, or pride describe relations not individuals. In other words, there is an event in which the two events are cogredient – we use the conversation as a paradigm case. As a result of having an event in common, the two events actually become immanent in one another. This is so whether we agree or disagree with the other. The longer two events (a person is a family of events) are intersected by a third, the more these two become immanent in each another. This reflects the experience that we become better and better at anticipating what is likely going to happen in events involving a longtime partner. When couples live together for a while, and even when teachers teach together for a while, we can observe that they are becoming like the respective other.

In the transactional approach, rather than asking how some person-thing comes to internalize an aspect from the shared environment or from another person, we have to consider all aspects of our theory in terms of events. No event is isolated but is related to other events in the same duration – events that in some instances are material only, generally involve others. Just as plants become immanent in gardeners (see Chap. 9), others become immanent in the subject-superject during social events. This is a transactional explanation of the idea in the second introductory quotation that was first articulated by Marx and Engels and subsequently taken up by Vygotsky (and others). The title of this chapter is a play on that of a philosophical

investigation, *Soi-même comme un autre* [Oneself as Another] (Ricœur 1990) but with a focus on the ever becoming of self in every specious present. In this way, I am true to the genetic underpinnings of my work that seek to create social psychological theories that are the results of natural and cultural evolution rather than theories that cannot explain why certain psychological qualities exist in the first place. That is, if we equivocate oneself and another, then we have not yet explained how this situation can come about in the first place. On the other hand, a theoretical move that places sociality in nature (e.g. Mead 1932), for example, has no trouble with the fact that personality is social through and through – rather than the result of individual and social construction.[1]

Relating – Intersection and Junction of Events

In common psychological frameworks, individuals are thought as self-identical entities – such as in the concepts of self, personality, or identity. Two things external to each other are connected by some third item, such as a sign in some form that is said to mediate the relationship between the two persons. In Chap. 5, I focus on the sign as the phenomenon of interest. In the present chapter, the focus is on people and their continued becoming. In the transactional approach, living people are not considered to be things but are understood as families of events. Relating to a person, the events include all forms of biological events. This is so because something living can be understood only in terms of categories of living, that is, in eventual categories. Typical for the people-as-things approach is to consider them in terms of some self-identical core, which is somehow changed taking the person from one stage to the next. Change is external. The approach can be likened to the operation of film, where a sequence of still images is played quickly enough for the eye to have the illusion that whatever is seen is moving itself (the cinematographic approach described in Chap. 2). But the movement is due to the forces in the playback mechanism, external to the photographic images.

Once we begin theorizing phenomena of interest in terms of events, then the next question has to be how events relate. It cannot be the same kind of relation that marks the object-based ontologies. Indeed, in object-oriented ontologies, the relation between two person-things occurs via a third object that mediates between the two. In the present context, three forms of relations between events are considered: (a) separation, (b) intersection, and (c) junction (Whitehead 1919). Two events x and y are separated when no member of x or y also is member of the respective other, y or x (Fig. 10.1a). The two events do not intersect, have nothing in common, and thus do not relate. If some larger event were to be completely *dissected* in this way, an understanding of how the different parts relate would have been lots. We obtain a non-overlapping exhaustive dissection of the larger event. Two events x and y are said to *intersect* when they have parts in common (Fig. 10.1b). Some parts of event

[1] This is also a reason why Alexei N. Leont'ev's (1981) theory of human development is so much better tan others, for he shows how every act has affective qualities from the beginning of life.

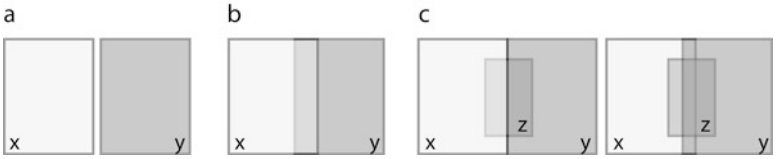


Fig. 10.1 Different relations of events. (**a**) Separated events *x*, *y*; (**b**) intersecting events *x, y*; and (**c**) two events *x* and *y* are joined, as (i) every member of the third event *z* belongs to either *x* or *y* or (ii) every member of the third event z belongs to either *x* or y or both

x also are parts of event *y*, and some parts of event *y* also are parts of event *x*. The two events *x* and *y* thus are *immanent* in each other. Finally, two events may be *joined* when there is a third event *z* such that each member of *z* belongs either to event *x* or to event *y* or two both (Fig. 10.1c). The continuity and connectedness of the natural and social worlds exist because of this latter form of relation. This is so because, as seen in Fig. 10.1c, two joined events are continuous with each other. Here, it is apparent that the concept of a junction extends that of the intersection, for it explains how two separate events can be joined and thus relate.

In Chap. 3, the idea of the intersection is already present when the sound-word-as-event is considered to be a part of both speaker and recipient. It is in that event {*saying* | *receiving*} that two people are joined. In other words, {*saying* | *receiving*} truly is joint work – they are like the two proverbial hands making a clap. We can extend this analysis a little more and consider that the saying also involves *orienting to* the intended recipient, and receiving implies *orienting to* the speaker. There are aspects then in the larger event that are not common to the two participants. In this instance, therefore, we have a situation as in the second diagram of Fig. 10.1c, where there is a third event z that intersects with both *x* and *y* (each representing a participant in a conversation) but some elements of *z* belong to *x* only, some others to *y* only, and some are shared by both speaker (family of events *x*) and recipient (family of events *y*).

Two normally separate (families of) events may come to be joined for a while and then separate again. Although they are separate after the encounter, each has in its past history that event of the encounter. That same encounter is immanent in the histories of both families. As a result, two have become a little like the other. In the transactional approach, the irreducibility of person and environment in the event means precisely that both person and environment are immanent in each other. Becoming-like-the-other is a phenomenon that has been observed in the physical world as well, and the associated notion of *entrainment* has been taken up in the social sciences. The original observations go back to the Dutch physicist Christiaan Huygens (1629–1695). He had observed that two pendulum clocks initially having different periods fall into synchrony when mounted on a common board or hung from a common railing. To the present day, physicists speak, as Huygens did, of the "sympathy" of the clocks that have become intersecting parts of new, more extensive system that also includes the support. Sociologists have used this phenomenon as an analogy to describe phenomena such as sports events, musical spectacles, and

other events where there is some object in common that constitutes mutual focus (e.g. Collins 2004). In a soccer (football) match, the game everyone is watching has the same function as the common support system that Huygens (and modern physicists) use for mounting the two clocks.

When I write in Chap. 9 about how in gardening gardeners increasingly become a little more like their plants, then this is precisely understood in terms of the idea of immanence that arises from the intersection and joining of (families of) events (gardener, tree). On shorter time scales that immanence is observed in conversations between two people, where research has shown that there are alignments of pitch, pitch contours, pitch continuation, speech rates, and rhythmic features under certain conditions and disjunctions of these qualities under other conditions. On longer time scales, the immanence is observable in the ways in which one person increasingly comes to act like another person when they spend a lot of time together. In my research, I investigated the alignment of prosodic features during conversations in many different settings. Specifically, I investigated the phenomenon of becoming like the other in the research on coteaching, a situation in which there two or more teachers simultaneously are teaching and taking responsibility for a lesson.

Becoming Like the Other

As part of my research on coteaching, I observed certain behavior characteristics that everyday reasoning would attribute to a particular teacher could subsequently also be attributed to their coteaching partner. I noticed such changes in the way participating teachers asked questions, how they covered the space in the front of the classroom, in their manners of gesturing, and how they intonated words and phrases. Most of these changes occurred without that the participants in coteaching were themselves aware of it. In the following, I provide examples from two of the contexts in which I had conducted extensive research. In the first, Christina and Bridget were teaching together a mixed fourth- and fifth-grade engineering design curriculum that lasted 13 weeks. Christina had been the regular classroom teacher; she had less experience in innovative ways of teaching science and the then current constructivist epistemology. Bridget had developed and given workshops on this particular curriculum and also had 4 years of experience as classroom teacher. The other materials derive from chemistry lessons for the secondary students in an urban school of the northeastern US, where the teachers-in-training studying at a nearby university participated with regular teachers in teaching science lessons. The transactional approach, in which analyses are based on the {person | environment} unit and where phenomena are analyzed as events irreducible to things, provides us with an appropriate theoretical framework of how a person A – understood as an event or a historical continuity of interconnected events – is becoming like the other (person B) in the same processes whereby this other (B) and the relations are becoming immanent in the person A.

When Christina and Bridget came together, different moves initial were observed in the relevant {person | environment} unit. This was so in part because Bridget had studied science and was very familiar with the subject matter of engineering. Christina, on the other hand, a resident teacher in the school, was much more familiar with the children than Bridget, in part because some of the students also had been in her class during the preceding year (where I encountered them first). Initially, the initiating {query | reply} sequences observed in {Bridget | environment} occasions often were not deemed appropriate for the particular students invited (by Christina), so that the exchanges were not successful for the learning of students to occur. Christina, on the other hand, knew the students very well, but the {query | reply} sequences that were observed in the {Christina | environment} unit did not lead to extended conversations because the associated initiations – intended queries – were shut down by the yes or no replies that these called forth. However, as Christina and Bridget taught together, each taking full responsibility of the lessons, they began to resemble each other in striking ways. My field notes and annotations of the transcripts reflected this sense of increasing resemblance in remarks such as, "Christina is asking a question, but I hear Bridget" or "Bridget is doing what Christina would have done." Moreover, they began resembling each other in their mannerisms, a supportive stance toward some students and a more overbearing stance towards others; an individual, pensive movement of a hand to the chin followed the same motion of the hand by the other; a turn of the head or the whole body of one, reflected in the movements of the other. After about 2 months, the two were so attuned in what they were doing that they could conduct a class without previously talking about their roles. Bridget and Christina performed their questioning because each "just knew to alternate like that without having spoken about it." They shared a common sense of where the classroom events were leading, attested to the fact that they were becoming like the other without being able to state this common sense in just so many words. But when pressed, Bridget described how she had changed by saying she was coming "to know when to stop and draw the line [in questioning]"; and Christina said that she was "learning to ask productive questions." In the following paragraphs, I elaborate on each of these two observations that the two teachers were making in the course of the experience of working together in the same classroom.

Lessons are events, and no event ever is quite like another.[2] In the transactional approach, this is modeled inherently because each passage from past to future in the specious present is understood as encompassing novelty. Thus, what was appropriate in one (past) instance no longer is so in another because of the novelty that comes with passage. Thus, what is appropriate in one situation involving one student no longer is appropriate in another situation with another student. Knowing "when to stop" and "where to draw the line," that is, "getting a feel" for the antecedent conditions that call for a situated practice is an important aspect of a teacher's practical knowing-how – because it bears on the ways in which what they know

[2] In the dialogue named *Cratylus*, Plato attributes to Heraclitus the statement that one could not step into the same river twice.

about science and their experiences in teaching science content come to play themselves out in acting toward students. Bridget often talked about the differences she perceived in their common sense of when to initiate stopping a line of questioning. Although she had 4 years of teaching experience with students of the same age, Bridget recognized that Christina had a better sense of the right time for stopping a line of questioning. From Bridget's perspective, Christina had a sense for drawing the line between productive questioning and discouraging children because their antecedent efforts appeared to be treated as insufficient. However, when pressed in debriefing meetings after school, neither Christina nor Bridget could express and thus make explicit just what it took to get the "timing" of questions right other than by talking a posteriori about specific classroom events where it had or had not been right. Yet it was in this aspect of questioning that the {Bridget | environment} unit was becoming like the {Christina | environment} unit while they were working together, that is, while these units intersected.

There were several occasions in which the contrast between the respective knowing-in-action (an event) became apparent, and which ultimately contributed to an increased sense for initiating the stopping of questioning at what both felt were the right times. In these situations, Christina was entering a space that Bridget simultaneously was offering. It allowed Christina to initiate a whole-class session or a teacher-student interaction to invite forms of student participation that did not make the children feel uneasy. In one particular instance, Bridget attempted to invite Daniel – a student eligible for special services because of a learning disability – to "extend his thinking" about the forces acting in the bridge from drinking straws and add to his construction. Bridget attempted to initiate extending the questioning even though Daniel already was employing some conceptually very difficult engineering techniques (e.g. increased material strength by means of lamination). When Christina perceived what was happening, she initiated stopping the questioning and offered Damian that he could do another bridge rather than having to modify what he had done so far. After the lesson, the two talked about this teaching move as having acknowledged an achievement, a successful solution to the task, and as having invited the student to go further in an optional second bridge project. Here, the teaching event had led to an appropriate outcome, for the "right thing" was happening at the right time for the student. But the teachers were recognizing that a shift had been occurring in the roles that they were playing. Whereas initially Bridget was Daniel's counterpart, Christina was finishing the exchange. They subsequently acknowledged during the debriefing meeting that Bridget might have been inclined to "push" the student, who might not have ended with a positive feeling about what he had done. Without much deliberation, Christina has had the sense that Bridget was intending to go too far with her questioning about forces, braces, and shearing; and she had the sense that this micro-event "just needed to stop" right then and there. With time, the two were finding themselves in repeated occasions of this kind, having the opportunity to live through these together, though each with her own perspective.

In Bridget's case, the timing issue was the quality in which her relations were increasingly becoming like those of Christina; that is, getting a feel for initiating

questioning that was occurring at the right time and in the right place (student, context). Although she had had a sense for the appropriateness of the context – preceding an impending (anticipated) disaster to some structure, before children were running the danger of hurting themselves with tools, or when children thought they were finished – it took several months working next to and with Christina before her timing became "right." Even then, she could specify appropriateness only as much as that one develops a "sense" for it, but she could not make explicit just how this practical knowledge was constituted. This sense was based on the experience working with Christina and going through situations with her partner. This sense, and the way in which she "picked it up" from Christina, resisted her efforts of describing what was happening to her and when. Yet this timing was the very quality that made the questioning appropriate and simultaneously more similar to what could be seen in the {Christina | environment} unit so much more effective by providing the appropriate context for her great. Although both teachers found it difficult to put in words what was happening, they could nevertheless point to relevant situations on one of the two videotapes that continuously recorded lessons.

When I began attending and participating in the lessons in Christina's classroom during the preceding year, I noticed the high incidence of devised-format questions, that is, questions that were paired with replies stating factual information or yes/no replies. The questions students asked their peers during presentation and discussion of student-produced artifacts also were of factual nature. After Bridget entered the classroom, the patterns of the {query | reply} sequences began to change. Out of the devised-format questions that had been characteristic of the classroom when my study began arose content-oriented and open-ended questioning characteristic of what occurred when Bridget was part of the exchange events. As they were looking at their teaching – e.g. using the videotapes shot – Christina and Bridget began calling these {query | reply} sequences "productive questioning." They used this name because the questioning "extended children's thinking" and led to much higher conceptual outcomes than what Christina had seen when teaching this curriculum before and on her own. Over time teaching together, this quality of Christina and Bridget's questioning became increasingly similar. Even students began to initiate more open-ended and reflective {query | reply} sequences.

Initially, productive {questioning | answering} was not something characterizing the lessons prior to Bridget's arrival. I had been to the class Christina was teaching during the preceding school year, involving some of the same students. As the classroom transformed (was reborn in a new way), and as she was seeing what the children were doing (i.e. the structures they were building) and how they were doing it, Christina began to notice differences with her earlier experience of teaching a unit on bridge building. She attributed much of the increased student learning to the difference in questions that helped children to draw cognitive benefit from their experiences. It was through the event of productive {questioning | answering} that the quality of the observable science talk was improved. The productive {questioning | answering} ultimately led to the success of the unit in the lessons that were part of this research project.

A major shift in the {query | reply} sequences occurred about 4 weeks into the engineering unit. At the beginning of the lesson, in the course of an exchange with a group of three boys, all of the initiations asked for specific, one-word replies or implicitly suggested what students were to do (e.g. enlarging a tower by adding a base or a top or stabilize it by adding triangular braces). The replies took the form "yes," "no," or "we can do that. It's very easy." About 16 min later, there was an exchange involving the same students and Bridget, whereas Christina was watching what was happening from a few meters away. The exchange took a dialogic form, where replies initiated further queries, and further queries extended the range of replies. The {query | reply} sequences also concerned reflections on the building experience itself, that is, it offered opportunities to the children to talk about their building experience and thereby to become (consciously) aware of the particular building techniques employed. The {query | reply} sequences covered the weaknesses, strengths, or outstanding features of the boys' engineering design; and they led to explain characteristic aspects of the tower currently under construction. It was quite evident that reply parts of the sequences were more extensive than those that were recorded earlier in the exchange between the students and Christina. The two teachers subsequently talked about the two events in this way: Bridget had participated in the exchange in ways that were initiating more extensive replies and that encouraged students to talk about what they had done or wanted to do. In contrast, they talked about Christina's participation in terms of the failure of an opportunity to initiate student reflective talk about their design work or about the practical and theoretical engineering concepts involved.

Upon looking back, Christina talked about how she had begun capitalizing on or creating learning opportunities. In her (after-the-fact) explanation, she invoked an experience in a situation where she questioned a group of two boys. The videotape of that situation provides evidence that the {query | reply} sequences bore great similarity with those in situations where Bridget was part of exchange events. Rather than offering direct queries about the engineering work, the situation initiated an opportunity for the boys to articulate the scientific content that they deemed relevant to the design project. Although each passage brings with it the birth of new forms, these new forms tend to be unnoticed. After this particular exchange, however, I observed an increased frequency of queries initiating open-ended explorations of scientific and practical topics surrounding the children's designs. When Christina later reflected on what was happening during this particular lesson, she recognized it as a turning point in the nature and quality of the {query | reply} sequences that occurred in this classroom. Christina said, "This is one of my first days when I started to think about, 'What kind of questions am I asking?' and 'What can I do to extend the kids' thinking?'" And she continued a little later, "I did not ask why it was a big challenge, but what it was … I asked the question, 'Where is the tower going to break?' and Bridget asked the question, 'Why is it going to break?'" She talked about having noticed that {query | reply} sequences were more productive when Bridget was part of the mix than when she was there. Commenting

on the specific micro-event with the three boys, she emphasized the positive outcomes of what she had seen when Bridget and the three boys were talking and compared that with {query | reply} sequences that were happening when she talked to students.

