

Chapter 3

Birth of Signs: A (Spinozist-Marxian) Materialist Approach

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Abstract The existence of “the sign” generally tends to be taken without questions. In this study I show that signs are born in and for activity, where they are part and constitutive of the relation with others. I use a brief case study as the empirical basis to suggest an approach grounded in cultural-historical and pragmatic approaches that abandon the notion of signs as mediators and instead focus on the developing communicative field that is common to the participants in relation. Abandoning the sign as mediator allows us to pursue studying the lines of becoming that were so dear to the late Vygotsky, who was in the process of replacing his earlier mediational approach to the sign by a Spinozist-Marxian approach.

Keywords Sign · Commodity · Sign vehicle · Materialism · Sensible Suprasensible

3.1 Introduction: A Cultural-Historical Materialist Take on the Sign

Sign operations are the result of a complex process of development, in the full sense of the word. (Vygotsky 1994, p. 151)

Semiotics has gained considerable traction in the field of (mathematics) education. Educational semiotics can be defined as the amalgamation of learning theory and semiotics; it is “a form of inquiry into how humans shape raw sensory information into knowledge-based categories through *sign interpretation* and *sign creation*” (Danesi 2010, p. ix, emphasis added). Absent in this definition is the fact that in fluent practice, signs are not *interpreted* at all but are *read transparently* thereby

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giving access to phenomena directly (e.g. Roth 2003). There are thus three possible areas of investigation constituted by how people relate to the pertinent signs: creation, transparent reading, and interpretation. Much of mathematics education research tends to be concerned with the third. This chapter, on the other hand, takes the creation of signs as its topic, or, more correctly, it is concerned with the birth of signs in society-specific relations.

An important early articulation of the importance of the sign and its birth in social relations can be found in the work of the societal-historical psychologist Lev S. Vygotsky (e.g., 1997). Accordingly, the sign is first a means of and for acting on others before it is used for acting on the self; it first *is* a social relation before it exists for the person (Vygotskij 2005a). Vygotsky uses the birth of the intentional pointing gesture, an indexical sign, as an example for the birth of the sign generally. Thus, the process emerges from a child's failed grasping movement aimed at some object, which the mother treats as an instruction by handing the object to the child; and the movement has become a sign when the child actively uses the demonstrative gesture. Here, the hand and finger movement is bodily and real, therefore the *sensible* aspect of the sign is apparent. The *suprasensible* aspect, its ideality or "meaning" (the hand is pointing rather than moving arbitrarily) is relational. It arises from the fact that the movement (i.e., the sign) is a reflection of the mother-child relation. When it has become a sign, the hand movement has synecdochical function in that it stands for the relation with an Other as a whole. But prior to having become sign, there already is a hand movement that is part of a transactional event. Clearly, it is not yet a sign and thus does not *mediate* anything. The hand movement is a constitutive part of the relation; without the movement, the relation does not exist.

The theoretical development of the preceding point goes back to the cultural-historical analysis of the emergence of (exchange-) value as the suprasensible side of a sensible commodity (use-value) (Marx and Engels 1962). In the simplest version of an economic exchange, a commodity obtains its *value*, short for "exchange-value," in terms of the amount (quantity) of another commodity (e.g., 20 yards linen = 1 frock). In such an exchange, the commodity exists both for "buyer" and "seller," as use-value and exchange-value, respectively. Exactly the same can be shown to be the case in the exchange of words, verbal symbols, or signs (Roth 2006), or, for that matter, "any combination of such signs and the syntactical pattern of this combination" (Il'enkov 2012, p. 174). If the word does not exist for two, there is no exchange at all. The analysis can be taken further. The same producer may exchange the same amount of linen for other goods, so that its value comes to be expressed in terms of different quantities of different goods (i.e., 20 yards linen = 1 frock = 40 lbs. coffee etc.). All of these exchanges occur at small scales, *within* groups. This is equivalent to the case where students do mathematics in small groups. But what they come up with does not have to—and in many case does not—conform to standard mathematics. Something else has to happen, which the example of the commodity renders apparent. The general, universal value form emerges only in exchanges at the level of the society, when the various commodities are produced for the generalized satisfaction of human needs. In this case, the value of all commodities is expressed in the same good (e.g.

1 frock = 20 yards linen; 40 lbs. coffee = 20 yards linen, $\frac{1}{4}$ wheat = 20 yards linen etc.). All ideals (universals) of mathematics arise and exist in this latter form (Il'enkov 2012). Consciousness, thus, is not merely and accidentally social (as any relation between two people) but always and essentially societal, determined by “the societal being of man” (Marx and Engels 1978, p. vii). The suprasensible aspect of the material-sensible commodity, as for the material-sensible sign, simply is a manifestation of the societal [gesellschaftliche] relation constituted in and by the (commodity, sign) exchange. That is, the commodity (material sign) is a synecdoche of the exchange relation, its ideal form (i.e. the exchange-value) being a transposed and translated manifestation in consciousness of the material exchange relation.