The videotapes recorded in this fourth- and fifth-grade classroom document the changes in the number and quality of the {query | reply} sequences. Within a three-hour period, a new type of exchange event was born and established itself where queries (as events) initiated extensive and elaborate replies. At the time I was doing the research, I had no sense of how this or any such rebirth came about; and, using an interactional paradigm, I did not have a theoretical means for explaining why one self-identical individual-as-thing (teacher identity) could become like another. While watching the videotapes of this lesson, Christina and Bridget were becoming aware of the differences in the ways in which they participated in the {query | reply} sequences. They did notice though that when Christina was part of the mix, the exchanges seemed "to go nowhere" and did not cover any scientific ground. When Bridget was part of the mix, there were initiations that led to extended exchanges that covered a lot of ground but the danger that negative student feelings were looming was often looming.

It has been suggested that two or more people will start behaving in similar ways when there is a common focus and a sense that others are orienting to the same matters – such as observed in the cheers or spectator waves in sports events (Collins 2004). For the two teachers in my study, the engineering lessons and children's learning constituted a mutual focus. Both were immersed in the event, though, of course, their experiences are not to be identical. They were both integral part of their joint experiential field, two life lines intertwined with one another and all those lifelines that weave together the totality of the field. New forms of action made sense against the historically antecedent phases of the field in which they originated as much as they made sense against the new field, recognized to be the effect that the actions had to bring about change. Experiencing {query | reply} sequences in the context of their jointly lived engineering unit put these sequences "into their beings" and "made these become part of them." That is, these teachers themselves were realizing that they had become like the other, and that this had been occurring in the same process as they respective other had become a little like themselves. Christina emphasized that participating with Bridget helped her to make the initiation of {query | reply} sequences "part of herself." In other words, these initiations that previously recognized as a quality of events in Bridget's present now also had become immanent in exchanges where Christina was present. Experiencing the sequences in the living situation of a real classroom context helped her to become like her teaching partner – though the ways in which this happened remained unexplained. She could only say that these situations were "going in" and becoming part of her so that she was able to initiate acting accordingly.

Coordinated Movements

> Without bodily presence, it is hard to convey participation in the group and to confirm one's identity as a member of the group. (Collins 2004, 54)

In Chap. 2, I offer the analogy of the fibers, strands, and threads for thinking about events and families thereof. Two events that are part of a larger event also are implicated and immanent in each other. This is so because the whole being present in each part, each part also is part in another part because of its role in the whole. In a musical piece, we hear each note in relation to all other notes rather than hearing individual notes that we somehow mentally add up to a chord. Each note is not a thing but a micro-event co-existing with the preceding not receding into the past and in anticipation of the note coming next. In the ways musical lines move about and affect how we hear, participants in an event are thought as evental lines in a flow with other evental lines. In the concrete case of two teachers working together in the same lesson, we may therefore expect some sort of mutuality to occur in the way that this initially appeared to me while observing Christina and Bridget at work. In part they appeared to become like the other because of the ways in which they took the other's place: as one stepped forward to take over the lead in a whole-class session, the other stepped back; and the stepping back of one made possible the coming forward of the other. In the stream of classroom life, the two flows of events (Christina, Bridget) come to wind around each other, becoming like the other while taking the place of the other. It is this phenomenon that I came to research in inner-city schools of Philadelphia, where a teacher-training program was oriented to the practice of teaching by having the candidates work at the elbows of resident teachers in schools near the university. A particular focus of the research was to come to understand *how* teachers were becoming (a little) like their coteaching partners.

There are different forms of practices that participants and researchers refer to as coteaching. Often it simply means that two teachers work together on some aspect, for example, planning lessons and then one teacher teaches while to other does something else (e.g. grading papers, organizing future lessons in some way). In my research, coteaching referred to the practice of having two or more teachers take full responsibility for all aspects of teaching and doing so simultaneously. Importantly, two or more teachers would be participating in a lesson with the commitment to step in whenever an improvement offered itself up or was called for. Sometimes, a teacher added some content rearticulated some statement to assist student comprehension, correct an error or omission. When coteaching was felt to be at its best, the video records provided evidence of seamless turns taking of the two or more teachers, that is, of spatial and temporal coordination in the movements of the teachers involved. In the following, I draw on some examples from chemistry lessons that a resident teacher and department head (Cristo) taught together with a teacher in training (Chris). The lesson fragments provide evidence of the spatial and temporal coordination of teaching in this classroom at a point of about 3 months into their coteaching experience.

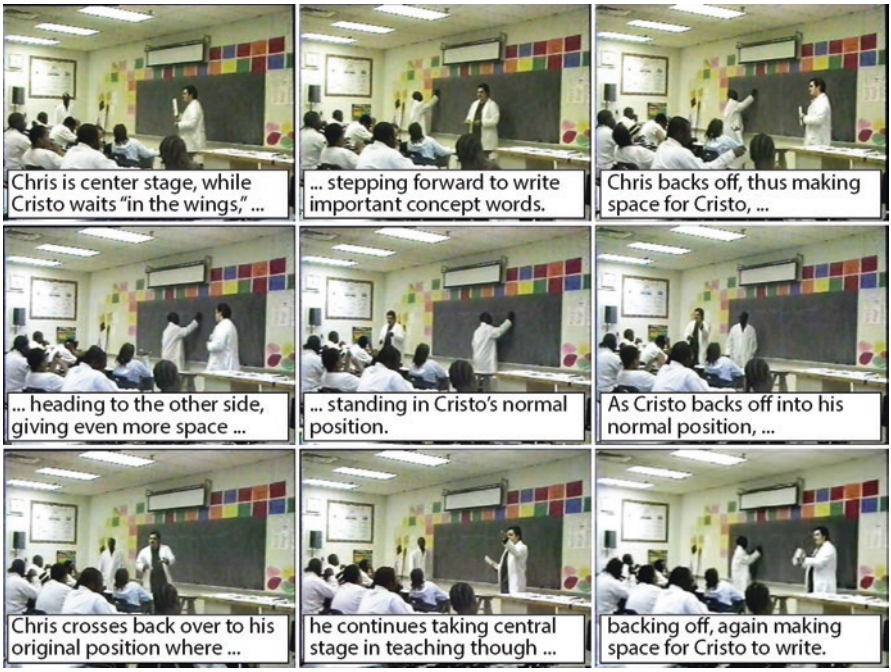


Fig. 10.2 Teachers, such as Cristo (experienced) and Chris (new) who have taught together for a while work in concert, making and taking space, as if in a dance, which succeeds because of the coordination of movements

In the first lesson fragment shown, Cristo stands at the far side of the classroom front part, "in the wings" so to speak, positioned as if ready to step onto center stage. Chris currently is located center stage in the configuration, describing *for* students what they are to do in the laboratory task that the current talk anticipates (Fig. 10.2). While the latter part of {question | reply} event in which "Are chemicals elements or compounds?" is paired with multiple articulations of "elements," Cristo moves to the chalkboard and begins to write. We thus have one event in which there is both preparation for a task that is to follow and the clearing of the chalkboard followed by noting of important aspects from the talk content. Chris is continuing to talk to the students, and Cristo is writing a long note beginning with the words "Chemicals are compounds …" that eventually covers the chalkboard to the right-hand side (Fig. 10.2). The first four frames show that as Cristo is writing and moving, he increasingly invades the space of center stage, so that the physical space available to Chris diminishes. The spatial configuration emerging at this point in time creates the antecedent conditions out of which Chris's crossing over to the other end of the front stage emerges, which then occurs all the while talking contin-

Fig. 10.3 The notes that one teacher (Cristo, left) is writing are integrated, in gesturing movements, into the student-oriented talk of the other teacher (Chris)

ues. While the talk is occurring now from that side of the classroom, Cristo is finishing writing the note that initiates the backing off again into the direction of the place where he usually stands (Fig. 10.2). This movement occasions another one that has Chris crossing back toward the center. Cristo, however, is not walking all the way back near the wall but stays right at the end of the chalkboard, enabling him to record notes on the chalkboard whenever appropriate.

Whatever is written on the chalkboard is part of the setting and thus may enter actively into the shaping of the lesson event as it is unfolding. The writing enables percipient events that unfold together with other percipient events of the auditory type. Now that the writing is on the board, it may become part of the event of presenting. For example, Chris may, while talking, refer to the writing so that it complements or adds to whatever he is saying (Fig. 10.3). Here again, the image of a dance offers itself up for us as a way of characterizing how the event of writing comes to intertwine with the event of talking, each event only existing as part of the larger event of teaching. One event is a condition and ground for another, the former passing into the next as writing captures what has been said, and the saying draws on and incorporates the content of the written.

The second lesson fragment covers a period of time when Chris appeared to experience difficulties in presenting. He does not find his words and begins to use gestures that provide images of the things he is talking about (Fig. 10.4). His talk is intermittent, longer, clearly noticeable pauses separating phrase segments. At this moment, Cristo begins moving in toward center stage, drawing the outline of a beaker and then clearing off the remainder of the blackboard. The presentation then builds on the figure Cristo had been drawing, pointing to the diagram concurrent with talking. Chris also adds to the diagram by drawing a little cup on the inside of the beaker that Cristo has previously drawn. After the fact it is apparent that some of the preceding movements had been gestures symbolizing the little cup now avail-

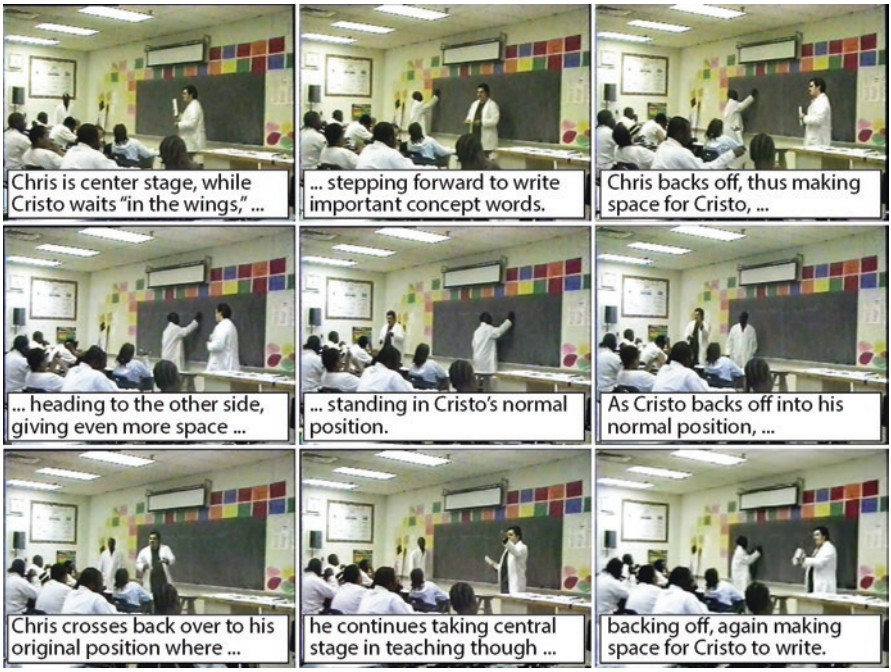


Fig. 10.4 After some trouble appears related to the teaching of Chris, the coteaching Cristo moves in. Rather than decomposing the event into the actions of self-identical individuals, the transactional approach considers this lesson fragment as one event in which multiple other events are joined

able as a line of chalk on the chalkboard. This diagram will have been the starting point of a figure representing the entire set up of the laboratory task that the students subsequently are to complete. Chris continues talking. At the same time, Cristo continues adding to the emerging diagram until the entire set up of the laboratory task that the students are to do is depicted on the board.

In my previous ways of thinking, I was taking the situation apart, theorizing each teacher as an individual person and the chalkboard as a collaborative space. The two teachers were theorized as contributing to the drawings and writing evolving on the board, one as the producer of the said that the other inscribed on the board in visual form. But when we approach the analysis of lessons in this way, we end up with individual people- and objects-as-things the relationship between which requires other things as mediators. Thinking about such lesson events in terms of dance or musical events allows us to avoid the reduction to things, for dance and music only exist in two extensions, one temporal the other spatial. Although we might in a first

analytical move dissect the overall event into individual events, these will not relate unless we also provide evidence of those events in and by means of which the dissected events intersect.

Temporal alignment and coordination also is achieved in a continuous manner. In coteaching, change over from one teacher to another sometimes occurred at conversational breaks, just as they would in ordinary conversations. One event of speaking apparently comes to an end as the intonation falls toward the impending end of a complete phrase followed by an emergent pause. At this point, there is, conversationally speaking, a temporal space opened up for another person to join in, and in the coteaching context, to take over the lead in teaching. In general, I observed that as long as one teacher was speaking, others did not try beginning to talk. There may have been looks between two teachers, and out of this joint looking at the other, a changeover occurred. Other opportunities for entering an ongoing exchange arose during conversational pauses or hesitations.

In this research, we observed that situations without conflict the pitches of speakers tended to be aligned such that the next speaker would take up at a level where the preceding speaker had ended (Roth and Tobin 2010). That is, Cristo and Chris increasingly resembled each other in the ways they articulated particular words and phrases, so that one sounded like the other. In other words, the pitch contours were highly correlated. When they contributed to verbal exchanges one after the other, the second speaker began with the same pitch at which the former had ended. Describing the situation in this way is consistent with the research that existed at the time: it is wedded to a person-as-thing ontology in an interactional approach, where words are pinned to and understood as the property of the speaker, followed by a reply that is the property of another speaker. I remember that I accepted the research results, but I was mystified because there was no strong explanation for why two independent and consecutive acts of speaking should exhibit the same prosodic features. In the transactional approach, as seen in Chap. 3, sound-words are (parts of) events of {saying | receiving}. I noted that this is a resonance phenomenon where the sounds exist as vibrations in the vocal cords of the speaker as much as in the eardrums and tympani of the recipient (respondent). Rather than "beginning" with the same pitch frequency as the talk preceding it, the vocal cords of the respondent actually continue at the same frequency as the eardrums and tympani resonated while the preceding words were heard. The living organism is the medium in which the frequency already exists prior to being expressed through the vocal cords.

The pitches do not always have to align for solidarity to exist and for a good working relationship to be observable. In Fragment 10.1, two future elementary teachers (Rosie and Alicia) talk about a graph that displays the relative abundance of three types of plants, C3, C4, and CAM. There is an exchange over the abundance of the C3 species at one elevation.

Fragment 10.1

1 R: what I was thinking is that, the importance of the c-three being at coolest least dry two thousand it's very important that it would occur there, you know what I mean?

2 A: as supposed to what?

3 R: as supposed to (0.3) if (0.4) um (0.5) it was occurring here, (3.5) maybe the importance is not so much, it won't be seen. at this elevation it would be.

We observe the alignment of the conceptual content of an offered question, "As supposed to what?" and the movement of the hand to a point in the graph that would be the comparison point (turn 3), a movement that falls together with the repetition of the preceding statement leading into the beginning of an answer. We notice that there is not only hearing of the phrase in turn 2 occurring but also a repetition of precisely the phrase. The answer is set up by and arises out of this phrase. The resonance between the two speakers is apparent at the material level, where important voice parameters parallel each other.

The voice analysis shows that the two speakers speak at the same rate, giving rise to the sense of their shared rhythm (Fig. 10.5). It is not just that the phrase is repeated but also it is repeated at exactly the same syllabic distance, and the final part "to" is drawn out in the same way. Pitch analysis shows that the two contours are parallel (Fig. 10.5), but shifted by about 20 Hz with respect to each other. While listening, this is heard as the same melodic line even though the pitch is shifted, a sense that we would get from two different musical instruments playing the same melody but each in its characteristic range. In their entire two-hour session, there is never a difference, argument, or conflict. Listening to the two women, we get the sense of considerable solidarity in completing the task together and to play into each other's hand. Their relation to the object (graph) determines their relation to each other (talk), and their relation to each other determines their relation to the graph.

Such alignment phenomena also may be observed in situations involving larger groups. The following observations derive from an investigation into the teaching

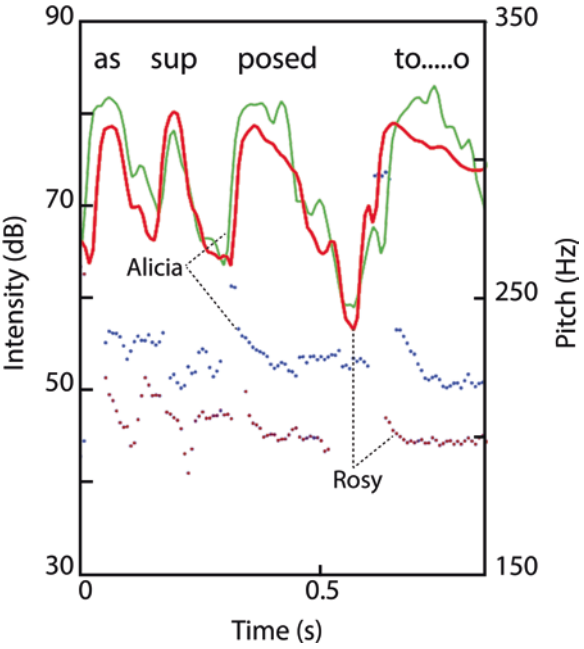


Fig. 10.5 Alignment between two future teachers while working on a graphing task. The two pitches (dotted curves) show pitch alignment exists even though the two pitch contours are shifted by about 20 Hz with respect to each other. The plots of the speech intensities (solid lines) indicate same speech rate and rhythm

and learning of chemistry. The particular lesson fragment considered was devoted to a summary of course content from the preceding lessons; and one student (Mary) offers a different method for solving a particular problem. In this lesson fragment, we observe a coordination of behavior across the classroom without any evidence that this coordination occurred at the level of consciousness. The different members are indeed only part of a larger setting characterized by a particular beat – much like that observed in the above-noted sports events with coordinated movements and chants. When Mary begins, turning her gaze toward the periodic table, the gazes of the others also move in the same direction, though no other signal occurred that could have been taken as a clue to look in this particular direction and at the table. The beat in and of the production of the sound is the same beat in and of the reception. It may therefore not surprise to find other indicators of the same beat (rhythm). This rhythm is audible so that we might anticipate that it manifests itself elsewhere in the classroom even if others do not have visual contact. This is indeed the case. For example, the video shows Gabe's head rocking a back-and-forth motion (Fig. 10.6). Both the sound stream and the rocking head are manifestations of the same beat. In the past, I had thought that it was the voice that *mediated* between some rhythm characteristic of Mary and same rhythmic frequencies observed in the movements of others, including the forward-and-backward movement of Tania's

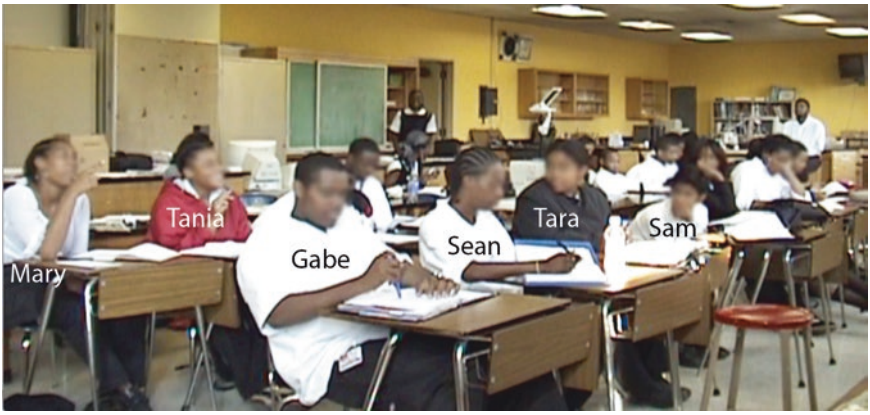


Fig. 10.6 While Mary is presenting a method for solving a problem, considerable coordination of rhythms are observed across the different members of the group even when they do not have visual contact with the speaker

hand that parallels a similar movement seen in Mary's right arm and hand. Today I no longer think that the voice is mediating anything at all. Saying so would make no sense in the context of a transactional approach. It would make as little sense as saying that the sound of the drum section in a rock band *mediated* the guitars. Instead, they all play together in tune (and sync) thus give rise to melody, rhythm, and intensities. Synchrony is not passive, and it is not the result of an interpretation. Instead, it is an active achievement arising from the intersecting of playing and anticipating the playing of others. It is in this togetherness that the unity of the musical composition exists, not in any external relations where two self-identical parts are mediated by a third.

There are other indicators of this rhythm in other modalities. Thus, the videotape shows that when Gabe's chin is in the most forward position in its rocking, back-and-forth movement, then we also see Mary's hand reach its most forward position. Both fall together with the extreme points in sound intensity and the peaks in the pitch contours. Gabe's leg is rocking up and down in a precisely coordinated movement. When the sound-words come to the end of a phrase, the video shows an upward movement of Gabe's gaze, as if placing a period at the end of a phrase, and all the rhythmic come to their end at this point. We also observe the rhythm elsewhere, including the beat generated when the teacher's chalk hits the chalkboard and in the periodic movement of other students, including the beat of Sean's pen, rhythmically moving downward until touching the page.

The alignment of the different events and eventual families also were reflected in the alignment with respect to the conceptual content apparent in speaking. At one point in the exchange, the teacher presented a shortcut to quickly obtain the answer to a problem. While the teacher is beginning the explanation with a first point, Tania's lips can be seen forming "one"; when the teacher arrives at the second point, Tania's lips form what would have given rise to the sound-word "two" if sufficient energy had been involved to actually make the sound hearable. As the teacher's chalk hits the board for the third item, Tania's voice sounds "three" aloud. While the teacher's voice sounds out "four," "five," "six," "seven," and "eight," Tania's lips move as if they were had they sounded out the same words.

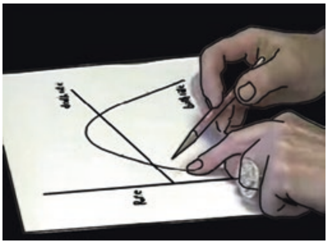
In the past, I had thought about such situations in terms of an object-based ontology. Thus, for example, I thought about the synchrony as a *resource* for members to a setting, a resource allowing them to experience and recognize alignment and agreement (e.g. Roth and Tobin 2010). I thought that Tasha was displaying synchrony in the way she responded to the counting and movement with the rhythmic patterns that her teacher Virginia produced. In so doing, I did not realize that the members are not self-identical things that were acting upon each other. In a transactional perspective, synchrony is a quality of the system in the same way that quality of a chord is the result of the relation of concurrently played notes. There is not one note marking discord and another one accordance. Synchrony is an alignment of intersecting events, like the synchrony displayed by two clocks mounted on the same board, which occurs even when the clocks, running individually, display a different rhythm. Solidarity, that is, the fact or quality of being perfectly united in some respect with others, here is not merely articulated in public, as I had thought before, available for all to use as a resource in subsequent actions, but it is indeed a quality driving the event as much as being driven by it. Solidarity is available much like it is in the shared chants of spectator in some sporting event. From an analytic perspective, therefore, we cannot think of individual participants who orient themselves and each other to existing public exhibits of (collective) solidarity. Instead, we are better off thinking from the perspective of the overarching event that exists because of the events over which it extends but these events exist in the way they do only because they are parts of the overall event. It is the alignment quality of the event in which we observe other students to resonate in the same way. In other words, we do not see individual behavior in each member (student, teacher) but a manifestation of a larger event in which they, qua person-as-event, are constitutive part, and where at a coarse level perception recognizes recurrences in the form of individual persons and identities.

Resistance and Accommodation

In the two preceding sections, I describe the event of oneself becoming another at timescales of several months. I also refer to the suggestions that during conversations, participants become aligned in speech and prosodic features. Understanding those longer-term evolutions requires us to investigate events of shorter durations, such as what happens during interview situations and even on smaller scales of particular phases of such events. We may observe alignment and misalignment as qualities of the exchanges, which cumulate into a sense of how the event unfolded for the individuals. Some research suggests that during interviews, interviewer and interviewees become aligned in the way energy is expended in the sound spectrum generally but with respect to pitch in particular, which in fact is below the range of articulated sound (Gregory 1999). Alignments and misalignments of prosody have shown to be related to power and status relations. Accordingly, lower power and status persons become entrained into the pitch frequency of more powerful persons so that there exists a convergence between these levels. Yet the data from the different data sets that I collected over the years suggest a different picture. I found that pitch alignment and misalignment rather than being signs of power and status in fact are qualities that – if perceived – may constitute conditioning events in subsequent developments. As the following example shows, resistance and difference are characterized by pitch differences, noticeable in particular when the base frequencies of the participants are perceivably different, and pitch are aligned when there is agreement or one person exhibits (e.g. at verbal level) a particular intent to accommodate the other. The fragments are taken from a research project in which an undergraduate physics major (Daniel) organized think-aloud protocol sessions with physics professors, who were asked to read aloud graphs from their own discipline and the discipline of biology. The graphs were typical of undergraduate textbooks. Besides Daniel, the fragments below involve Anne, who has been a professor for more than 30 years.

In the fragment, is completely oriented toward the graph. She rarely looks up, even when she asks a question. While she talks, both making descriptive and interpretive statements and questioning her two hands are positioned on the graphical feature or in the area of the sheet that constitutes the current topic of talk (offprint in turn 1). Sometimes she follows a feature using pencil or finger, thereby iconically reproducing the shape of the indexed entity. At other moments, she merely points to a specific feature or toward a general area on the graphical display. The first fragment follows a lengthy first reading of the graph. Subsequent to a brief pause, the event has Anne offering up the query whether she is right (turn 1). In the context of the think-aloud session that Anne has agreed to participate in, asking whether she is right certainly is unexpected and perhaps surprising. There is a 1.10-second pause, followed by Dan's production of sounds that serve to both acknowledge his hearing of the query and stall on providing an immediate response.

Fragment 10.2



1 A: is that right?
2 (1.10)
3 D: uh [m::] [khm]
4 A: [am=I] loo [k =i] m looking at this region here now.
5 (0.30)
6 D: °yea° thA:- yea=i=th (.) i think=that's: (0.20) c:orrect. is=thad=wha=it=says=on=the=graph?
7 (2.50)
8 D: °°pp>h=or:?°°
9 (0.39)
10 A: you=mean hE:re ((hand moves down to the text))?=
11 D: [=[yeah, does it s:] [ay-?]
12 A: [[that's=what=you=say] [d'you=want] =me to look there? ((*points to text*))
13 (0.55)
14 D: NO i mean-
15 (0.18)
16 A: °°hum°°=
> 17 D: =is tha is that what you understand=or is that (0.19) your personal=um observant [ion.]
> 18 A: [°be] e equals be° B:::, B, what what are these variables? eN is here ((*points to the graph*)), what's lIttle b?

Anne articulates what can be regarded as a clarification of the question, specifying which of the three regions – below, between, and above the two intersections (offprint, turn 1) – she is referring to (turn 4). The effect of the fragment is one in which Daniel either hedges or creates uncertainty about the correctness of what Anne has said despite her request for confirmation of having the right answer. These hedging and uncertainty-producing moves consistently are associated with displayed pitch levels, which tend to diverge. That is, in addition to the pauses and interpolations, the pitch levels make apparent some sort of resistance or accommodation. However, in contrast to the rising pitches associated with disagreement and conflict among hopscotch playing children (Goodwin et al. 2002), Daniel's pitch remained or moved into his normal range, much lower than that which is characteristic of Anne's voice.

Anne, who has spoken with a mean frequency of 235 Hz (max = 274 Hz, min = 174 Hz, SD = 26 Hz), drops on the final word ("now") to 180 Hz. In responding, Daniel stays within his range (min = 121.5 Hz, max = 154.7 Hz, mean = 139 Hz, SD = 7.5 Hz). This range clearly is exhibited throughout this episode, including turn 17, which continues to seed uncertainty because it raises questions about Anne's articulation of the graph as alternative classifications of it under "understanding" or

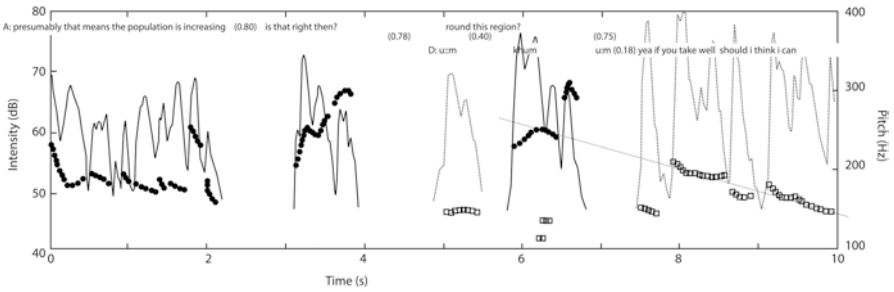


Fig. 10.7 When Dan hesitates in responding to queries, he stays in his normal range; when he does respond to the interviewee's questions, his pitch moves up into her range and then drops until he reaches his normal range

"personal observation" are proposed. Anne, reorienting to the graph, makes an attempt at grasping a formula given for the parabolic birthrate curve in which the parameters are b0, b1, and b2. The pitch of the sound when Daniel is speaking (which expresses uncertainty about the correctness status) lies considerably below the pitch of the sound when Anne is speaking. For the entire two-hour recording session, these pitch levels correspond to the normal range for Dan and are near the normal 210–240 Hz range for Anne in the early part of her continuation, with high pitch spikes on "B" and "are" (Fig. 10.7).

In Fragment 10.2, we notice first resistance to replying, manifesting itself in pauses and interpolations that project continuing role as the recipient rather than an incipient move to assume the next turn. This has the effect on the person who poses the question of creating uncertainty, which might arise from a problem in the articulation of the question or its domain of application (Roth and Middleton 2006). Thus, out of a missing direct reply to the query about being right in the graph interpretation, arises Anne's re-specification of the domain of applicability of the explanation ("round this region?"), an assessment of correctness she now requests (turn 07). Dan hesitates, there is a pause, then produces another interpolation, before launching into a rapidly unfolding explanation about how to go about reading the graph by subtracting the death rate from the birthrate (turn 10).

Fragment 10.3

	1	A:	presumably that means that the population is increasing.
	2		(0.80)
	3		is that right then?>
	4		(0.78)
>	5	D:	u:m:
	6		(0.40)
	7	A:	round [this / khum] rE:gION?
>	8	D:	
	9		(0.75)
>	10		U:M (0.18) yea if <you take well should I think I can stay off it if you take the birth minus the death>

The bottom panel of Fig. 10.7 shows the changes in the pitch level of Dan's voice, which initially (for the interpolations) remain in his normal range ("um," "khum": min = 143 Hz, max = 150 Hz, mean = 147 Hz, SD = 2 Hz). Then, when he actually responds, the pitch level of his voice jumps into a higher range, in fact, into the normal range of Anne. His pitch (F0) begins at 211 Hz and then progressively decreases into this normal range in the course of turn 10 for a mean of 121 Hz (SD = 4 Hz) over the last 2 s of the entire turn (min = 112 Hz, max = 131 Hz). The broken line in the graph (Fig. 10.7) shows how Daniel's descending pitch can be extended backwards, where it meets up with the pitch level on which the voice of Anne ends. That is, in his pitch, Daniel expresses approximation and accommodation only to return to his normal, probably more comfortable pitch range.

Existing research suggested that convergence of prosodic parameters in face-to-face exchanges is observed when persons with less power or status accommodate others with more power and status (Gregory 1999). My own analyses show a somewhat different picture, one consistent with the idea of resonance and dissonance phenomena that mark the current phase of the event. Thus, whenever this interviewer's voice exhibits hesitancy to respond, any utterances are associated with its normal pitch range, which is also lower than that of most interviewees. Whenever the interviewer actually does respond – i.e. quickly and without delaying the actual reply – the pitch of the interviewer's voice moves into the range of the other person, often joining up to produce pitch continuation. That is, the events of acceding to and accommodating the question are heard as associated with a pitch that meets that of the other. In the course of responding, the pitch of Daniel's voice falls back into its normal range. It is evident that the effect clearly is observable when the normal pitch ranges of the two speakers are apart rather than overlapping or even being the same.

On this particular occasion, the question of who is more powerful is not easy to answer, as shown by the negotiations around who knows what and what mathematical knowledge is pertinent to the situation. Thus, Anne, enlisted in the study as an expert, asks questions about something that she does not know; and she asks a person whom she knows to be a moderately successful undergraduate student in her own department. Because of the association of knowledge and power, then, Daniel is the one to whom knowledge would be attributed in that event and who would be said to be in control over providing or not providing the sought-for answer. The issue of power, however, is more complex. On the one hand, the university-based physicists interviewed by Daniel would be said to be in institutional positions of power over Daniel. On the other hand, being part of the research team, interviewees often hold him to be knowledgeable about the graphs they are asked to think-aloud about; here, then, the institutional relation places Daniel in the position of more power. But as an additional dimension, the physicists have been recruited as experts; as such, they might be expected to know more about the attendant issues than the researchers asking for expertise. Although in this situation it is Daniel who accommodates the other more than others accommodate him in terms of pitch alignments, it is also Daniel who withholds judgments, evaluations, and other responses, all instances during which his pitch remains in his normal range and does not meet that of his interlocutors.

In summary, therefore, the analysis of this data corpus – here exemplified by excerpts from the meeting between Anne and Daniel – suggests that it may be better to think of and theorize pitch levels as (a) expressing and being correlated with events in which resistance or accommodation occur and (b) as transactional qualities that may allow others to feel or make inferences about the positioning of the speaker. From the transactional perspective, it does not make sense to theorize power as a quality of individuals, or as a thing like phenomenon that one can have in the way one has a wallet in the pocket. We may ask the question whether these findings about the relation between pitch levels and institutional relations of power hold up in other settings where teachers and students interact. The upshot of the analysis is that the *inter*actional approach just does not work and that we need to talk the transactional approach in which the characters ascribed to participants themselves may change from one phase of the event to the next.

Personality – Immanence of Societal Relations

> A nexus enjoys "social order" when (i) there is a common element of some form illustrated in the definiteness of each of its included actual entities, and (ii) this common element of form arises in each member of the nexus by reason of the conditions imposed upon it by its prehensions of some other members of the nexus, and (iii) these prehensions impose that condition of reproduction by reason of their inclusion of positive feelings involving that common form. Such a nexus is called a "society," and the common form is the "defining characteristic" of that society. (Whitehead 1933, 261)

This chapter starts out with two quotations that point to the experience and theory of the self as another. Whereas readers may more easily dismiss the poet, it is more difficult in the case of a scholar, especially when it is someone like Vygotsky at the height of his intellectual output. At the beginning of the chapter I also quote the anthropologist and philosopher Gregory Bateson, who suggests that attributes generally taken to describe an individual are better thought of as description of relations with others. Saying with Vygotsky that personality is the ensemble of societal relations may not immediately make sense or be plausible. This is in part because the lasting effects of relations tend not to be visible as such. But the case studies I provide – which follow individuals over longer periods of time in occasions with common foci – show that the relations within events shape persons and the shaping goes both ways if there are two (or more). The case studies show how ways of moving in and covering space, voice parameters, and dispositions toward relation with still others (students) change in the course of working with another teacher. I refer to the physical analogy often made with two pendulum clocks and the phenomenon of entrainment. Although not directly referring to the analogy with the pendulum clocks, similar analogies have been made in transactional theory: "there is an analogy between the transference of energy from particular occasion to particular occasion in physical nature and the transference of affective tone with its emotional energy, from one occasion to another in any human personality" (Whitehead 1933, 242). In speaking to another person, we are in relation with the other, in our conduct

already taking the attitude of the other, thus never acting as a completely insular self (e.g. Mead 1938). That attitude of the (generalized) other, which is common to the members of a society, is precisely one of those defining characteristics of society that is immanent in every member – as described in the introductory quotation that opens this section.

In this chapter, I present evidence of the phenomenon – oneself becoming another – in occasions where adults work together. Relations are even more formative in the early parts of a life-strand, where small children engage in play, where they act first in the role of one than in that of another person. At that time, the different roles are not yet integrated into a more firmly organized whole but the child instead is passing from one role to another. Children in this phase of their life-as-event not only come to take different roles but also begin to organize and orchestrate them into a performance and even stop the play to applaud themselves – thus controlling all aspects of the temporal performance. Children first experience the roles of others, much like Chris and Christina experienced what Cristo and Bridget were doing; and experiencing means that some qualities of the respective other were already on the inside. The result is that the person generally and the child specifically "becomes a generalized actor-manager, directing, applauding, and criticizing his own roles as well as those of others" (Mead 1938, 374). Adults, too, before important events, imagine the different forms that these could take and their roles and responses to different trajectories that the future event might take. An adult or child could not act in the different roles unless it already had the experience of the role in relations with others, that is, unless these roles were not already immanent in its own life-strand (experience). In the context of children, the next phase involves a passage to a life phase where games are important.