From this ever-so-brief analysis, we can take three aspects of the birth of signs. First, there is a relation between two things, which, below, are identified to be the sensible sign vehicle and suprasensible sign content (mapping onto use-value and exchange-value, respectively). Second, there is a human relation in which the sign is exchanged and that is constituted (in part) by the exchange. Third, the peculiarity of the materialist approach in the Spinozist Marxian tradition lies in the fact that it takes the first relation also as a reflection of the second (i.e. the relation between things exchanged, objects or signs, reflects the relation between people). This cultural-historical materialist framework considerably expands currently available semiotic studies generally and semiotic studies in mathematics education particularly. Especially in mathematics education, children come to be confronted with phenomena and sign vehicles that they have not encountered before. Our field (mathematics education) therefore is an ideal test bed for investigating “*the natural history of the sign*” (Vygotsky 1994, p. 151), ranging from *birth* to *becoming* and to the *death* of the sign.

3.2 The Structuring Work on Which the Birth of Signs Is Founded

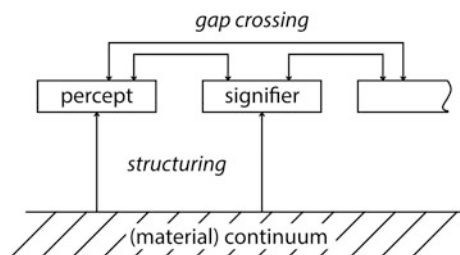
The preceding section exhibits sign use as involving a first relation between sign vehicle and sign content. Studies in the philosophy of language show that to interpret any linguistic or other “sign means to define the portion of continuum which serves as its vehicle in its relationship with the other portions of the continuum derived from its global segmentation by the content” (Eco 1986, p. 44). The “continuum,” of course, is material. However, its portions and segmentations are not given; instead, they are the results of human labor (Jornet and Roth 2015). For example, in one think-aloud study, which asked practicing PhD biologists to interpret graphs from an introductory biology text, participants in many instances failed to give the generally accepted responses (Roth and Bowen 2003). While gazing at a figure plate—in which a birthrate ($b(n) \sim -n^2$) and death rate graph ($d(n) \sim n$) intersect at two points—to make a statement about what happened to

the population n , one scientist said that she was looking at the slopes of the lines. A standard reading of the graph, however, requires looking at the values of the functions $b(n)$ and $d(n)$. On the same task, only 1 out of 17 biologists correctly replied to the question at which point the increase in the population size was largest—which is neither at the highest point of the birthrate graph nor at the point where the difference between birth and death rate is largest; instead, it is largest where the function $(b(n) - d(n)) \cdot n$ is maximized. Thus, most of the scientists' failures in interpreting the graph in the standard way can be traced to the non-standard structuring of the material display. Simultaneously, many participating scientists did not uncover the second part of the underlying sign relation, that is, they did not identify the content of the graph (i.e. what it was intended to be about).

This phenomenon can be understood if we think about the sign in the way Eco suggests: it consists of a material configuration that comes to stand out against everything else that configures the ground. There are two types of work required in the production and use (interpretation) of signs (Fig. 3.1) (Jornet and Roth 2015). First, each portion (signifier) is the result of a structuration of matter yielding form—e.g., something in the world needs to be perceived *as* some thing that has form (percept). Second, any sign is the result of the relation between two structured portions, each of which constitutes a signifier (segmentation of the continuum). Because these are separated by an ontological gap, relating percept and signifier or two signifiers requires gap-crossing work. In other words, there is a transactional relation between the two, each being integral to the definition of the other. Take Vygotsky's pointing example. To know that a hand movement constitutes an act of pointing requires the presence of an object pointed to. There may be two cases of trouble. If there is an intended pointing movement but no effect on the part of the intended recipient, we may hear, "Can you look over there!" In the reverse case, we may hear, "Are you trying to show me something?" or "What are you trying to show me?"

In the case of the scientists discussed above, their first type of problems arose when the form they perceived in the population graph plate was not the one they needed to perceive in the standard approach; and they were hampered in making the connections to the natural phenomena that the graphs are taken to stand for. Their work is to be theorized less as a process of sensory cognizing (Danesi 2010) and more in terms of a phenomenology of movement that does not initially need to or require units of knowledge, schema, and the likes (Vygotskij 2005a). In the

Fig. 3.1 Segmentations of materials, such as percept and signifier, have to be produced before gap-crossing work can link them up



following, I focus on how a new sign—a percept–signifier relation—is born in exploratory activity and then I provide a societal–historical account, which also leads us to abandon the idea of sign mediation. Vygotsky already moved in this direction, for during the last period of his work, he “came to understand that notions he had been using so far, such as ‘sign mediation’ or ‘functional system,’ could not fully explain the whole complexity of human consciousness” (Zavershneva 2014, p. 74).