The particularity of games is that every move is determined by all other possible moves, that is, by the "rules of the game." The rules of the game imply that each participant is a generalized player in whose moves all other players and parts are presupposed. In plays and games, we thus witness "the formation of the child's personality in the life of the family, and of other groups in which the child finds himself" (Mead 1938, 375). Readers notice that Mead writes about the life of the family, not of the family-as-thing or condition. These events make sense in the way described when we think of the child in terms of a life-strand that interlaces with other life-strands and, in the process, is shaped just as much as others are shaped (with each child, parents become different). These interlacing strands make a nexus or family of events, as suggested in the quotation that opens this section. As the child is "assuming the roles of others, to which he has stimulated himself by his own conduct, he is organizing them into generalized attitudes and becomes a member of the family, of the school, and of his set" (375). For this reason, the child never is just learning, adopting, or trained in one aspect of a relation but both aspects are present in the way they are in the intersection of two events. As a result, for example, "we have to think of the individual, in fact, as trained in dominance–submission, not in either dominance *or* submission" (Bateson 1972/1987, 101). This is precisely what is involved in the learning of games where the rules are designed to enable the observability of the collective phenomenon.

In considering the quotations and the data provided here, we should not allow ourselves to succumb to the temptation and fall back into the person-as-thing ontology. In the transactional approach, we instead understand each person as event. Here, "our consciousness of the self-identity pervading our life-strand of occasions, is nothing other than knowledge of a special strand of unity within the general unity of nature" (Whitehead 1933, 241). In this manner, my life-as-event (a strand) relates to other life-strands also thought as events. When there are intersections between any two events, each carries within itself the marks of the encounter with the other; in other words, each is immanent in the other. In the transactional approach, an individual person-as-event never exists apart from other events. That lifeline always is intersected by other passages where it connects with other events. The lifeline thus is the ensemble of its relations with other lifelines (families of events). We might equivalently speak about experience, which is continuous (Dewey 1938) so that we all are forever emerging from experiential continua. The idea of the experiential continuum comes to make sense as soon as we think of nature in terms of its vector rather than scalar qualities. This vector structure leads us to understand that "the immanence of the past energizing in the present" (Whitehead 1933, 241). When Dewey writes about the "longitudinal and lateral aspects of experience" (Dewey 1938, 44), he does so because of the transactional perspective on life.

The evental perspective also comes to the fore when he writes about "life-space and life-durations" (Dewey 1938, 74), which come to be expanded with experience. When the relations are of shorter durational extent, the effect on the individual life-as-event may be small, even to the point of being unnoticeable. The importance of the empirical work from which the preceding fragments have been extracted lies in their role as documentary evidence of the shaping character of the relations with others. When the poet Rimbaud recognizes that he is another, then this bears testimony of the lasting nature of the relations with others, which bring about the continuing of the life-long event of oneself becoming another. Whereas this statement might appear strange, it does appropriately describe the individual from the transactional perspective: if we are always intersected by events and in relations with other lifelines, then we cannot think about the self as independent of the other. Ours is a relational Being, and in every word that we address to others for the purpose of affecting them we are already taking the perspective of the other onto our own conduct.

One important upshot of this approach to understanding the individual – personality, identity – is that we are forced to think about the society. Currently, both theoretically and practically, this is little if at all done, for example, in the case of deviant behavior. If personality is the ensemble of societal relations, then locking up individuals for robbery or murder will not rid us of that crime. We can no longer be satisfied with searching for the reasons of school shootings in a particularly deviant individual mind or in the genes of the perpetrator. Instead, the transactional approach forces us to take a hard look at our society as a whole. This does not mean that *society* is responsible for everything and that we thereby divest ourselves of the responsibility for our actions. But the approach does recognize that each person is an event in which all of society-as-event is reflected. In terms of the image provided in Chap. 2, each family of event represented in a thread manifests the larger cloth patterns as a whole, it is both shaped by and shaping the overall pattern.

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Chapter 11
Dissolution of the Body–Mind Problem

> As life is a character of events in a peculiar condition of organization, and "feeling" is a quality of life-forms marked by complexly mobile and discriminating responses, so "mind" is an added property assumed by a feeling creature, when it reaches that organized interaction with other living creatures which is language, communication. Then the qualities of feeling become significant of objective differences in external things and of episodes past and to come. This state of things in which qualitatively different feelings are not just had but are significant of objective differences, is mind. (Dewey 1929, 258)

In his last written texts and notebooks, Vygotsky noted the psychophysical problem as an issue that he needed to address in the future. He had recognized the intellectualism in his own early work, which he intended to overturn in his work to come. When he wrote that language is in practice consciousness for others and for the self, he actually had articulated the seed for an important part of a theory: consciousness exists not in some ideal immaterial netherworld but, in the form of language, is part of the everyday material world that we inhabit and thus is available. However, in his theoretical move from ideal word meanings to the existence of a sense-giving field – the accented visible but not the visible – Vygotsky still formulated a parallelist approach. In a note from late 1933 or early 1934, that is, only months before his death, Vygotsky recognized this parallelism: "Our analysis … was mistaken … there is no unity but rather parallelism and correspondence" (Vygotsky, in Zavershneva 2010, 49). George Herbert Mead (as Alfred North Whitehead), on the other hand, had already developed an approach that overcame the body–mind dualism and parallelism. He did so by making sure the theory of mind is consistent with evolution shaping the human species prior to the emergence of mind and culture, where mind (consciousness) and culture then constituted advantages to the survival of the species: "Man certainly arises in nature, and his experience is that which belongs to nature itself; this does away with the old dualism of the Renaissance" (Mead 1938, 642). John Dewey and Whitehead were fundamentally taken the same transactional approach to mind as Mead.

In this chapter, I exemplify how and why mind is a quality and perhaps structure of the human relationship between people and between people and the physical

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world. Consciousness, manifest in speaking to all those hearing, is but one of those strands that is part of a family of strands involving physical and biological processes. Those strands are events, and events are united, as seen in Chaps. 2 and 3, by the mutual immanence of one in the other person (e.g. when sounds-words are common). A strand also may be termed a nexus of events that are mutually immanent in each other, a conception that can be used equally well for understanding societies, persons, living organisms, substances, and enduring objects (Whitehead 1933). Mind is a quality of the relation between the organism understood as a nexus or family of events that is part of the observable transaction with its world – i.e. all the surrounding events cogredient in the same passage – rather than something that exists in addition as something unobservable: mind "is a property of a particular field of interacting events" (Dewey 1929, 262). This also means that we have to investigate relations of events for understanding human conduct, and such relations of events thus are the most appropriate objects of psychological knowledge. Failing to investigate events and their relations, we are unable to appropriately understand mind. If mind were not observable in the public forum, it would be a phenomenon accessible only through private introspection. Pragmatic philosophers committed to the transactional approach reject the conception of mind derived in this way, for observation itself would become unobservable – "sufficient evidence of departure from procedures having scientific standing" (Dewey and Bentley 1949/1999, 116). According to these philosophers, the depiction of mind as an isolate manifesting itself in psychological or physiological form can only be destructive to any sound effort of theorizing the phenomenon. There are indeed suggestions that the body–mind (psychophysical) dualism are of theorists' own making:

> The physical world is not merely physical, nor is it merely mental. Nor is it merely *one* with many subordinate phases. Nor it is merely a complete fact, in its essence static with the illusion of change. Wherever a vicious dualism appears, it is by reason of mistaking an abstraction for a final concrete fact. (Whitehead 1933, 244–245)

The psychophysical problem can be situated as having originated in ancient Greek thought, where a contrastive distinction was made between appearance and reality. In the course of its development, philosophical thought increasingly relied on visual perception as the basis of human experience. That reliance had the effect of separating mind, dependent on perception, and nature, reality outside of the mind. The first and perhaps most important culmination of this form of thought exists in Cartesian dualism. Also beginning in the Greek philosophical tradition is the focus on *things* at the expense of a focus on process, such as it appears in the philosophy of Heraclitus, for whom everything is flowing. "The idea that matter, life and mind represent separate kinds of Being is a doctrine that springs, as so many philosophic errors have sprung, from a *substantiation* of *eventual* functions" (Dewey 1929, 261). Other philosophers agree in suggesting that substantiation – though it allows a certain level of planning and control typical of technology – fails to describe the most characteristic quality of human existence: the event and the evental nature of its appropriation (Heidegger 2006). The result of such analyses is that Being, an event, is not reducible to beings, things abstracted from some occurrence of being.

Thus, if we really want grasp the relation between the *animate* body and mind, then we have to orient to describing them in evental terms. Here the emphasis is on the living, animate body, for to it the irreducible relation with the environment matters, whereas it does not for the purely physical body. For inanimate things, qualities such as red, warm, wet, light, or bright do not matter and may be disregarded in theorizing them. But in "life and mind they play an active role" and thus have to be taken into account "in the affairs under consideration" (Dewey 1929, 266). Indeed, the statement may be turned around as well to say that inanimate and animate bodies may be classified based on whether they *respond* to qualities, which the latter do in contrast to the former.

In the introductory quotation of this chapter, we find mind described as a phenomenon of *life*, which has the character of *events* organized in a particular manner, and *living* creatures. Complex life forms also have feelings, sense perceptions arising in the relation with the environing world; and these feelings are the condition for the added quality of the {organism | environment} relation that is called mind. Feelings also come in (non-sensual) intellectual, conceptual, and understanding types, which intersect with those of sensual (physical) nature to give rise to the hybrid forms that mark mundane life (Whitehead 1929/1978). Our actions in the world always arise from the intertwining of sensuous and non-sensuous feelings. A statement makes sense when it has become admitted to feeling. Feelings are a quality of experience, which cannot be thought outside the unity/identity of organism and environment. Dewey concludes that as soon as there is mind, the feelings, the sensations of a living physical organism, no longer simply are felt but also make sense. Importantly, those "qualities never were 'in' the organism; they always were qualities of interactions in which both extra-organic things and organisms partake" (Dewey 1929, 259).[1] For both Dewey and Gregory Bateson, any such qualities – whether in the relation between organism and environment or between two organisms of the same species (e.g. human beings) – are characteristic of the irreducible {organism | environment} relation in passage from one occasion into another, that is, of both the organism as much as of the thing or other organism.

Two further issues arise from the above-quoted, conceptually dense works: (a) the evental qualities of the theoretical phenomena characteristic of the transactional approach and (b) the association of mind with the relation among the living creatures themselves through communication generally and language specifically.

First, throughout the introductory quotation, Dewey emphasizes life, living organisms (e.g. "creatures"), and processes (e.g. "mobile responses"). This is important because feelings and mind are qualities of *life*, not qualities of a purely material nature. Feelings and mind have a function in the *life* of the organism not in the physical matter of which it is made; and, as part of life, they have evental quality. Once mind is recognized as a quality of material life-as-event rather than of material itself, then there no longer exists the possibility to separate body and mind. Mind is a quality that arose in the evolution of biologic al life as a whole, shaping the relation

[1] Instead of the term *inter*action, Dewey should have used the more appropriate one of *transaction,* which he preferred using a decade or so later (e.g. Dewey and Bentley 1949/1999).

of organism and environment. Once we move to consider mind as a particular form of event in the relationship between an organism and its environment – which may be a society, including an animal society – then it is easy (easier) to overcome our tendency to associate mind with the functioning of a computer.[2] Mind is a relation, which, as seen in Chaps. 2 and 3, is a form of event. Indeed, the body-mind problem arises out of a perspective that takes persons as self-identical things closed upon themselves (monads). This is an immediate consequence of the tenets of popular epistemology – the immanence of mind in the body or its transcendence of the body. If the idea of mind transcending matter is discarded, it immediately is assumed as immanent in the body-as-thing. But this alternative to transcendence is "unacceptable because large parts of the thinking network are located outside the body" (Bateson 1972/1987, 325). In other words, mind is a quality of the coming and going at the dynamic interface between self (inside) and other (outside) (Mikhailov 2001); and this interface it is not a thing but is itself an event of continuous birth in this very same coming and going.

Second, mind exists as the relation of relations – between people and things and people with other people – which is not theorized as thing but as event having events (rather than things) as its parts (see Chap. 4).[3] The performance analyzed below (Fragment 11.1) exhibits both of these evental qualities, that of the relation of people with people and that of the relation between people and things (materials used in a science laboratory task).

An Evental Account of Designing an Experiment

The preceding discussion highlights that to appropriately understand and appreciate human conduct, such as communicating and learning in school science classrooms, we have to move away from accounts grounded in an ontology of things (including persons with identities) and toward accounts that approach lessons as events. That is, we no longer theorize a lesson in terms of (a) things that move in time and space, (b) individuals who move those things according to thoughts in their minds, and (c) individuals as self-identical things that undergo change or change themselves because of some (external) force. An event is different at the beginning and its end; any duration is a passage from existing fact to novelty. We cannot therefore talk of a subject, such as the student Jessica appearing in the following case study, because the two snapshots taken of her at the beginning and end of the event would differ.[4]

[2] In the human situation, mind is sometimes thought of in terms of wetware rather than hardware in which the software operates.

[3] Apparently, this double relation between organisms and between organisms and their physical environment also exists among ravens, which take into account others and the natural world in their planning behavior (Boeckle and Clayton 2017).

[4] When the name "Jessica" is employed, it is to be understood as a family of events the historical unity of which is given by the continuity of experience in the continuous passage of subject into superject.

Thinking and the thought attributed to it are two different phenomena, the former an event and the latter an abstraction. But just as playing a film reel fast enough to create the illusion of movement, life does not return if we compare the two snapshot-things or if we invent forces that are said to have made the second from the first. Learning does not return if we think of it in terms of knowledge-before and knowledge-after, the differences having been caused by the curriculum or the curricular materials.

The materials for this case study come from a student-centered physics curriculum with a focus on static electricity. In that particular lesson, students were asked to explore electrostatic phenomena using materials provided, including wool, cotton, rods from different materials, and plastic transparency film. In our agent-centered language, we may gloss the following fragment in this way: Jessica proposes an investigation where a previously charged transparency film (turns 1–8) is held near a stream of water from a faucet (turns 9–12). The film can be used to attract the water (turn 13). In the repetition of the description, the right hand moves in vertical direction and then, as the transparency sheet in the left hand moves to the left, the finger-hand configuration of the right hand also moves to the left (turn 18).

The fragment can be thought of as involving four phases. In the first phase, the transparency is literally charged as the event has Jessica rubbing the film with a rod of a different material while bringing the event into the accented visible by saying that this is what is to be done. There is the beginning of a verbal description of what is to come next (turn 9). We then enter the second phase where the left hand holds the transparency film whereas the right hand faces the film with open palm (turn 11). In the next phase, the right hand with its open palm rests in place while the left hand with the transparency move to left (from the actor's perspective) while the event has her saying that it can be attracted. In the final phase, the right hand moves through a complex trajectory into a position where the index finger points down followed by the hand moving downward (turn 18). The right hand then turns to the left as the left together hand with the transparency. There are therefore two movements that initially are independent and then come to be coordinated. To allow readers a better sense of the assembly of the different movements into a single coordinated one in the last phase of the presentation, snapshots of the presentations are placed side-by-side (Fig. 11.1).

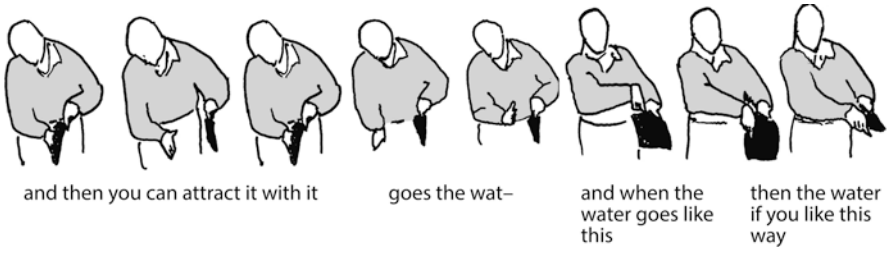


Fig. 11.1 Complete dynamic of the performance in which an experiment in which a stream of water dripping from a faucet is attracted sideways by means of a transparency sheet that had been electrostatically charged beforehand

Fragment 11.1

1 J: what you can also do
2 (0.7)
3 you can do it like this
4 (0.4)
5 like this,
6 (2.1)
7 °we've done this once in (?)°
8 (0.6)
9 <and you hold it to a water tap>

10 (1.3)
11 you hold it to a water tap
12 (0.3)

13 und then-en you can °attract it with it°
14 (0.7)

15 C: °do we hold [that?°
16 J: [goes] the wat–
17 (0.3)

18 <and when the water goes like this> then the water goes if you like this way.

It is quite apparent that if the words were to be read on their own, the phrases would make little sense. Any performance in the event presupposes knowing one's way around the world so that one can hear and see the right hand as "representing" the water flowing from a faucet, which is pulled by the charged transparency film. Indeed, the notion of performance much too easily orients us to the person at the expense of investigating the unity/identity of person and environment, both of which are theorized as being in passage (e.g. subject into superject).

Standard interpretations of those aspects of such events that can be attributed to the individual can be found in the literature on embodied cognition. But these often are about how certain schemas are bodily expressed and thus become embodied. A distinction thus is made between the schema and its expression; a similar spilt thus exists between a schema and its enaction. It is therefore not surprising when some philosophers point out that there are remnants of Cartesianism in embodiment and enactivist approaches. If there are (mental, sensorimotor) schemas and frameworks that seek and find expression in the body, then the Cartesian split has entered the discussion from the beginning. In other theoretical takes, the split is overcome in considering movement and its recurrence and the inherent feeling (e.g. Sheets-Johnstone 2011).

In my own earlier work, I thought of such situations in terms of individuals articulating some knowledge proper to them. The articulations include verbal and non-verbal qualities, such as hand, arm, and other body movements that contribute to the recipient's sense of having understood. Thus, I was describing such situations in terms of the gestures that allow students such as Jessica to "construct complex explanations even in the absence of scientific language. In this, gestures serve to represent aspects of the communicative content or to point to entities in the world that represent themselves" (Roth and Welzel 2001, 111). I thought that Jessica was having a more-or-less finished idea but had trouble putting it into the public forum. As the performance went on, the idea increasingly got expressed verbally so that the gestures presented redundant information and thus were of lesser importance later when increasing detail became available in the verbal modality. The existing literature in the learning sciences and psychology of gesturing supports such a reading – and therefore quite clearly manifests an intellectualist perspective.