3.3 The Genetic Origin of Signs

3.3.1 *Case Study from an Elementary Mathematics Classroom*

With the following lesson fragment from a second-grade mathematics classroom I exemplify and theorize the dawning of signs in human activity. The episode saliently exhibits (a) the birth of a first sign vehicle–sign content relation and, as if in slow motion, (b) the eventual death of the first relation and the birth of a second one. These events unfold as part of a second development: the emergence of a vehicle–content relation that has *common* currency within a group of students. Easily missed is the third aspect of signs: that the relation between vehicle and content also reflects the social relation. Only the second aspect tends to be studied in mathematics education research under such topic titles as “social construction” and “negotiation” of “meaning” and “socio-mathematical norms.” The case study presented here, however, highlights all three aspects.

In the episode, the children have been asked to model a mystery object hidden in a shoebox (one portion of the continuum serving as the sign content) using plasticine (the second portion of the continuum serving as the sign vehicle). They are allowed only to reach into the shoebox through a hole—covered by a baffle so they cannot see the mystery object—and feel it. All three girls (Jane, Melissa, Sylvia), seen in that videotape in turn, repeatedly reach into the shoebox, apparently feeling out the hidden object, and then begin to shape the mass of plasticine that they each previously received for the purpose of the task. The task, therefore, is a completely material equivalent of situations where there is a (material) sign vehicle but the sign content is ideal (i.e. “meaning”), and, therefore, inherently inaccessible (which leads Lacan 1966, to a critique of purely ideal “meaning”). It is a situation where, “in order to become an object’s (word’s) sign, the stimulus [plasticine model] finds support in properties of the designated [mystery] object itself” (Vygotsky 1994, p. 151, content in square brackets added). The teacher eventually comes to the table where the children are working and groups together two of the plasticine shapes (made by Jane and Sylvia) while pointing out that these are similar; and they are marked to be different from the shape of the third model (Melissa’s), which is kept apart. The girls are asked to settle on one shape (model) because there is only one

mystery object and there cannot therefore be different shapes modeling it. There is a long debate because the models of different group members vary significantly (cube vs. slab).

Melissa first shapes her plasticine into a cubical form. She claims the mystery object to be a cube because it has the same three sides. While speaking, she uses her thumb and index finger configured into a caliper and holds it to three different orthogonally positioned edges of her plasticine shape (Fig. 3.2a). But her peers challenge this statement, therefore treating it as a claim. Over the course of the 16-minute episode, Melissa will have reached into the shoebox eight times, feeling (transitive) the object for a total of more than 3 min. As part of the debate, Sylvia repeatedly instructs Melissa in what the mystery object feels like (intransitive)—i.e. flat as if two palms rubbed together—and how to take the mystery object between index finger and thumb to feel (in/transitive) its thinness (Fig. 3.2b). But Melissa maintains that she feels three equal sides, which is well represented in the plasticine cube she has formed. At one point, Melissa has her right hand in the shoebox and the left hand on her model (as in Fig. 3.2c) and, based on this situation, continues to maintain that there is a cube inside the shoebox.

Jane then shows Melissa a test: one hand apparently feels the mystery object while the other simultaneously rotates and feels the plasticine model. Melissa eventually accepts the invitation to do likewise. The video shows her with the right hand in the shoebox while gazing intently at the left hand, which repeatedly and slowly feels (transitive) Jane's plasticine model and turns it over (Fig. 3.2c). After completing four feeling/turning cycles, Melissa looks up, puckers her lips, grabs her plasticine cube and begins to reshape it into a flat rectangular prism. What has been a very limited, local, and individual sign—the relation between the plasticine cube

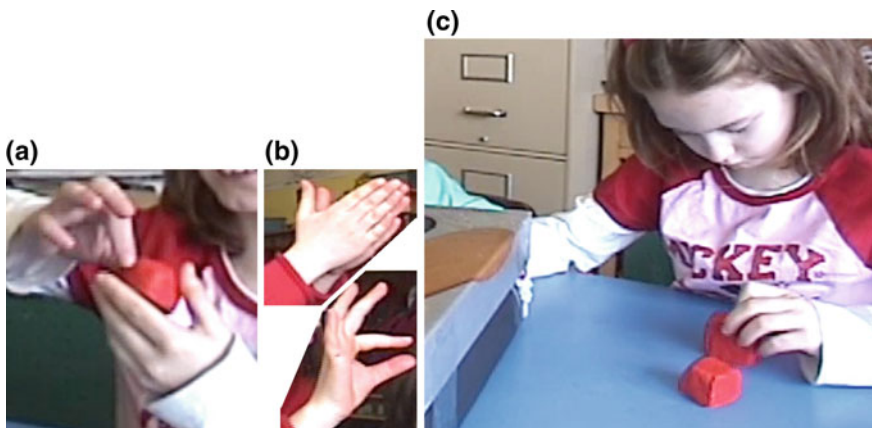


Fig. 3.2 Images from an event in which a sign is born. **a** Melissa shows why the hidden object is and feels like a cube. **b** Sylvia configures her hand/s to show why the object should be a flat slab. **c** By means of touch, Melissa directly compares the hidden object with a cube

and the mystery object—has died before it ever could become exchange currency in and constituent of the relations involving the three girls.

Here we observe how both sides of a sign relation come into being as a result of the structuring and restructuring work, and how they are related through the bodily work of a child. While the children are reaching into the box and feeling the object, what initially only is an obstacle opposing touch eventually comes to be felt (in-transitive) as a particular form: from touching emerges a percept or worldly matter takes form (i.e., “percept”). Based on their respective percepts, each girl then shapes a piece of plasticine, Melissa, based on prior experiences, calling hers “a cube,” whereas Jane and Sylvia do not have a name but are shaping the plasticine into a form that “feels” the same as the mystery object. That is, they use another part of the material continuum (plasticine), to which they give shape through molding so that it may serve as a sign vehicle for the mystery object (sign content). The relationship between the two is based on the similarity between the feel of the object (signified) and that of the plasticine serving as a signifier (Fig. 3.1). In this effort, the children are engaged in semiotic processes involving physical materials (mystery object, plasticine) that parallel other processes involving images.

3.3.2 *The Societal Nature of the Phenomenon: A Historical Connection*

The preceding episode should not be reduced to little girls’ play. Instead, we observe here a societal phenomenon that evidences itself in many different guises. Sometimes the staff of the same social phenomenon—the birth between a natural phenomenon and a (mathematical) model—may be mature scientists. For example, in the 19th century, physicists were debating whether “light” (sign content) was a “wave” or a “particle” (sign vehicle) and, therefore, what the appropriate mathematical model was. Although the physicists agreed to be looking at the same phenomenon, light (corresponding to the mystery object), what they “understood” light to be, its (invisible) nature, was related to the model. They later realized that “light” is *neither* particle *nor* wave—how light manifests itself depends on the observation situation (operation). In the debate between two different symbol systems for describing quantum mechanical phenomena, there existed two models (sign vehicles), Schrödinger’s wave mechanics and Heisenberg’s matrix mechanics. These two, later were shown to be equivalent in the works of Dirac and von Neumann (like the teacher grouping of Jane’s model and Sylvia’s model). Similarly in the case of the three girls: It is immediately apparent that all three initial models would have been appropriate if the topic of investigation had been topology (they all have the same Euler number $n = 2$).

3.4 The Sign *in* Relation, the Sign *as* Relation

The case study exhibits the birth (and death) of sign vehicle–sign content relations. The description shows that even in the case of a material rather than ideal sign content, differences and disagreements may exist. This is consistent with observations in controlled studies showing that in teacher demonstrations, what students see—i.e. the sign content that results from their structuring work—may differ (Roth et al. 1997). This is significant in a discipline such as mathematics education, where students are shown demonstrations (e.g. proofs) or engage in hands-on investigations (e.g., Dienes blocks, Cuisenaire rods) and where they are to learn disciplinary practices and facts through sensual experiences. Such disciplinary practices are not simply “copied” by observing others. Instead, they always require students to act so that they may discover these practices in their own actions, much in the way that the child learning to point discovered this pointing in its own failed acts (Vygotskij 2005a). Considerable work is involved in relating the two portions of the continuum, some students establishing a relation whereas (many) others may fail.

The very notion of the sign implies that it is a possibility for two people in a verbal exchange; an object, a sign or word, cannot exist for one person only (Feuerbach 1846). This is immediately apparent when we consider the analogy with the commodity in an economic exchange relation: if there is no one commodity that changes hands, and therefore is common to two persons, there is no exchange. When a sign appears to exist for one person only—e.g. the proverbial knot in the handkerchief as reminder for something—then (a) it inherently could exist for another person and (b) it exists for that one person *as if* it were an Other within the self (Mikhailov 2001; Vygotskij 2005b). The sign thus emerges as a relation where one person acts on another, and only subsequently serves as a means to act upon oneself. Melissa’s offer to take the cubical shape as the sign vehicle for the mystery object (sign content) is modeled on all other experiences with signs and social relations. That is, a sign exists only as a commodity in verbal exchanges between two or more people, where it has use- and exchange-value (expressed by another commodity, sign). As Marx showed, the relation between people in the exchange comes to be grafted onto the relation between things; and that relation then is reduced to constitute the exchange-value of one of these things. The suprasensible aspect of the commodity (sign)—i.e. the “pointing” function of a hand movement—is a reflection of an earlier, real relation between two people (mother and child). In other words, “the thing that is expressed in [the objective ideal form], ‘represented’ by it, is a definite societal [obščestvennoe] relationship between people which in their eyes assumes the fantastic form of a relationship between things” (Il’enkov 2012, p. 176). As a result, a sign, as any higher psychological function, initially did not simply exist *in* a relation with another person but more importantly *was* a social relation first; and, once it has been fused into one, the psychological can at any time be unfolded into the relation between two people (Vygotskij 2005a). Thus, all three girls articulate for others with their plasticine what they feel when touching the

mystery object. But initially, the three models differ. No model therefore obtains the status of a commodity exchangeable for the mystery object.