To my defense I might say that in that particular study, I did in fact use at least one diagram that contained "event lines" "representing" the different levels of Jessica's proposal. It included entities and actions involved in the performance, and showed how these are coordinated in time. One line in the diagram consists of the words said and the gestures of each hand completed. Another line contains descriptions of the phenomena represented in words and gestures. In the narrative, the stream of water and the transparency film functioned as subjects that have effects on the world. These effects are also represented on specific event lines. When this is done, then one can note how the different event lines come to be filled as the event minimally described in Fragment 11.1 progresses. The problem with such presentations is apparent, for everything is reduced to verbal expressions. But what is to be seen in the communicative exchange analyzed also should be present in the evidence researchers present. Below I offer one approach for overcoming the limitations

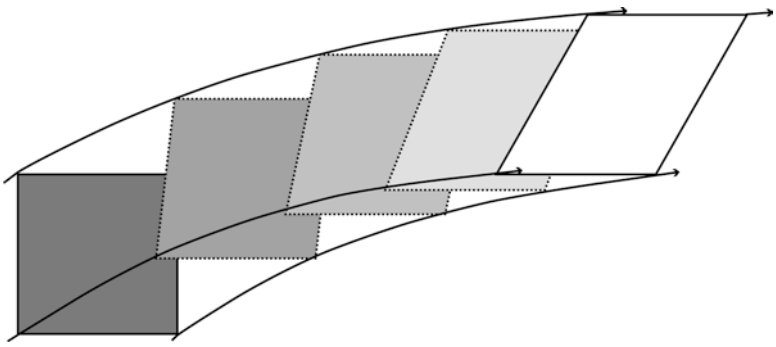


Fig. 11.2 Different photographs (cross-sections) are taken of a field of flow, yielding, in this analogy, a series of parallelograms. If we play these parallelograms quickly one after the other, only a semblance of movement would be created but not the original flow

that come with common forms of representing observational data (see Fig. 11.2 and associated discussion).

In the fragment considered here, we notice that there are also events involving physical things external to the body besides the talk and physical movements. Thus, the event has Jessica pinning the transparency film with her left hand against the tabletop while rubbing it using a plastic rod held in the other. In most theoretical approaches, we tend to abstract certain aspects of the overall event because of their "interest" to this or that discipline – educational science, educational psychology, or learning science. But whatever event has Jessica doing would not be possible if there were not a background of events that make possible the performance and against which the performance comes to stand out. That is, "the body inherits its physical conditions from the physical environment according to the physical laws. *There is thus a general continuity between human experience and physical occasions*" (Whitehead 1933, 244, emphasis added). It is not just that the body somehow is situated but that there is continuity between whatever is experienced and the physical world. In this transactional approach, the body itself is understood in terms of numerous strands of intersected events that together form families of events. There is no clear boundary between a body-box and whatever surrounds it. A living body has to breath, and breathing is an event that goes across the skin-determined boundary of the human being. Indeed, we may think of the very idea of a boundary as being defined by the coming and going of oxygen. As soon as we do so, the question of the boundary surfaces again with a vengeance: is the skin the boundary of the body or is it the surface in the lungs where the oxygen enters the blood stream? Similar questions are posed by the results of modern science, which show the role and importance of the gut microbial system to (a) the health of a person, (b) the degree to which cancer treatments do or do not work for a person, or (c) the enhancement or suppression of infections in other parts of the body.

When the event has Jessica return to the group with the materials that move in and as part of the performance, a certain excitement is noticeable in her comportment.

That is, affect may be noted. Such affect tends to be theorized in educational psychology as part of a system separate from the cognitive and practical qualities of behavior. A separation of the person into distinct components is thereby achieved, and many studies of learning do not address at all the question of affect and emotion. In the transactional approach, in which there is no separate physical body from immaterial (metaphysical) mind, the entire body is suffused with affect. The very idea of the concept of experience – especially in the form of perezhivanie [(emotional) experience] (Vygotskij 2001) – introduces affect to the {person | environment} relation in the unfolding of the occasion into its successor. The concept of a *continuity of experience* makes thematic that every present is made possible by past events, the conditions from which it arises and inherits something while introducing something new. In this passage, "sensitive nerves, the functionings of our viscera, disturbances in the composition of our blood, break in upon the dominant line of inheritance" (Whitehead 1933, 243). It is precisely in this way that affect arises in the form of emotions, hopes, fears, and inhibitions; and in this way sense perceptions arise as well. The living body thus can be understood as a complex family of events (occasions) intersecting with other events; and the effect of all of these events and intersection is the fusion of the body and mind, where the latter, qua thinking, is understood as but another event in the family characterizing any particular {person | environment} unit. Affect is a form of valuation integrated in every aspect of the material passage from past to future. It is also "overlaid by, and intermixed with, the novel hybrid prehensions derived from integration with the conceptual ferment" (Whitehead 1933, 210).

In the event under consideration, we notice something that after the fact looks and sounds like a break and passage into another phase. In the passage of turns 13 and 14, the left hand moved with the transparency to the left of the speaker. The words then states something about the water while the transparency and the palm of the right hand come to stand face to face, a movement out of which the right hand moves upward. It is at this point that the saying stops in mid-word. After a brief pause, the voice picks up again articulating what will have been a conditional phrase, in which water goes one way, accompanied by the right hand moves downward, followed by the implicative phrase that the water then moves in some way linked to the accompanying movement by means of an indexical term "this." We do not have access to any thinking, and the only fact that we have access to is whatever thought is articulated when everything is said and done. Some of the aspects that few researchers are interested in analyzing performances are the breaks that occur during the event of talking, any erasures, new beginnings, and similar phenomena. It turns out, however, that even the most experienced scientists and lecturers begin articulating what they have announced to be an idea they are having only to stop repeatedly during the performance, erasing what they have written or drawn on a chalkboard to begin anew, sometimes erasing this again before ultimately arriving at something that will stand and thus stand for the idea announced (e.g. Roth 2015). Why might this be the case?

The situation is difficult to capture in existing mainstream theoretical frameworks; and if attempts are made than it will be in terms of deficits or faulty

transmission from the location where the idea has been conceived to the instant that it has been communicated. The phenomenon of the Freudian slip is but one of the manifestations of this, as much commonsense as scientific approach. In the transactional approach that is concerned with events, *thought* – the content of thinking – is unavailable until the thinking is done much in the same way that the Said is unavailable until the Saying has ended. This is so because the percipient event, as shown in Chap. 2, is one occasion among many in the same duration. Some *thing* only exists as abstraction from an antecedent percipient event cogredient with the event perceived. The content of thinking therefore may be perceived (grasped) only after the thinking has come to an end. In normal exchanges, when participants do not articulate memorized and previously prepared text, there may be a vague sense of what is to be said: the germ cell of an idea. That initial situation is like the first note in a musical piece that we may have played or been sung before or that might be an impromptu composition (improvisation), which then unfolds with a dynamic of its own one note or cord at a time, one musical phrase after another. It is because of such dynamics that we do not remember individual notes – or, for that matter, that pilots do not remember abstracted parts from their standard operation procedures or why we remember many aspects of a place and previous events when we are near that place. But once the first note or cord sounds, what comes next already is called forth (even if we did not intend it, and thus, in the absence of our will as causal agent). The event unfolds with its own dynamics, which is not one of piecing elements (notes) together in seriation or addition. The thought is born in a process involving articulation – whatever the modality – paralleled by thinking. But that thinking does not grasp itself as thought. Thought is available to thinking only after the associated thinking has come to some form of closure. This is precisely what the phenomenon of stopping and restarting or stopping, erasing, and redrawing/rewriting points us to: the event itself provides everything required for discovering it, including on the part of the performer. This is also why thought relates to thought as a photographic image on a film reel relates to another photographic image. As a result, "that which becomes conscious exists in causal relations that are completely withheld from us – the sequence of thoughts, feelings, ideas in consciousness does not signify that this sequence is a causal sequence" (Nietzsche 1922, 36). Consider the analogy of a flow, which, when photographed, yields a series of images in the form of differing parallelograms (Fig. 11.2). Each photograph corresponds to one of Nietzsche's thoughts, feelings, or ideas in consciousness. If these photographs were mounted to give a movie reel, its projection would create the impression that the original parallelogram (dark square on the left) changes into the parallelogram on the far right. But this movement is not that of the flow – mistaking the two is precisely the cinematographic fallacy described in Chap. 2 (Bergson 1908). *Thinking* cannot be recovered from the sequential consideration of thoughts in the same way that the evolution of the novel genre cannot be recovered from considering novels (Bakhtin 1981), which are but manifestations a continual social, cultural, and linguistic flow. It is here again that the transactional approach with its focus on events exhibits its advantage: a phase of an event arises from another phase without having been caused by what comes earlier is part of the constitution of what comes later.

Thought – the snapshot of an unfolding event – does not govern (cause) action – another snapshot – in the same way that one of the forms in Fig. 11.2 does not cause the shape of the form that follows. This idea may appear strange, and there are certainly many who have struggled with the observations made among engineers and scientists showing that plans do not *determine* or *cause* the actions that follow (Roth 2009; Suchman 2007). Cyberneticists have pointed out before that "in no system which shows mental characteristics can any part have unilateral control over the whole. The mental characteristics of the system are immanent, not in some part, but in the system as a whole" (Bateson 1972/1987, 322). The temporal characteristics of a complex system are such that any governor is determined as much as it determines the remainder of the system. In the occasion analyzed here, we cannot theorize Jessica or her mind as the causal origin of the thought, for in part the event has her finding any thought in the passage from the beginning to the end of her formulating it. This explains the observation of a repeated and refined though in which the earlier one relates to the subsequent one as the different parallelograms in our analogy (Fig. 11.2). If everything had been expressed, repeat performance would make little sense. We can therefore say that where the phrase "goes the wat–" is heading is discoverable in the initial orientation and the associated movement of the right hand, which, in moving, is equally revealing as to where it is heading. It is only when that heading is available that it can be stopped and that it can be corrected or elaborated upon in a new performance arising out of the old. Even the recognition that the preceding phase was stopped in its track is possible only after the fact when the next phase is completed. It is with this completed form as the backdrop that the preceding two phases – turns 11–14 and turn 16 – appear to be less developed (i.e. like an earlier to a later form in Fig. 11.2). But from the evental perspective, these preceding events are but phases in the larger event (i.e. the flow entering Fig. 11.2 on the left and leaving it on the right), being part of its conditions and therefore inseparable from the achieved performance content.

In the evental approach, this phenomenon is understood in relation to experience, which inherently occurs as the passage from immediate past to the immediate future. The future is not *causally* determined by the present, though it is understood as immanent in the present. That future is understood in terms of "the process of self-completion of each individual actual occasion" (Whitehead 1933, 247). There is thus passage from a recurrence of the past (e.g. a particularly formed parallelogram) to an anticipation of self-completion (satisfaction). In that passage, novelty emerges making whatever we might abstract from its beginning (e.g. Jessica's self, identity) is different from what we may abstract at its end. As the performance under consideration moves from the beginning of turn 16 to its end, its content is precisely what becomes available as novelty. This is the first part of the micro-event out of which the stopping arises, which then becomes the condition in which the restart is born, giving rise to the final phase of the performance in which the water flow and its deviation from the vertical is achieved in the accompanying movement of the transparency sheet away from the falling water stream.

The event itself is part of a response, the first phase of which involved events of orientation, perception, and comprehension. The event is contiguous not only in

temporal terms – which essentially means that there is a continuity of experience in which the performance is but a phase – but also in spatial terms. It is immediately apparent that the inclusion of the materials that are to be seen to grasp the content of the event – which is not reducible to the body and voice of Jessica alone – leads to spatial contiguity. This is so because of the particular movement trajectory of the transparency film from before the beginning of the lesson fragment to its end. But what we might ascribe as performance to Jessica is not for itself. Instead, the performative event is only part of a communicative event involving Jessica and her three group mates. That even itself is nested within the lesson, nested within schooling, nested within society, and so on all of which are happening simultaneously and in the same slab of passage. Whatever Jessica is doing is *for* the group mates, who, thus, are immanent in the doing. In being for the others, the perspective of these others already is immanent in the event, for it aims at making for conditions that lead into other events. As seen in Chap. 10, the attitude toward the generalized other is precisely the common form inherent in every member of the nexus that defines the society. For example, what the event has Jessica doing could have occasioned the group to move to the faucets in this science laboratory and to see whether they can make the experiment work, to test the proposed configuration, to refute the hypothesis that a charged transparency film can make a stream of water move sideways, or to find out about the conditions that make or break the phenomenon.

Moving Toward a Transactional Approach of Analysis

In Chap. 1 I show that when transcriptions and analyses make use of words only and omit all information about the actual production of communication, they lend themselves to support constructivist and cognitivist arguments making claims about stable knowledge (structures) in the mind somehow abstracted from the physical world. As soon as gestures and other perceptual aspects are included, for example, as soon as they are rendered in verbal terms, they no longer constitute incarnate qualities of life. Aspects of a situation that make sense because they are available to the senses have been reduced to verbal consciousness that did not exist in the occasion. Thus, the discourse of sensorimotor schemas does not get us any further because it is consistent with theoretical positions that make mind a metaphysical entity to the point that there is nothing outside (verbal) understanding. Because “the presuppositions of the Kantian ontology remain closed to the being of life” (Henry 2003, 45), no account of knowing based on material and conceptual *things* can capture the essence of a transactional approach.

Sequential Analysis of Turn Taking

The constructivist inferences from word-things pointing to meaning-things – as exemplified in in Chap. 1 – are incompatible with any transactional theory of human conduct, including the dimensions of thinking and speaking. Rather than focusing on thought and word, we theorize human conduct in terms of events, including thinking, speaking, and their evolving relation that occurs at their intersection. Thus, from such a perspective we have to take transcriptions such as those appearing in Chap. 1 as pertaining to events, the extensional properties of which issue into temporal and spatial relations (Whitehead 1919). In such a theory, speaking may be thought of as part of a family of events in which various biological processes together give rise to the sounds we hear. As bodily event, speaking intersects with other bodily events that together give rise to feeling. Feelings therefore also manifest themselves in speaking to such an extent that we learn to attribute specific emotions to speakers. As speaking unfolds, so do gestural movements; and speech and gesture intersect and are immanent in each other in the same way as this has been said about speaking and thinking (Vygotsky 1987). As an extension to what appears in Chap. 3, I present and discuss here a form of transcribing conversations that lends itself to viewing thinking, speaking, and their relations as events.

The sequential analysis of turn taking typical of the conversation analytic approach is grounded in a history of ideas of language philosophy that what matters to understand language are not "meanings" but the ways in which words are used. Subsequent developments in language philosophy focused on a speech act that consists of three parts: *locution, illocution*, and *perlocution*. Locution refers to the act of saying something, illocution to the intent (asking, ordering, responding), and perlocution to the effect. In any concrete analysis, the effect that a locution has on others in the setting is available only in and through their subsequent acts. Consequently, to understand a speech act, researchers have to take the *turn pair* as the minimal unit of analysis. That is, it is no longer possible to attribute speech to an individual because a speech act inherently is spread across multiple participants, across speakers and their audiences. This is consistent with a conceptualization of discourse in which any utterance straddles speaker and listener, where any word – spoken for the benefit of another – belongs to both speaker and listener (Chap. 3). This way of approaching transcription and its interpretation therefore focuses on understanding conversation as unfolding event among events, as something living and lived, rather than on purported structures of individual minds whose contributions to the conversation are independent of (and external to) those of others.

I begin this analytic take by presenting again Fragment 1.2 in an augmented way typical of conversation analysis augmented by information provided in Chap. 5. This transcription form includes all the sounds produced, pauses, hesitations, respiration, prosodic information, and emphases (Fragment 11.2). In the fragment from

a mathematics lesson in a second-grade classroom, Melissa replies to a question arising from her claim that the mystery object in a shoebox, which can only be felt by the hand but not seen, is a cube. Notice how Fragment 11.2 adds features that were not present in the transcription provided in Chap. 1. For example, pauses within speaking turns and between speaking turns are measured and indicated to one tenth of a second. The transcription also marks emphases (capitalization), partial sounds ("sti"), mispronunciations ("kjob"), extended sounds (colons), and trends of the pitch (punctuation). It renders aspects of speaking as it actually unfolds; that is, it contains the mumbles, stumbles, stutters, breathings, malapropisms, metaphors, and tics characteristic of everyday speech. In those instances where visual information is relevant, screen prints or drawings are imported into the transcription or provided in an accompanying figure (see below). The precise timing of the visual information with the speech is indicated in the transcription.

Fragment 11.2

1	M:	((*pulls rH out of box, pushes it away*)) I sti– (0.2) I s::till think that there=s=a cube.
2		(1.7)
3	S:	((*picks the box, turns it, reaches in*)) let me check.
4	L:	why do you think its a kjob (.) cube.
5		(0.2)
6	M:	CAUSE its (0.3) the SAME ((*turns cube and has caliper grip with thumb/index*))
7		(1.2)
8	M:	its the sa::me shape.
9		(1.6)
10	S:	WHAT i:s it; ((*reaches into the box*))

Melissa's turn is the first part of what turns out to be two turn pairs. Sylvia gets to say, "Let me check," which allows us to hear the pair of turns as a {constative | verification} speech act pair. In fact, Sylvia not only comes to say "let me check," but also pulls the shoebox closer and sticks her hand into it. Her verbal articulation is a *formulation* of the action: Sylvia's hand reaches into the box and her voice formulates for others what she is doing, that is, it articulates an *intention*. This makes explicit and available to the audience a verbal description of an illocutionary act – it is thus available in the public arena where any individual unfamiliar with that completion of a turn pair could learn it. Reaching into the box is formulated as an action that has the intention of checking what is in there. Because of the pairing of turns, the checking is heard with respect to the constative "it is a cube."

The second turn pair exists in the sequence with Lillian (research assistant). We can hear turn 1 and turn 4 to be snapshots from a sequence, because the locution "Why do you think it is a cube" picks up on and repeats what Melissa as saying. The interrogative adverb "why" is articulated with emphasis allows us to hear a {consta-

tive | request-for-justification} speech act: "I still think it is a cube" is followed by "Why do you think it is a cube?" This hearing is consistent with the next turn sequence, which we can hear as a {query | reply} pair: "Why do you think it is a cube" is followed by a coordinating conjunction "[be]cause," which introduces a reason, "like the same … it's the same shape."

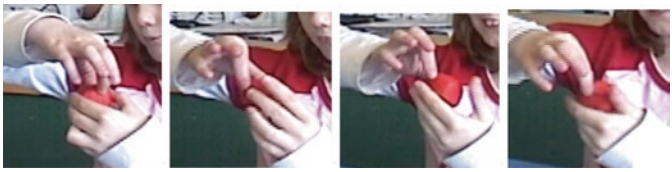
This form of transcription in the hands of conversation analytically informed researchers, therefore, allows readings that focus on the unfolding nature of the event. The ending of a turn pair is the beginning of the one into which it passes. The members to the setting fill the slots that a social action (realized here as a turn pair) provides. Strictly speaking, such a form of analysis is interested in the social, though in practice, many analysts of conversation reduce the turn sequence to individual action (e.g. in the case of research investigation the initiation-reply-evaluation or IRE pattern). We instead focus on analyzing pairs of turns, that is, on the effect a locution has on the other participants as their actions make it available to everyone else. Our interest is the sequential enchainment of locutions (utterances), where turn pairs, which are social processes, constitute the minimal unit. The point of the analysis is to reveal the inner dynamic of the *conversation*, which is a social phenomenon sui generis and must not be reduced to the addition or seriation of individual contributions. This kind of analysis is *process oriented*, allowing us to understand the constitution of this segment.