In that episode, a crucial turning point in the events arises from the exchange with the teacher, who requests that the girls arrive at one and the same model (vehicle, signifier) because there is only one mystery object (content, signified). It is an explicit request to establish one rather than multiple sign relations and, therefore, to establish a situation where there is one model to be used by all in and as their communicative exchange. In this specific case, the nature of the tasks requires the establishment of an iconic relation, which means that the children have to come to agree on what can be felt in the box. But this is precisely where they initially disagree. Nobody can make Melissa change what she feels (intransitively); the results of her feeling (transitive) have to come to feel different. This is not easy, in the way it would not be easy to change into feeling happy over the comment of another when we initially felt hurt by it. In the episode, concordance of the (intransitive) feelings in the left and right hands is established through multiple tries of simultaneously feeling both parts of the continuum, one within the box, the other outside.

In this, the exchange with a teacher is crucial, as it is in many cases in mathematics education. This is so because when a teacher already expresses standard mathematical ideals in her behavior, these can be unfolded again into joint behavior (Vygotskij 2005a). There is a “renewed division into two of what had been fused into one” (p. 1023). The constraint requested by the teacher to have but one model constitutes a nudge towards the production of one model that is common to all, at least within the group, so that it can then be brought up for more general discussion at the whole-class level. In this, then, the possibility for a trajectory for local exchange-value of the model to a *universal* value is opened up. When everything is said and done—when the whole-class discussion begins, and especially after the girls have presented their work—we will have witnessed not just the birth of the relationship between the model (sign vehicle) and mystery object (sign content) and not just the birth of an agreement about a common model to be used in conversations about the mystery object. Instead, we observe how the social relations become absorbed into the material relation between things. The sign—the relation between vehicle and content—has “swallowed” one of its parents, the social relation, thereby mystifying its own nature. The sign, like any other material thing, “once it appears as commodity, it transforms itself into a sensible-suprasensible thing” (Marx and Engels 1962, p. 85). It “not only stands with its feet on the ground,” that is, has material character, “but also stands on its head,” that is, has ideal character (p. 85). In the Spinozist-Marxian analysis, the sign form no longer is mystical and mysterious. This is so because the sign form *appears to have* “meaning” as a “natural property” when in fact the suprasensible character of the sign merely is a reflection of societal (i.e. universal) relations that exist as societal relation of material things (e.g. sign vehicles).

The task of the three girls also presupposes the intelligibility and therefore societal nature of the condition: only one model (sign vehicle, signifier) can exist when there is only one object (sign content, signified). In the lesson fragment, the

teacher's intervention directs the children towards establishing a single sign relation. The specific sign relations that are to emerge for school students—e.g., in mathematics lessons—already exist for practitioners in the field of study (e.g., mathematics). These practitioners, including mathematicians, are embedded in material cultures and act/reason in ways that are universally recognizably mathematical. Whereas the children might come up with all sorts of relations—for example, the three girls might have ended up retaining all three models or they might have retained the cube as their sign vehicle—the presence of the teacher affords a universally valid and used relation to re/emerge *as* and *in* the children's relation to each other. The task of the teacher is to assist students in gaining entry to the field of mathematics by creating conditions that allow for the rebirth of sign relations that already exist for others in the society. That is, her presence affords the re/birth of the universal in the labor of these children. In the episode, we do in fact see the foundations of a mathematical culture: all three children engage proof procedures (providing reasons for their models). We also observe that the children (Jane, Sylvia) themselves evolve an educational strategy for stimulating a process that allows a peer (Melissa) to perceive (feel) the mystery object differently and, therefore, to establish a new form of sign relation.

Some semiotics scholars focus on relationships not merely between materials but more importantly between some material and a non-material mental entity, a “concept,” “meaning,” or “construction.” From the perspective of a *concrete human psychology*, this is not very useful—not in the least because humans engaged in communication always lack the second part of a sign relation when mathematical universals are involved (Roth 2016). A pragmatic take on the sign explicitly rejects the mediational function for accessing some “meaning” and consider only its use (Dewey and Bentley 1999; Wittgenstein 1997). The sign then is a manifestation of the very societal relation of which it is an integral part and that it contributes to constituting. The three girls are seen in the process of establishing that part of the sign relation that would stand for the (mystery) object of interest *in their future relations and communicative exchanges*. If the task had continued in the future, what would have emerged as the signifier (sign vehicle) could have been used to make present the mystery object even when it was no longer available. In use, the sign never is disconnected from its material and social basis, even and precisely when the sound-word is involved; and it is never disconnected from the soci(et)al relation that it has come to stand for. This is important for appropriately responding to the statement “cube,” which might be raising a question concerning the nature of thing involved, a descriptive statement, or a request for some cubical object (depending on the intonation). That is, not some “meaning” of “cube” matters primarily but the function of its use. In the absence of accounting for the sound, verbal intercourse is incomprehensible; not accounting for the sensible material basis of the word is a fundamental shortcoming (Vygotskij 2005b).