Strictly speaking analysts using this method cannot take recourse to processes that are not available in public – including thinking, conceptual frameworks, or meanings. When there are phrases such as "I still think" and "Why do you think?," then these are taken to be everyday ways of reasoning where psychological concepts are invoked for the purposes at hand. The "I think" in turn 1 is taken to be a formulation of the work that has been done, and turn 4 is taking up the self-description as a way of referring to the same work description. It is not the researcher who imputes thought processes – as in Chap. 1 where researchers impute conception- and meaning-things – but it is one of those ongoing descriptions that participants provide to articulate the situation together and *for one another* with the content. Here, the content is the nature of the model Melissa has built, and its relation to the mystery object. It is the situation itself that suggests the use of the "thinking" as a description and the available language form to describe what she has been doing is that she is "thinking." An alternative might have been to say, "I feel it to be a cube" or "I believe it to be a cube."

In this transcript, because the gestures are described in words, the girls' parts in the communication comes to be evaluated purely in terms of the linguistic sense ("meaning") that researchers attribute to them. In classical conversation analysis, gestures were not attended to – in part because the research was based on audiotaped conversations on the telephone. But many analyses now include precise studies of body movements. In my own work on the role of symbolic body movements (gestures), I precisely coordinated information about gestures with speech. Consider Fragment 11.3, which presents an augmented version of turn 6.

Fragment 11.3

6 M: CAUSE its (0.31) the



SAME | (0.7) | (0.5) | its the | sa::me shape.

In this transcript, photographs are taken during the rotation of the cube held in the left hand and an associated movement of the right hand, the thumb and index finger of which grab the plasticine "cube." The transcription clearly shows that three bodily configurations precede the articulation of the predicate "it's the same shape," and the fourth configuration also precedes the second, key part of the predicate "same shape." This part is further of interest, as the word "same" is drawn out, which can be heard as an emphasis or as a delay in the speaking event.

In this instance, the hand movements may actually not be purely symbolic. The left hand holds the cube rather than gesturing a cube, and the right hand produces a configuration that is applied with little change to the cube that turns underneath it. The situation does not symbolically represent the events that have occurred just seconds before while the event has Melissa with her right hand in the shoebox, but her left hand outside. We do not know what happened inside the shoebox, how and even whether the mystery object has been turned. This is of particular importance later given that the mystery object turns out not to be a cube. But in the present instance, the configuration is repeatedly applied to the different dimensions (*x, y, z*) of the plasticine model ("cube"). The configuration, therefore, especially when it occurs the first time, constitutes the articulation of an epistemic movement designed to "check the faces."

The transcription in Fragment 11.2 exhibits temporal features characteristic of verbal exchanges; it also features some of the details of the actual production of communication, including hesitations, false starts, emphases, and so on. This type of transcription lends itself to transactional theories that include temporal features between thinking and speaking and to theories that focus on the passing nature of human life and its continually unfolding nature where subsequent phases are unavailable to the actors. Moreover, theories that take the actor perspective on social events find such transcription useful, as these contain implicit and explicit information that participants use in the pragmatic conduct of social events. A danger is still looming, however, in that analysts focus on the *inter*action between speakers that take the turns rather than focusing on the irreducible transactional relation that is inherently social. Most languages lead us there, for they represent the world of events in grammatical forms based on subject, verb, and object. It is that transformation that reduces the transactional world into an interactional one (Ricœur 1986); and it turns a world of events into one of things (Bergson 1908; Nietzsche 1922). In

the transactional approach, it is not just the sequencing that is important but that participants act simultaneously and sequentially *toward* and *for* each other, thus making the social phenomenon happen before any interpretation or construction. Because doing, feeling, and experiencing are evental in nature, the adjective *social* means that there are intersections that make them immanent in one another – spatially or temporally speaking. Considerations are specified in the next subsection for a truly transactional take that overcomes the mind–body dichotomy in regard to phenomena of interest to the educational psychologist.

The Transactional Analysis

Recent developments in philosophy and sociology (of emotions) focus on temporality, periodicity, and resonance as fundamental phenomena for the constitution of (common) sense. Temporal phenomena such as the increasing alignment of prosody across speakers within turn pairs are evidenced in Chap. 10. Such research shows that pitch levels are not aligned in situations where interlocutors have conceptual disagreement and conflict; and there are pitch-level, pitch-contour, and cross-modal rhythmic alignments that are shared by those who are part of what is happening when and where. In the transactional approach, rhythm is an important phenomenon because the "essence of rhythm is the fusion of sameness and novelty, so that the whole never loses the essential unity of the pattern, while the parts exhibit the contrast arising from the novelty of their detail" (Whitehead 1919, 198). Rhythm thus has the essential quality of passage. In the sociology of emotion, such rhythmic alignments are sources of emotional alignment and a sense of solidarity. Alignment, though difficult to theorize in the self-actional and interactional approaches, makes immediate sense in the transactional approach that takes events as the analytic and theoretical units of interest. Here, persons are understood in terms of families of events that come to be intersected by events they have in common; such intersections also make the different persons immanent in each other (Whitehead 1933). The occasion as a whole is a macro-event in which particular qualities resonate in all its cogredient events (including people); and this therefore also includes the physical environment (objects, artifacts, tools). This relation between the whole and its parts exists because the "qualities characteristic of sentiency are qualities *of* cosmic events" (Dewey 1929, 267). To do justice to phenomena of interest to educational psychology, therefore, requires us to attend to the transactional constitution of the world generally and that of the {person | environment} unit specifically. As Dewey suggests, we do not make progress toward a solution of the psychophysical problem unless we revise our assumptions about existence (Being).

In my recent studies of knowing and learning, I show the importance of the incarnate qualities of human conduct that appear in speaking and moving, which therefore have to appear in transactional accounts (e.g. Fig. 11.3). Pitch and rhythm are of interest because speakers are not conscious of it. They are therefore *direct* relations between environment and person; this relation is not the result of an

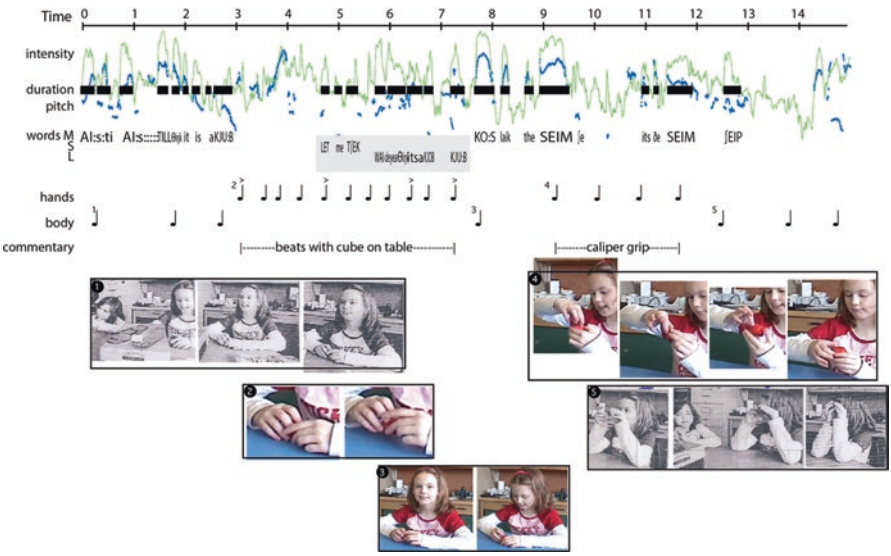


Fig. 11.3 An evental perspective on the performance mathematics functions like a musical score (representation developed together with Alfredo Bautista)

interpretation. Similar relations hold for speech intensity, though under certain circumstances speakers are conscious of their speech intensity and increase or decrease their volume. In contrast, as part of outbursts of anger, they do not voluntarily control speech intensity. Because these then are non-conscious features of communication, they cannot be theorized in the same way as verbal consciousness. Speaking and verbal thinking are but two of those evental (families of) strands that make a person; but they do not *causally* determine all the other strands cogredient in any duration of interest. Transcriptions including these features therefore lend themselves to analyses accompanying the transactional assumptions about existence. A more extensive, though still limited and limiting transcription would include sufficient information to allow performing the situation of interest. Doing so would give the investigator a *feel* for what has happened, a feel that cannot be had when only words are provided. Readers may thus treat the revised transcript (Fig. 11.3) as a graphic musical score: an occasion for playing a particular tune in a particular way given a blend of conventional and unconventional notational means.[5] In this way, the rate and total time of playing themselves become performative aspects. As a result, readers will *feel* the type of knowing perceived when they perform the transcript rather than merely look at and read it. In this way, we conform with the philosophical insight that "I have no means of knowing the human body other than that of living it, which means taking up on my own account the *drama* which is being played out in it, and losing myself in it" (Merleau-Ponty 1945, 231, emphasis

[5] For a variety of examples of graphical notations in music see this website of the UK music station Classic *f*M: http://www.classicfm.com/discover-music/latest/graphic-scores-art-music-pictures/.

added). It is the role of drama as psychological theory that I take up in Chap. 12. Any concrete psychological understanding the human body and psyche, emotions and consciousness that goes with them, will be dramatic in nature (Vygotsky 1989). It is in the drama of the actual performance that we counter "the reflective movement that detaches subject and object from each other, and which gives us only the thought of the body, or the body as an idea, and not the experience of the body or the body in reality" (Merleau-Ponty 1945, 231). The experience is important here, as it makes for an inherent connection between person and environment, for having an experience implies an environment. When we take the representation of the event involving Melissa (Fig. 11.3) as a script or score for a dramatic performance, then we may take up on our own accounts the drama. We are no longer verbally representing and theorizing the event from a remove but, in playing it out, we may lose ourselves in the drama and feel it in and through our bodies.

As can be observed, this revised transcription does make use of information that is presented in the preceding types of inscriptions (e.g. words). In addition, the transcription directly maps the sound (phonemes), using the conventions of the International Phonetics Association, onto the prosodic information. Because the phonemes are directly mapped against the prosodic information, changing speech rates, emphases, and rhythms also become observable.[6] As in a musical score, the melodic line (pitch) and changes in intensity – indicated in such musical terms as piano, pianissimo, forte, or diminuendo) – are given quantitative expression. In addition to the coordination of visual information already present in the augmented Fragment 10.2, these now are associated with the information about repeat patterns. This, therefore, allows exhibiting the rhythmic aspects of a performance, which also would be available in a musical score.

The resulting transcription (Fig. 11.3) exhibits some striking differences with respect to those appearing in Fragment 1.2 and Fragment 11.2. First, it makes explicit the temporality of the occurrence. Speech not only exists *in* time – viewed as a prior to experience – but also it makes time as sound-words, phonemes, and even individual letters are drawn out or speed up with respect to each other. There are pauses; and there are intensities that punctuate what is being said. Speaking now is presented as a durational and rhythmic event. For example, in the sounds that come from Melissa's mouth, one can hear stresses "I," "still," "cube," "cos," "same," "same," and "shape." These stresses or emphases with the interspersed more rapid deliveries punctuate the phrase as it unfolds. They give the phrase its specific rhythmic quality, and therefore also is affective tone. Hearing and perceiving the performance is not passive at all, for not only does concrete listening involve a very different form of consciousness but also perceiving actually means producing the rhythm (Abraham 1995). Actually, in turn 4 the sound-words run together making out of "do you think it's a cube" one single sound complex (Fig. 11.3).

We note that the pitch moves up and down, sometimes producing spikes with individual words (e.g. "cos," "like," "same") and producing overall tendencies (e.g. the pitch drops with the production of "still think it is a cube." Such information is

[6] This representation was developed in collaboration with Alfredo Bautista.

important because, as seen in Chap. 10, it can contribute to the sense of the performance. In conflict, the pitch levels tend to rise, each speaker "trumping" over the preceding one so that both may be speaking with pitch levels three to four times higher than their normal pitch. Speech volume, too, contributes to the way we understand what and how someone else speaks, as interaction participants tend to hear much louder than normal speech as "shouting," in many situations treated as a manifestation of anger. Much lower than normal speech volume, in the case of a student who also speaks slowly, may be felt as an expression of timidity, not knowing the answer, or as a tentative exploration of ideas. Teachers use such feelings routinely in their assessments of teaching. Yet at present, research in educational psychology does not account for these corporeal features.

The transcript includes visual information similar to the one we presented in the preceding subsection. For example, the fourth image sequence exhibits the same four hand/finger configurations introduced previously. Here, however, I also mark with a "♩" on the temporal axis the precise instant when the configuration is happening. The musical notation exhibits the highly rhythmic feature of the gestural movements. That is, the four configurations that exhibit mathematical features – sameness of the length of the edges – occur in a highly rhythmic fashion. This then constitutes a very different manifestation of sameness across the dimensions. Importantly, that rhythm is not independent of the conceptual issues or the actual cube. A comparison with the sound-words shows that the first gestural beat (i.e. a corporeal event) falls together with the emphasized "same" (a physical sound and intellectual event). The second beat falls at the beginning of the pause, which in speech, as in music, is an important and constitutive feature of what and how we hear in any given situation (e.g. hesitation or uncertainty). The third gestural beat coincides with the restart of the verbal "melody." The forth and final beat falls on the second "same." We might expect another beat corresponding to the verbal production of "shape." But, as the score shows in the change of the animate configuration where the gaze (heretofore exclusively oriented to the hands and cube) now is raised to meet that of Lillian, the person who has initiated the justification that has just ended forthcoming. Melissa then turns to gaze at Jane, and finally appears to complete her presentation by enclosing her cube in a gathering movement that also brings the elbows close together. This, therefore, constitutes a continuation of the rhythm but in a different modality, that is, on a different "stave" of this graphical score of communication that is an irreducible part of a mathematics lesson.

Returning to the beginning of the transcription, we note that the changing orientations constitute a rhythmic phenomenon as the event has Melissa orienting toward the cube then to others and finally back to her cube (Fig. 11.3, image sequences 1, 3, and 5). Between these sequences there are long pauses on the stave reserved for the voice. The second of these "pauses," as shown above, occurs when Melissa rhythmically produces the four movements that constitute an integral aspect of the articulation of a justification (which would not be a justification unless it involved the other). The first "pause" in the shift of orientation is associated with pausing speech. There is a long duration out of Sylvia comes to announce that she is going to check, followed in turn by the articulation of a request for a reason. During this

speaking pause, when the plasticine model in Melissa's hand hits the table repeatedly (in the sound wave, there are spikes that mark the precise instant that the cube hits the table). As the graphical score shows (Fig. 11.3), there is a perceivable rhythmic beat in the event. Not only is this event rhythmic, but also the transcription shows that the beats fall together with the beats in Sylvia's voice. Moreover, it coincides with the beginnings of the major segments in the sounds coming from the mouth of Lillian (i.e. where she says "deya [do you]," "it's a," "kjob," and "cube"). That is, the same rhythm can be perceived across the three participants. We therefore notice a resonance phenomenon that requires a systemic unit in which all these are seen as constitutive parts; and the whole manifests itself in each part. Because perception of rhythm means production of rhythm, all of these features produce the rhythm as a social phenomenon in a strong sense. It is not that there is one self-acting subject followed by another self-acting subject to yield an interaction. Instead, the rhythm is performed on the part of speakers and recipients, who thus resonate in the phenomenon together – much like the music from a band or orchestra is a phenomenon sui generis that comes together because each player not only is agential subject but also subject and subjected to the whole. We see the same phenomenon in the chemistry lesson of Chap. 10, where the rhythm is observed across the participants in the lesson. It is not that the same beat occurs by chance. Changes in the speaker's rhythm reflect changes in the field of intersecting events that constitutes mind and the background against which conduct make sense (Dewey 1929). The perception of beat is a form of active resonance, which both allows for the observed alignment and the occurrence of this alignment. The rhythmic aspects together with the prosody emphasize ritualistic aspects of human conduct. Sense is a resonance phenomenon enabled by the field of intersecting events cannot be reduced to words or other non-verbal means of expression. The ritualistic movements also manifest those events of the animate body that we come to know as affect and emotion.

Readers unfamiliar with such analyses might ask why this is important. It is because these changes in rate and intensity are associated with what we hear as main and subsidiary clauses of a sentence (cf. Roth 2014). Whether something is a main or subsidiary clause, that is, how intellectual-conceptual issues are heard, entirely depends on physical phenomena describable in terms of pauses, pitches, pitch contours, speech intensities, and so on. Thus, the material aspects of speaking, which appear to have nothing at all to do with the content knowledge – e.g. they do not appear in subject matter textbooks – nevertheless are integral and irreducible aspects of communication and the practice of the subject matter. That is, the difference between subject matter content and purely material and performative dimensions of communicative events is undecidable. They constitute one and the same phenomenon. A distinction between the corporeal and the mental becomes impossible.

At this point we also see where the transactional approach takes us in a different direction from that in which embodiment and enactivist theories are headed. For example, the mathematics seen in Melissa's performance and required for seeing the performance as mathematical is not *embodied* because corporeal gestures

(hands, hand/arm, other body parts) exhibit logical structures that are also or alternately expressed in words. There are no (mental) schemas that somehow seek corporeal expression to make themselves available to other individuals. From the transactional perspective, there is a family of events that constitutes a unitary performance as a quality of a unit transcending the person. Recurrence does not require an outside source, like a non-physical mental schema causing a particular bodily movement or speaking. The movement unfolds in itself, and any recurrence results from recognizing characteristics that have become habitual (Maine de Biran 1841; Whitehead 1919). Whatever concept-things might be abstracted from the different events – e.g. speaking and gesturing – may or may appear contradictory. What matters is not the performance of a person but the occasion as a whole, which includes all the other participants and material phenomena. In this, any two events are irreducible to each other: they are relating if they are intersecting and, in so doing, are becoming immanent in each other. This irreducibility of linguistic (mental) features and purely corporeal qualities (prosody, rhythm, bodily gestures) makes sense within the evental approach of the transactional take. We thus avoid following all those philosophical traditions that set themselves up for the error I noted above, that is, creating a gap between body and mind by substantiating evental functions.