The materialist approach to the sign offered here therefore allows us to overcome an often-observed dichotomy between body and mind. Signs are not merely “‘representational glue’ that interconnects [children’s] body, their mind, and the world around them in a holistic fashion” (Danesi 2010, p. ix–x). Instead, they are concrete

(always and necessarily partial) manifestations of a child-acting-with-others-in-environment unit that has practical, intellectual, and affective dimensions (Dewey 2008a; Vygotskij 2001). In use, the material sign vehicle is a means of affecting others first, and subsequently a means of affecting oneself as an Other. The effect on others initially is not intended. Instead, a sign (e.g. sound-word) emerges *in* and, more importantly, *as* a social relation when others treat it in a certain way (Vygotskij 2005a). Everything required in learning and development occurs out in the open and no recourse to inner (invisible) mental processes is necessary: everything that is taken to be internal in psychological functions is necessarily external. This is why we can research learning and development anthropologically: by investigating what appears in the public sphere. This does not mean that there is nothing happening in the mind; instead, it means that anything relevant is public and researchable as such. Similarly, the signifier (sign vehicle) to be used in the lesson fragment arises from the exchanges and the level of approval or disapproval different proposed sign relations receive (e.g., the girls' debate about the appropriate model). The ultimate sign relation therefore also reflects the relation between people and the function within and constitutive of this relation. Vygotsky's concrete human psychology takes all higher psychological functions to *be* social relations with others first before they become relations of the person with herself. Even writing personal notes was a relation with others first, now directed to and being for the person as "'the Other' within" (Mikhailov 2001). Viewed from the late Vygotskian Spinozist-Marxian perspective, the sound- (ink-) word has use- and exchange-value, which manifests itself in the differences of (mostly inaccessible) intent and observable effect on others.

3.5 On the Possibility of Abandoning the Idea of Sign Mediation

The soul knows no mediator. (Mikhailov 2006, p. 36)

Most scholars will easily accept—and hold up Vygotsky's work to support their position—that the sign functions as a *mediator* making possible the relation between two or more people or assisting a person to access memory (Middleton and Brown 2005). However, the late Vygotsky had abandoned this, his earlier approach and was beginning to work out a Spinozist-Marxian position according to which there is only *one* substance (Mikhailov 2006). Because there is only one substance, there cannot be mediators because everything already is part of everything else. This is a point that Vygotsky was taking up from the materialist, Spinozist philosopher L. Feuerbach (1846), who inspired Marx and his analysis provided above. Feuerbach states: "only that exists, which is for me and the other at the same time, wherein I and the other agree, what is not only mine—what is *general* [*allgemein* = mine of *all*]" (p. 308). As the case of the commodity in economic exchanges clearly exemplifies, it does not mediate the exchange relation but in fact

constitutes the relation. There is no exchange relation if the commodity does not change hands, resting for an instant in the hands of seller and buyer.

The idea of the sign as taking a mediator position already has been critiqued within American pragmatist philosophy. From a pragmatist *transactional* perspective, the often-invoked triangular relation between sign (i.e., representamen in Peirce's triad), referent, and interpretant is a false and misleading appropriation of Peirce's work on the sign (Dewey and Bentley 1999). Instead, signs testify to the mutual implication of one in the other in the course of historically situated practical, "socio-cultural" activity, where word and sign each have their histories (Dewey 2008b). The environment, including language, is a "medium or milieu, in the sense in which a *medium* is *intermediate* in the execution or carrying *out* of human activities, as well as being the channel *through* which they move and the vehicle *by* which they go on" (p. 185). Instead of writing about medium, those pursuing the path taken by the late Vygotsky and like-minded Russian scholars write about a *communicative field*—variously referred to as *semantic field* [semantičeskoe pole] (El'koninova 2008; Mikhailov 2001), *sense-giving field* [smyslovoe pole] (El'konin 1994), or *imaging field* [pole izobraženija] (Bakhtin 1975)—that has changed because something in the visible environment writ large has been changed through accentuation. The signs (models) make visible, allow to be seen, in and as communication, characteristic features of the mystery object. This idea of language (sign) as the "*accented visible*, different from the visible ... where something is made manifest and something, on the contrary, is covered over, as if withdrawn" (El'konin 1994, p. 23) is one of the central ideas in the notes of the late Vygotsky (Mikhailov 2001). The analogy between a communicative field and a force field in physics may help. Like a physicist's heavenly bodies, which produce the gravitational field within which they move and that acts upon them, humans and their world constitute and relate through a communicative field that is common to them. The force field is thus not external, between, and separating the entities.