To get closer to the transactional approach, we must not just read a transcription as this normally is done. A transcription has to be more than *comprehended*. As suggested above, knowing the human body means living it, which requires analysts to take up on their own account the drama that has played itself out in the occasion of interest. This is similar to cooking: we do not know a recipe if we memorize ingredients and verbal descriptions of what to do with them. Instead, we have to actually do the work of which the recipe is taken as a gloss. The transcription then relates to the performative of an occasion as a cookbook recipe relates to cooking or in the way a musical score relates to a musical performance. That is, to really feel the knowing and understanding of the occasion analyzed, readers need to perform according to the graphical score provided (Fig. 11.3). Only by performing an occasion do we come closer to the sense of what it means to be in the occasion rather than disengaged objective observers who, as the spectators and journalists of sports events always seem to know better than the athletes themselves.

Walking the Walk on the Unity of Body and Mind

In my career, I have heard a lot of talk about the embodied nature of cognition but eventually came to the conclusion that it was all talk. Little of the talk reflected how speakers understood themselves in everyday life. It is just another form of the Cartesian split, now enhanced by talk about how the body enacts some schema or how some aspect of thought comes to express itself in the body and thus may be qualified as being embodied. Pretty well every philosopher who gives primacy to the event rejects the contention that there is a causal relation between thought and the action that follows; indeed, the very notion of action attributed to a subject is

suspicious because the abstraction already has occurred (e.g. Nietzsche 1922; Ricœur 1986). An interesting way of considering these issues is provided in the context of the analysis of how complex systems work, such as steam engines and their governors. Complete control of the system by the governor would be possible only if the latter were outside of the system. But when it is considered to be an integral part of the system, everything changes. When we follow what happens in a complex system, we notice that what happens in one part has consequences for what happens in another part and so on until the path leads us back to the governor. What the governor does, therefore, depends on what else happens in the system; and what happens elsewhere in the system depends on the governor. The result is that "the stability of the system … depends on the relation between the operational product of all the transformation of difference around the circuit and upon this characteristic time. The '*governor*' *has no control over these factors*" (Bateson 1972/1987, 322, emphasis added). I already quote Bateson's conclusion above: any *mental characteristic of a dynamic system is immanent in the systemic whole*. With respect to humans, we can therefore say that mind is immanent in the larger {person | environment} system. Indeed, mind is integral part of the {person | environment} relation, possible only in the continual coming and going in the event intersecting both. In the present chapter I show how an analysis consistent with this epistemological take operates and what kind of analyses will result.

There are other theoretical approaches that have alerted the scholarly communities to the need to analyze conduct in terms of the person plus environment system – e.g. that theoretical take referred to as *enactivism*. However, an important shortcoming of the ways in which these approaches are applied always approaches the system in terms of the relation of things: person-thing and environment-thing. When analysts talk about the *affordance* of some artifact- or tool-sign, then an attribution of a characteristic is made to the environment rather than to the system. One of the purposes of the present book is to shift the discourse from a focus on things to a focus on events. In Chap. 3, I already propose several categories appropriate in the approach. Categories such as *responding* and *corresponding* are appropriate because they do not reduce the relation between (families of) events to independent things somehow brought into a relation by means of mediators external to those parts that are to be combined. In Chap. 9, I present a way of writing about learning events without attributing any causes of change to students or teachers.

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Chapter 12
Dramatic Psychology

> Through speech a person dramatically identifies himself with potential acts and deeds; he plays many rôles, not in successive stages of life but in a contemporaneously enacted drama. Thus mind emerges. (Dewey 1929, 170)

Life generally, and school life specifically, is essentially dramatic. We never quite know what is happening next. This makes it necessary to theorize psychology in ways that the unforeseen may occur at any instant. Some of psychologists and philosophers that I am drawing throughout this book have recognized this need and therefore introduced in their theories the continued emergence, novelty, and creativity of passage and in the specious present. In Chap. 11, I provide a quotation stating the philosophical insight that we have no means of knowing the human body other than that of living it, which also means taking up on our own accounts the dramas that play themselves out in it and losing ourselves in it (Merleau-Ponty 1945). If mind and body are one, then psychologists may just as well theorize relevant educational phenomena in terms of drama that play themselves out in the body. I begin with an account of an event in my own teaching experience, which was dramatic in the common understanding of the term.

In early 2017, I happened to connect via email with Duane, who had been a student in my computer science class some 31 years earlier. In a variety of educational contexts, I had told stories about several events involving him when the conversation at hand concerned difficult-to-teach students. Duane, too, seemed to have talked about me over the course of the 31 years: "I've spoken of you often over the years," he wrote, "whenever people tell stories about cool teachers they've had." Although Duane was known to be trouble in school, was kicked out of many classes, and had been suspended from school at times, he and I were part of a very good relation. Duane did well in my classes, and he got hooked enough on computers to get one from his parents at a time when few people had them at home (even I, the computer science teacher, did not have one). In one of the two emails he sent, he wrote:

> You certainly made a mark on my life, Michael. I remember the last words you said to me before you headed to Louisiana

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> – Never compromise your ideals, for nothing and nobody. And I haven't!
>
> Funny thing is, I think faculty and staff in [town] expected you and I to be like lithium and water. The no-nonsense German teacher vs. the smartassed local punk. I had people advise me to avoid computer science to avoid the inevitable clash with you. Didn't quite work that way:) I recall once I hadn't been to your class for a few days. [The principal] caught me in the hallway and was pleased that now he had me – he knew I was supposed to be in your class at that time so now he had an excuse to expel me. All he had to do was get you on side. Knocked on your classroom door, explained the situation, and you said, "No, I just excused Duane five minutes ago to visit the restroom. There's no problem." Hahaha, the look on his face was gold!

Looking at this email, we note that there are the accounts of two events, the former pertaining to the last time we met before I left the town to pursue a PhD degree and the second to a particular event at the door steps to the computer science room. The account shows that the event was dramatic, not just in the sense that I develop this notion here but in the everyday sense as well. Duane was caught "loitering" in the hallways – because my students worked on two-week, individual contracts, and at the end of each contract period delivered the contracted products, they were free to organize themselves and their activities. When the principal had brought him to the door of my classroom, Duane could not know what might be said in the exchange with the principal and would happen after. The event played itself out with a happy ending for Duane, and he had some reason to be gleeful; but this ending was not on the horizon at the moment when the principal stopped him in the hallway. Although it was an important event in Duane's life, important enough that he continued to remember it over three decades later, I had forgotten about the specific occasion – though it sounds absolutely reasonable. When I went to the door where I perceived the principal and Duane, I would not have known what was going on or why the two of them might be present together. Whatever would happen after the principal began speaking was unknown to me so that I was as much subject and subjected to the occasion as I was its agential subject.

The occasion had a happy ending for both of us, as we continued to have a very positive working relation. Duane not only did well in computer science but also in his other subjects, in part because, with his developing reliance on word-processing, he handed in readable assignments and homework. Unexpected by my colleagues and principal alike, based on their previous experiences with the student, Duane ended up with the third highest grade point average of his graduating year. That is, his success appears to have arisen in part out of the positive experiences in computer science and his developing competencies in using computers for a variety of purposes. I know from my own life that certain teachers and classes have been key in shaping my development; and Duane noted, "You certainly made a mark on my life." Experiences and understandings like this will perhaps not come as a surprise to a transactional point of view, according to which the self develops out of the dramatization of the conversations with others in the same society (Mead 1972). The subject of experience also is the superject of experience, so that in passage there is a unity/identity of the two in a continued event of becoming (Whitehead 1929/1978). But reading basic textbooks in educational psychology will not provide us with the descriptions of a theory that would be able to explain the relationship between our

(Duane's, my) experiences and how the occasions in which we were part together shaped our lives (viewed as events) and left indelible marks visible even many years later.

We can therefore say that there are occasions, experiences, and relations such as those between Duane and me – or between my own teachers and me – that are more than others important to our becoming. Yet educational psychology has very little to say about the role of specific occasions in who and how we become. It has little to say about the unfolding of a life the future of which is unknown to us, and it has little to say about the fact that any thinking occurs as event cogredient with all the other events that make any specific quality in the here and now of the occasion; and it has especially little to say about the fact that we inherently cannot have a mental representation of the current happening because it has not achieved closure that could attribute some sense to what was happening. Traditional educational psychology is so focused on mental things, structures, and processes that it has very little to say about the transactional nature of everyday life (in school) even though we are continually becoming in such events, some of which turn out to be such that we remember them for a long time to come – some occasions are remembered as "*an* experience" in the sense of Dewey, an experience that stands out of the stream of experiences much of which we never remember (though they also shape who we are, what we learn to do, etc.). A focus on experience leads us to a transactional approach, because experience is not generated within the person, it always pertains to the {person|environment} unit of the occasion, that is, of a person transforming in the exchange with the impermanent (material, social) world. This world is continually unfolding and never stopping so to be grasped by some cogitation. We are thus exhorted to consider the world as event – even mountains or the Great Pyramids, standing symbols of permanence – or the evental nature of the event will always remain an inexplicable mystery (Dewey 1938; Whitehead 1920).

For a Transactional Psychology

In the opening part of this chapter (see also Chap. 8), I note that we remember occasions and experiences, which we recount in the forms of stories that have all the ingredients of events and relations. This mundane life thus is transactional, having both the temporal and spatial qualities that derive from its evental nature. We thus need a transactional psychology that describes and theorizes those occasions at school that more than others are of transformative nature, including the fact that we do not know today what we will know tomorrow and who we will be. Vygotsky was onto something when weeks before his untimely death, he gave a lecture on the concept *perezhivanie* [experience] with which he denoted the unity/identity of person and environment (Vygotskij 2001). Adopting this Vygotskian stance means that psychologists no longer can theorize the development of a person independent of the environment, and no longer can theorize the environment independent of the person. Any quality, including those pertaining to the mind, is a quality of the

{person|environment} relation on the occasion, where person and environment are not thought of as things but as events within events of historical span. Vygotsky thus sowed the seed for a transactional cultural psychology of education. But unfortunately it was but a dormant seed that has not yet had a chance to grow into something more. Even though he himself considered his early work to have been intellectualist and as not having overcome the body–mind problem, he continued to separate the internal and external. But this separation is the basis for all individualistic takes to educational psychology in which the social appears at best as the result of *inter*action – one action following another. Thus, he said in the lecture on the environment given shortly before his death:

> *the child's higher psychological functions, his higher attributes which are specific to humans, originally manifest themselves as forms of the child's collective behaviour, as a form of co-operation with other people, and it is only afterwards that they become the* ***internal individual*** *functions of the child himself.* (Vygotsky 1994, 353)[1]

In contrast to Vygotsky, the transactional philosophers mobilized throughout this volume – including George Herbert Mead, John Dewey, and Alfred North Whitehead – already had articulated a transactional approach with its primacy of events. These philosophers and social theorists emphasized the continued presence of mind in the world, even though it may have become invisible in the common ground that remains unquestioned on any particular occasion. However, whenever required, this common ground is made visible in the collective behavior not only of the child, as Vygotsky intimates, but in the cooperation of older students and adults as well. In fact, he may have grasped that idea already 5 years before his text on the environment when he wrote about the "*renewed division into two of what had been fused into one*" (Vygotsky 1989, 58). Unfortunately he did not pursue or get to develop this line of thought – even though in the same fragmentary text, he calls for "*psychology in terms of drama*" (58) and for considering "personality as a participant in a drama" (68). Drama always *takes place* – is a phenomenon with spatial and temporal quality – involving relations among people (sometimes the other within the self). It is thus a means of creating a transactional theory for cultural psychology of education, because "one must grasp the whole plot of a drama to comprehend the import of the details" (Mead 1938, 468). The very emergence of the object described and theorized in Chaps. 3 and 4 comes about in "the dramatic rehearsal of what one is advancing to do" (311). Drama is and has been a primary means for presenting and "enter[ing] into the attitude and experiences of *other* persons" (Mead 1972, 257). It is a form of (fictionally) *representing* reality that is sufficiently close to reality that markers are required for performers and spectators alike to distinguish between the two (Bateson 1972/1987). Psychology in terms of drama is a concrete rather than idealist human psychology. Dramatizations of past and future are modes of representations that actually allow re/living the real emotional involvement in

[1] New research suggests that the focus on the internal and internalization arises from a preoccupation of Western psychologists, who have imposed their own theoretical predilection on their rendering of the works of Vygotsky, in whose works the terms *internalization* and *interiorization* actually occur very infrequently (Yasnitsky 2019).

specific occurrences. By its very nature, drama is transactional. Neither Vygotsky nor Mead developed any further the idea of psychology as drama. The articulation of a dramatic (transactional) psychology of education offered in this chapter therefore is based on the works of the French psychologist and philosopher George Politzer (1928, 1929) where Vygotsky had first read about this idea,.

The special opportunities of drama derive from the fact that "it permits idealization, but the idealization is of natural events" (Dewey 1929, 89). I still remember playing with my little nephew by grabbing his nose between index and middle fingers, pulling, and then, after having pushed the thumb between the two fingers, making the configuration visible to him. He ran to his mother crying, "He took my nose." In this situation, my little nephew had mistaken two situations: play and the world where everything is serious and irreversible. I had played with him taking the nose but not really taken it. (In Vincent van Gogh case, taking the ear was real, and he ended up without one.) That is, drama is concerned above all with events, and representing events in evental form rather than by means of things and the forces required for changing them. Moving toward psychology in terms of drama recognizes that human imagination primarily is dramatic and therefore dialogic (Bakhtin 1981; Dewey 1929). In Chap. 11, I present a lesson fragment as a graphic score that needs to be performed. It is precisely in such a function that all dramatic forms allow theorists to enter into the attitudes, emotions, and experiences of those in the situations of interest (Mead 1972).

In the transactional conceptualization of human experience, every passage includes novelty (Mead 1932; Whitehead 1919). The theories of psychology, however, do not include this aspect. Instead, textbooks in educational psychology are full of advice for how teachers take control of the environment that is separate from them. The scientific approaches characteristic of current educational psychology fail not only by missing the nature of its phenomena as events but also by missing to capture the perpetual novelty of life (cf. Whitehead 1938). Textbooks are full of third person descriptions of process-things rather than events *as* events.

In many disciplines, there exists the concept of the gap between theory and practice. When facts are isolated from the context and explained by a discourses different from the context, they lose whatever makes them significant in the actual event; but the fact will make sense when it appears in a dramatic reproduction of the situation (Dewey 1938). We may conceptualize the difference in terms of that between map and territory. Although, in general, "a map *is not* the territory" (Korzybski 1933/1994, 750), there are situations in which the difference is not so clear so that special markers are required for participants to be certain that what is happening is not the real thing. That is, my nephew had mistaken the territory (game of the stolen nose) with the real thing, and thus he complained that I had taken his nose. One of the paintings by the Belgian painter René Magritte famously features a tobacco pipe with the caption, "This is not a pipe." The drawing refers us to a tobacco pipe without also offering the possibility to smoke. It is part of the map that humans have at their disposition for navigating their world.

Maps already exist in the exchanges between members of many animal species, special markers are made available to mark, for example, that something looks like

but is not really aggression. Here, play functions as a map of situations when things are serious. In children's development, (role) play is important; and even in the adult world there are many situations where we learn about the real world not in abstract theoretical terms but precisely through role-play. Role-play, as dramatic representation, is a map sufficiently close to the territory that it often serves well in the preparation for the serious world it represents. It is perhaps unsurprising that play and other forms of histrionic behavior are very early (primitive) forms of differentiation between maps and territories (Bateson 1972/1987) and thus to consciousness. It has been suggested that the "natural role of 'consciousness' is" "to re-enact the vicissitudes, crises and tragedies of life under conditions that deprive them of their overt dangers" (Dewey 1929, 89). Consciousness inherently is dramatic because it is an integral part of the {person|environment} relational event that plays itself out on any particular occasion:

> It seems to me that anyone who installs himself in the midst of the unfolding of drama *has* the experience of consciousness in just this sort of way; in a way which enables him to give significance to descriptive and analytic terms otherwise meaningless. (Dewey 1929, 307)

Installing oneself in an unfolding drama is the essence of the way in which transactional approaches theorize knowledgeability. Thus, when we ready ourselves to push some heavy object, we assume – based on past experience that appears in the present in the form of non-sensuous perception – a specific attitude. The distant object "arouses in the individual a resistance of the same sort as that which the body will exercise" (Mead 1932, 310). That is, knowing what to do and how to confront the heavy object exists in the form of a dramatic anticipation of what will happen when the object is actually pushed. That dramatic rehearsal manifests a *social* attitude, for in its own conduct the organism (person) anticipates the action and reaction of the material or human other.

When future teachers learn educational psychology, however, they know the difference between what they are taught and what they actually experience during internships or when they start teaching. Indeed, I had started my teaching career prior to taking any courses in education or educational psychology. I still remember having been very adamant about the gap between what the instructor of my first two courses in educational psychology was saying and what classroom life really was like. There was something about educational psychology that pretended to have predictive qualities, a form of (theoretical) consciousness that inherently was missing the very unpredictability not only of a lesson as a whole but also of the immediately following reply that is confronting the teacher with novel conditions in and on any occasion.

In accounting for situations where new experience develops, we are asked not to look for accounts in personnel psychology but to drama and fiction. This is so because these forms can express the nature and import of the new *experience*, most importantly, the emergence and development of the emotions involved (Dewey 1929). Only a dramatic form can give a sense of the different types of affect that an applicant may experience during a job interview – from the initially sensed hope or despair to the elation or disappointment felt at the end. The unity of the experience

derives from the affective qualities of its phases. As the interview is happening, there are secondary emotions as well. In this way, it certainly is "possible for each attitude and gesture, each sentence, almost every word, to produce more than a fluctuation in the intensity of the basic emotion; to produce, that is, a change of shade and tint in its quality" (Dewey 1934/2008, 50). A dramatic psychology allows understanding human conduct by approaching situations of interest from the whole (occasion), which is then understood in terms of its parts. In this approach, the whole needs to be understood for understanding the parts, and each part cannot be understood like an element, for it reflects all the aspects of the whole and thus all the other parts.

Interactionist Take on Dramatic Psychology

Vygotsky called for dramatic psychology or psychology as drama during a period when intellectualism still marked his work. Subsequently, he did not take up his programmatic call so that we do not know how such a dramatic psychology would have looked like when he made the shift toward the {person|environment} unit in *perezhivanie* [(emotional) experience]. Given Vygotsky's own failure to develop the idea of psychology as drama, it may not surprise that there has actually been little take-up of the call on the part of scholars analyzing and elaborating on Vygotsky's work or using his theories. But there is at least one study that provides an inkling of where the inclusion of the concept of drama in psychological theory of human development might lead us – a theoretical investigation of the zone of proximal development (Veresov 2004). In that study, development is conceived as the result of a dramatic contradiction (collision) between a child and its social environment. That contradiction between the child and its environment is said to be the moving force – although the study leaves unclear, as so many others, in which way a contradiction makes something move unless in the often-repeated but not very helpful sequence ascribed to Hegel: from thesis to antithesis and to synthesis. The synthesis is achieved when, as Veresov points out, a dramatic collision (contradiction) has found its resolution. This position fails to recognize what philosophers developing ideas arising out of the notes of the later Vygotsky already formulated – that self and environment (other) are not different from the outset but the boundary between self and what is other than self is the result of a *single* process of going and coming that generates and determines both (Mikhailov 2001). The problem lies in the ontology, where the individual and environment are treated as things – i.e. in substantial form – rather than as events. There is then a contradiction that arises between manifestations of some phenomenon – such as that between body and mind that are manifestations of one and the same substance in the approach that Baruch Spinoza had developed and that the later Vygotsky was aspiring to. Veresov locates the force not in the person (child) nor in the environment but in their relation, which is one of contradiction. It is quite apparent that the focus on the relation between person and environment at best gets us to a situated cognition perspective because the temporal

quality of human existence is not considered at all (e.g. Roth and Jornet 2013). That temporal dimension then has to be introduced as the result of something appearing between the two contradictory terms, contradictory though manifestations of the whole.

From the transactional perspective articulated throughout this book, however, there is no moving force generated *by* the contradiction in the relation between person and environment. Instead, because we begin with the event as the basic unit of thought, novelty and thus change and development are already inherent in any duration considered. There is no resolution of a conflict, which implies that now a new thing-like psychological form has established itself. Instead, everything continues to pass and therefore has to be thought in evental terms as passage, the intersection of past and future in the specious present. The person is a family of events related to environing events by intersecting events common to both. For this reason, the environment is immanent in the person as much as the person is immanent in the environment. As events, both evolve, and they do so together. In Chap. 3, I show how an event unfolds, as one phase leads to a next with which it intersects for any connection to exist. Thus, whatever contradiction is considered, when two individuals such as a child and an adult representing its social environment participate in an exchange, there is an intersection *common* to both. In the conversational exchange the word to which someone replies – first phase in the category *responding* – already has been the speaker's own as much as it has been that of the other. The child's reply is not just its own, does not manifest some solipsistic expression, but, to have any hope of affecting the adult (e.g. to give something), takes the perspective of the other and thus also and already belongs to the other. The dichotomy of the dramatic collision between child (self) and social environment (other) is a false one; and it arises from the substantive take on persons and their environments. This articulation thus fails to follow the program outlined in a quotation from Vygotsky that may be read as arguing for a process approach that actually contradicts the psychologist's own thing-based approach to such phenomena as the word and meaning. Thus, the experimental method envisioned

> attempts to dissolve every concealed and petrified psychological form and to convert it into a moving, flowing flood of separate instances that replace one another. In short, the problem of such an analysis can be reduced to taking each higher form of behavior not as a thing, but as a process and putting it in motion so as to proceed not from a thing and its parts, but from a process to its separate instances. (Vygotsky 1997, 68)

It is apparent from this programmatic statement that development should be studied when the development occurs, and it should be understood as event and its phases rather than as a thing and its parts. On the other hand, the quotation also shows that there is a thing-based idea, for the individual is initially conceived in terms of concealed and petrified psychological forms. It is apparent that Vygotsky was way behind the three main philosophers and social theorists who predominantly feature throughout this book: the trio of Dewey, Mead, and Whitehead. Vygotsky's statement does not make sense in a transactional approach, where the basic unit is the event and thus every psychological form – as seen in the notion of

the percipient *event* – is thought as event that cannot be reduced to things without penalty. Stable and immutable objects are but abstractions of recurrences across successive occasions. That is, when theorizing psychology in terms of drama, we must not begin by assuming people and their social environments as things, pitting them against one another to get a contradiction, and then arguing that it is out of this contradiction that change arises – this is how *logical* contradictions are solved. Drama is to be thought in terms of *events* that relate to each other because of an intersection *common* to both. In this way, we obtain both the spatial (transitive) and temporal (intransitive) relations typical of an evental approach.

The same type of contradiction arises in Veresov's uptake of the opposition between real and ideal forms, which, in drama, are thought as being transformed or as transitioning into one another. These *forms* are self-identical things that exist in their own rights and that subsequently *inter*act. Again, as shown throughout the book, as soon as we think psychological phenomena in transactional terms, that is, as soon as we take the event as the basic unit of thought, then the real and the ideal already are cogredient events in passage. If they relate, then this is because of an intersection common to both.

In conclusion we may say that Veresov is right in taking up the idea of drama as a category. But drama has to be thought as event, and it is under this condition that we arrive straightforwardly at the transactional perspective of Dewey, Mead, and Whitehead. Unsurprisingly, Dewey and Mead also make the relation to drama and, in the former case, "*an* experience" as a category, which is an indivisible unit of thought.

Psychology in Terms of Drama

> To paraphrase Marx: *the psychological* nature of man is the totality of societal relations moved inward and having become functions of the personality and forms of its structure. (Vygotskij 2005, 1023)

Vygotsky made repeated reference to psychology in terms of drama in a fragmentary text (from 1929) entitled "Concrete Human Psychology," where he also articulates the quoted paraphrase of Marx. The concern in Vygotsky's text partially lies in articulating a genetic law for higher psychological functions, which first exist as concrete, material relations between people before moving inward and becoming functions of the person. It is a psychological uptake of the Sixth Thesis on Feuerbach (Marx and Engels 1978), where the authors state that the human essence does not inhere in the singular individual but exists in and as the ensemble of societal relations. Psychology therefore has to be conducted in terms of the societal relations between people. Because Vygotsky theorizes in terms of the dichotomy of inside and outside, psychological functions are thought of as *internalized* social (societal) relations. Dependent on the occasion, such as in school classrooms, those relations internalized by the teacher can be unfolded again, leading to the "*renewed division into two of what had been fused in one* … the experimental unfolding of a higher

process … into a small drama. See Politzer: *psychology in terms of drama*" (Vygotsky 1989, 58). Drama is the one true perspective for Vygotsky, because in it are essentialized the relations between people. It involves conflict, such as that between intellect and affect – as in his example of the opposition of judgment and empathy paralleling the opposition of knowledge and love. But he conceives of the experimental method not in terms of events but in terms of one person who controls what happens and the other one who is controlled. He employs a thing-based ontology, which also encompasses his continued focus on the dichotomy between inside and outside. On this point, Vygotsky could have learned a lot from another philosopher featured throughout this book, Gregory Bateson, who wrote that "'inside' and 'outside' are not appropriate metaphors for inclusion and exclusion when we are speaking of the self" (Bateson 1979, 132). Clearly, Vygotsky does not think of the fact that two people – however unequal they come out of the relation – nevertheless *together* constitute the relation in which there is a common event that intersects both persons-as-event; and this together requires a transactional approach that takes the event as its fundamental category.

In his call for psychology in terms of drama, Vygotsky credits the idea to the Hungarian-French psychologist and philosopher Politzer, and specifically to an article published during the year that Vygotsky was writing his fragmentary text. Politzer indeed had written a book in 1928 developing this idea (Politzer 1928), and subsequently published an article in which he elaborated psychology in terms of drama as an alternative to the two strands constituting the field, experimental and interpretive psychology (Politzer 1929). The psychologist's intent was to overcome the dichotomy of which concrete human psychology based on the analysis of the dramatic life. Experimental psychology has the problem that it attempts to explain human conduct in terms of the natural world (e.g. physiology), whereas interpretive psychology attempts to explain human conduct based on the mind and mental constructs. Politzer's main point is that psychology should not lose itself in abstractions of one (quantitative) or the other (interpretive qualitative) kind. Both fail to describe and theorize the dramatic nature of human life in the way it plays itself out on each occasion. The events that we experience throughout our daily lives are dramatic. Politzer uses the example of the event of a marriage. (On the weekend when I first worked on these lines, Harry and Meaghan got married.) The considerations of a marriage as psychological fact requires taking into account the concrete, once-occurrent event and each individual in its singularity. Psychology needs to explain the here and now of the marriage, the ceremony and the sometimes-yearlong preparations leading up to it, which in turn gives rise to further events (e.g. the honeymoon). Only then do we understand the relationship between objective and subjective qualities of the experience, its nature as an event, and the affective qualities of the unfolding occurrence. On the other hand, "the mental capacities, ideas processes do not get married: as soon as one replaces individuals by these kinds of creations, the reality of the dramatic fact instantly disappears" (Politzer 1929, 43). Interpretive psychology is not excluded here, for mental constructions do not solve the problems of everyday life. Real people encounter, frame, and resolve obstacles in their daily pursuits, not thoughts thinking themselves.

Life is eventful and thus dramatic. Events that happen to us are dramatic: the les floor, the interesting conversation that we had with the cashier and other customers at the checkout counter. Not only is life dramatic (transactional), we also have a transactional view of life and of ourselves, we are agents changing the situation and patients undergoing the situation that we have contributed in creating (don't we often feel that things are not going the way we had intended?). Any intentions we have are dramatic, too, like when we intend to get married or go to a potentially upsetting meeting with representatives of the employer. When we get ready for such a meeting, we think of ourselves in dramatic terms: how we might react to certain statements others might make, or how we might act upon others to turn the occasion in our favor. Our comprehension of others is dramatic as well. This comprehension is not inherently abstract, for in the very act of asking a question (e.g. "What time is it?"), we anticipate a genuine reply. There is drama when we are invited to a beer or a glass of wine and then we accept or decline (e.g. "I don't drink beer because I am allergic to gluten"); and when we have to decline, we may consider about the (social) consequences declining an invitation may have. The rhythmically (ritualistically) patterned chains of events that appear in the sociology of emotions are dramatic, for rhythm (ritual) is dramatic. A concrete human psychology draws on the *event* as a unit of analysis, and the event is understood in evental terms (rather than as difference between states). For Politzer, psychology can be truly scientific only when its categories are appropriate for theorizing the life as it is experienced, in all its dramatic twists and turns. The viewpoint of the transactional psychologist thereby obtains has dramatic quality; in other words, the viewpoint coincides with the drama of the everyday world-as-event.

The psychological fact is not simple behavior, as it appears in abstractions. Instead, it is *human* conduct, always shaded by intentions, expectations. That is, the psychological fact is conduct as it unfolds in the course of events in those settings where human life unfolds and as it pertains to the individual, who is subject of and subject to this unfolding life. Events make sense precisely because they relate to a first person, who acts in and undergoes an occasion that others also undergo (though shaded by their own subjective takes). But the occasion itself is objectively present, each party to the occasion presupposing that the setting in which they find themselves is the same for the other. There is one event even though it appears differently in the subjective experiences. This also explains why concrete human psychology focuses on different phenomena than the experimental or interpretive psychologist. For example, dramatic psychology is not interested in memory as such but in the phenomenon of remembering and its bearing on the now in the passage of life. The event refers us to the person as a whole – an idea that like a number of other ideas Vygotsky (1987) takes up from Politzer in *Thinking and Speech*.

In the introductory chapter of *Thinking and Speech*, which constitutes one of the last texts that he wrote, Vygotsky makes a plea for not separating intellect and affect, as the separation would have the consequence of arriving at theories in which thinking exists for itself by becoming the thinker of thoughts. He suggests that thinking would be divorced "from the full vitality of life, from the motives, interests, and inclinations of the thinking individual" (Vygotsky 1987, 50). Everything

in those paragraphs revolves around the separation of thinking and affect, as if these two were the center of the universe. He writes about the unity/identity [edinstvo] of intellectual and affective processes. But he does not at the same time argue, as he does in the lecture on the environment, that we never should analyze behavior unless it accounted for all the relevant evental strands against which human conduct plays out. As a result, generations of Vygotskian scholars have continued doing the kinds of studies that the psychologist argued against. All the research on mental constructions, of meanings, concepts, or identities, fails to capture the individual in the drama of everyday life and any learning that occurs therein. That is, there is not just some simple unity/identity of intellectual and affective processes, but there are indeed many evental strands within and surrounding the individual under considerations. Even at the end of his life and after having introduced the idea of the unity/identity of person and environment, the consequences for any analysis of conduct have not been worked out. In a strong sense, as soon as our unit of analysis becomes the event in which there is a unity/identity of person and environment – i.e. {person|environment} where both person and environment are families of evental strands cogredient in the current happening – then every conduct is a characteristic of that unit rather than of the individual or its environment.

When we make that step to the unity/identity of the event, with its characteristic relational unit {individual|environment}, then it will be "nonsense to talk about 'dependency' or aggressiveness' or 'pride'" as characteristics "internal to the single person," for "all such words have their roots in what happens between persons, not in some something-or-other inside a person" (Bateson 1979, 133). It is precisely because the roots of characteristics lie in what *happens* between persons that we need to look at relations. But thinking about relations alone does not get us out of trouble. Personally, I was thinking about relations more in terms of things, perhaps like the stick models in chemistry (see Chap. 9). But relations are events – which is clearly shown in Chap. 3 where *responding* and *corresponding* are shown to be the transitive and intransitive dimensions of the event of speaking. That relation to others exists because of an event unfolding in time. There is no instantaneous relation that connects two people up like the stick holding together two atoms in the ball-and-stick models of chemistry. What we therefore need to do is focus on the event unfolding in temporal dimension that also produces the relation – i.e. spatial quality of the event. This allows us to realize that "power" is not something that can be had or held, like an object we own; instead, this term describes the quality of a relation in which two or more people are implicated. In the case of a psychological characteristic such as "pride," the admiration spectators provide is paired with the response of a performer, to which come more performance and more admiration. As a result, we observe not individual learning to be theorized but contexts of learning: query and reply or pride and admiration always go together, each providing the context for the respective other. There are then "hundreds of ways in which the components of contexts of learning may be interlinked, and, correspondingly, hundreds of characterological 'traits,' of which hundreds the experimenters have looked at about half a dozen" (Bateson 1979, 134). "Pride" therefore does not denote a thing but an event,

and more specifically, it denotes an event that plays itself out as drama such that pride becomes an appropriate name rather than something else (disappointment).

Drama means relation, and both drama and relation are evental in nature. Whenever we might be tempted by the vice of thinking about some phenomenon in a thing-like fashion, we should remind ourselves of the necessity to return to the event. We then return to analyzing the current phenomenon of interest in terms of a dramatic event under way in which any participant is but a witness who cannot grasp what will have been *an* event when everything has been said and done. We then theorize in the evental terms of the drama the occasion when Melissa, as part of responding to the request (directed to all three girls) to decide which one of several shapes best corresponds to the mystery object in the shoebox (Chap. 5), claims there to be a cube; and we analyze in terms of drama the reading session with the infant boy (Chap. 4) where the problem is that of finding out what the respective other is "talking" about. We also use the dramatic event as our frame for investigating the mother–infant relation, where cries are associated with the holding and not-holding a toy giraffe (Chap. 4). Here, as in all other dramatic events used in this book to exemplify the transactional approach to educational psychology, we do not attempt to explain what happens in terms of invisible intentions and mental constructions but in terms of the drama *as it plays itself out in public* and therefore is witnessable by all participants. These participants are alive, and thus require an evental approach to be comprehended as part of the overall flow of material and social life.

The drama approach also orients us toward a more symmetric approach to teaching–learning situations. Thus, for example, the concept of the *zone of proximal development* or *zone of potential development*[2] tends to manifest a striking imbalance: children or students are enabled by an adult (teacher, parent) or a more advanced peer to perform at a higher developmental level than if they were to complete the task by themselves. Research reports mobilizing the theoretical concept say little to nothing about the adult or more advanced peer. In the transactional approach, however, we would immediately be taken to ask questions such as, "How does the child or student become immanent in the life line of the adult (parent, teacher)?" That is, whatever the situation, it is a dramatic event that leaves traces in all participants. Our analysis therefore focuses on all the micro-events cogredient in some duration.

Another immediate consequence is that we do not surreptitiously insinuate to participants a grasp of what is currently happening – which is the case whether we investigate historical phenomena such as "May 1968" in France or Tahrir Square (Cairo) and its relation to the "Arab Spring" or whether we investigate conceptual change in the course of a scientific investigation (Chap. 6) or learning occurring in the course of pilots' biannual training and assessment sessions and the associated debriefing meetings (Chap. 8). A grasp of the event is the prerequisite of framing it

[2] Recent research characterized the notion as a buzzword and metaphor, which Western scholar adopted from Vygotsky but used for their own intentions and without a clear theoretical framework (Yasnitsky 2019).

in causal terms, because the attribution of a cause presupposes knowledge of the effect. But knowledge of the effect of an event is unavailable while it is unfolding, so that we inherently cannot grasp what is going on until some sort of closure has been achieved so that we can look back and reflect on something inherently past. By turning to the event understood as event, and by thinking about life in dramatic terms, a transactional psychology returns life to the living. It inherently is a concrete human psychology, one that no longer makes the break between theory and practice, and one that no longer requires special methods for seeing the order of the (social) world that comes about as events unfold.

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Appendix: Transcription Conventions

In this book, I by and large follow the transcription conventions of conversation analysis as outlined by Jefferson (2004).

Notation	*Description*
(0.4)	Time without talk, in tenth of seconds
(.)	Period in parentheses marks hearable pause shorter than 0.1 seconds
((*turns*))	Verbs and descriptions in double parentheses are transcriber's comments
lH, rH	Left hand, right hand
[flip it you have] to flip	Square brackets indicate overlapping talk
[so flip it]	Grey highlighted text within square brackets indicates the extent of the gesture seen in the offprint presented to the right
°y'know°	Degree signs enclose words spoken with less than normal intensity
°°possibly°°	Double degree signs mark speech almost impossible to hear
jUST	Capital letters were spoken with louder than normal intensity
*fair*ly deep	Italicised letters indicate emphases, stress
:	Colons indicate lengthening of phoneme, about 1/10 of a second per colon
>i look at the<	Angular brackets inward mark faster than normal speech
<what happens>	Angular brackets outward mark slower than normal speech
(?)	Missing words, one word per question mark
(stash?)	Word followed by question mark indicates uncertain hearing
.hh	Noticeable in-breath
hh	Noticeable out-breadth
–,?;.	Punctuation is used to mark movement of pitch (intonation) toward end of utterance, flat, slightly and strongly upward, and slightly and strongly downward, respectively
=	Equal sign indicates that the phonemes of different words are not clearly separated, or latching by a second speaker
↑	Significant jump upward of pitch

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