As noted above in reference to Feuerbach, Marx, and Vygotsky, the thing, commodity, and word is impossible for one but is a reality for two persons. In the case of the word (language), this is immediately apparent from the following revised transcription, where what Sylvia (turn 2) and Jane (turn 3) say only makes sense when we also consider, as transcribed, what Melissa has said before (turn 1).

- | | | |
|------|---|----------------------|
| 1 M: | ((says)) feel it eh? I have felt it's a cu:be, HU:::::ge | |
| 2 S: | ((hears)) feel it eh? I have felt it's a cu:be, HU:::::ge | no it's not a cube |
| 3 J: | ((hears)) feel it eh? I have felt it's a cu:be, HU:::::ge | i didn't feel a cube |

Only because what Melissa says is a reality also for Sylvia and Jane does the saying of the latter constitute a continuation of the talk. That "feel it eh? I have felt it's a cube, HU:::::ge" is the result of and constitutes their common communicative

(semantic) field: it is not a mediator. The field is constituted by and constitutes the relation. Each turn pair, therefore, has both a sociological dimension cutting across speakers and a psychological dimension that exists in the unfolding of speech and hearing (Roth 2014). Of course, in Jane's response, we should also have included the import of the statement "no its not a cube" that had come from Sylvia's lips, and which, in Jane's statement "I didn't feel a cube" finds further (empirical) support.

It has been noted that the materialist analysis of the commodity has a direct equivalence in the materialist analysis of the sign (Roth 2006). Thus, the sensible sound-word (sign) has (suprasensible) exchange-value for the speaker and use-value for the recipient. These exist not inherently in the sign, that is, these are not properties that inhere in the sign. Instead, both are tied to events. It appears obvious that exchange-value is tied to exchange and does not exist otherwise; something that is not exchanged has no value given in terms of another thing. Furthermore, "use-value is actualized only in use or consumption" (Marx and Engels 1962, p. 50). We cannot consider "the sign" as a Kantian "thing in itself." In the transcription, the exchange event exists across two turns, two phrases or statements. The first phrase simultaneously has exchange-value (Melissa) and use-value (Sylvia, Jane); the two reply phrases (at the ends of turn 2 and turn 3) also have exchange value (Sylvia, Jane) and use-value (Melissa). Incidentally, the Russian term *značenie*, generally translated as "meaning," also translates "value" and "magnitude"; in the materialist approach of the Spinozist-Marxist tradition, it should be read and heard as "function and rôle" (Il'enkov 2012, p. 178).

The traditional view of the sign as standing between the subject and her world is a structural (logical) perspective that lists elements of an event and connects them. Unsurprisingly, when there are two people, the sound-words seem to be between and connecting them. From this perspective, therefore, the word (sign) plays the role of an intermediary—expressed in the well-known triangle of Vygotsky's earlier work that makes thematic that a direct connection between two people (subject₁ and subject₂) is impossible thus requiring something else connecting them. In the Spinozist-Marxian materialist approach, commodity and verbal exchange is viewed as an event that has a dynamic, developmental direction running transversally to the opposition of two self-contained individuals. Those interested in development and becoming focus on continued change. Thus, there are *lines of becoming*. Whereas the consideration of a word to be said to another focuses on the logical relations between speaker, listener, and word (language), lines of becoming focus our attention on (a) change occurring in participants and language while talk is occurring (Bakhtin 1975); (b) how thought, language, and situation are developing during speech activity (Vygotskij 2005b); and (c) how maker, materials, and artifacts are changing in the productive process (Ingold 2011). Thus, the three girls and the materials they use and work and their English language are changing while the lesson fragment is unfolding, whatever the individual intentions of the participants. This is so, for example, because in *actively* attending to what Melissa is in the process of saying (turn 1), Sylvia and Jane *are affected*, that is, they are changed. Moreover, because their response—the diastatic event encompassing actively receiving and replying—is already under way, so is their thinking. An event

invisible to others and the self (Vygotskij 2005b), thinking unfolds and therefore changes the person. Not only the participants are changing, but also the material forms (here the plasticine). The children thus are changing physically (and presumably physiologically) as well as psychologically and sociologically.

The radical difference of this approach is apparent from the analogy with a river (Deleuze and Guattari 1980; Ingold 2011). The transitive subject–object or subject–subject connection mediated by a sign is like the relation between two opposite points of a river linked (mediated) by the bridge (sign, tool) (Fig. 3.3a). However, the flow of the river is perpendicular; it is intransitive, continuing despite the theorists’ inclinations to focus on the transitive relations between opposites. In being part of the field, all parts of activity are thought historically, as ever becoming and ever changing even after the mutually implicating encounter that leaves its traces in all of them (Fig. 3.3b). The Spinozist-Marxian approach is designed to understand phenomena culturally and historically. The present study makes thematic the entire life cycle of the sign, from its birth to its universal use.

3.6 Implications for Theorizing the Sign

The societal-historical approach to the sign that the late Vygotsky started has considerable implications for educational practice and research. In traditional cognitive scientific and constructivist theory, there are two problems with signs. The first concerns the relationship between thought and things in the world (how are thoughts related to material things?); the second pertains to the question of intersubjective agreement (e.g. “What is the ‘meaning’ of a sign vehicle?”).

Taking up a late Vygotskian, Spinozist-Marxian agenda on the sign allows us to see both questions as artifacts of theory and method. Vygotsky may indeed be the most important forerunner of educational semiotics, for he recognized that signs are manifestations of societal relations, embedded in *dynamical* historical and cultural relations. In this approach, the suprasensible moment of the sign is not some purely ideal “meaning,” “socially constructed” and internalized by learners. Instead, the suprasensible—*značenie* = value, function (“meaning”)—moment is a reflection of the original, constitutive relation with another person. The higher, supersensible

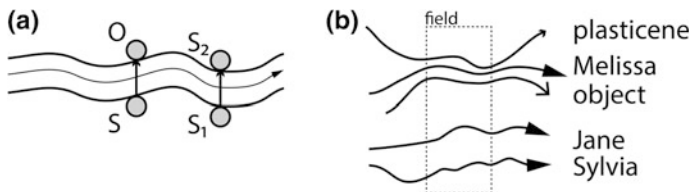


Fig. 3.3 **a** Traditional transitive subject–object and subject–subject relations require mediation (a bridge) to be linked. **b** Lines of becoming are intransitive, running transversally and constituting a field

function of the word was a social relation first and later appears as reflection of the relation in consciousness, where it is attributed to the natural property of it (i.e. “meaning” as natural property of the word).

In his late work, Vygotsky drew radical implications for his method. Accordingly, the sign in itself cannot be the unit of analysis; instead, the sign is only a manifestation of a larger *unit* that has to have all the characteristics of human society, societal relations, which constitute the very possibility of human sign forms. This unit, as is characteristic for educational semiotics, integrates humans and their environment and manifests itself in practical, intellectual, and affective ways. Because all that matters is the *use* of inherently material sign vehicles, humans become literate sign users by participating with others in societal activity where signs (language) also are part; one may say that persons become signs themselves (Fig. 3.3b). We no longer need to ponder the “meaning” of a sign—one of the mediating third parties that pragmatic philosophers (e.g. Dewey and Bentley 1999; Wittgenstein 1997) explicitly reject as useful to theorizing—because the sign always will be an integral part of some irreducible whole: a means of acting upon others or the self. As one Spinozist-Marxian philosopher suggests, “the ideal form of a thing is a form of societal-human life-activity, which exists not in that life-activity, but, namely, as a form of the external thing, which represents, reflects, another thing” (Il’enkov 2012, p. 184). In fact, ideality only exists in the continuous transformation of the two, “forms of activity and forms of things in their dialectically contradictory mutual transformations” (p. 192).

Educational practitioners following this approach might set up classroom contexts that afford the birth of (inherently shared) signs for communicative purposes. This is important because the birth and becoming of signs, as described and theorized here, is future oriented, irreducible to direct instruction or to the models of unidirectional transmission of factual knowledge. Students in mathematics, for example, may then be involved in producing and changing signs and sign relations while part of dialogical relations involving others (peers, teacher).

3.7 Conclusion

For the late Vygotsky, the Spinozist-Marxian, materialist logic implicit in Fig. 3.3b integrates the method of the sciences, nature, and philosophy. There is only one substance; and it manifests itself materially, biologically, and culturally. Materialism of the Spinozist-Marxian type is the only non-reductive human endeavor because it develops categories, the classical domain of philosophy, and their testing and further refinement in the same object of inquiry (Il’enkov 1960). Without doubt, Vygotsky, if he lived today, would have said that educational semiotics *is* nothing other than the ultimate science—and in that science there is no place for mediating thirds because the historical culture of mankind always and already is *immediately* given to all the participants in a communicative field (Il’enkov 2012). To grasp the idea of a field, an analogy with classical physics is

offered above, where the relationship between two entities—two masses, two charges—is conceptualized not in terms of a third thing but in terms of a force field. Both entities constitute the field and, in turn, the field shapes their movements. The resulting field is common to the all entities in and constitutive of the field (Fig. 3.3b), but the effects on each are different. The relationships are dynamic—as exemplified in the relation of heavenly body pairs, such as sun–earth or earth–moon. We may usefully conceive of human relations in a similar way, shaping and being shaped by the exchange of signs, each of which is reflected in consciousness. As a result, “consciousness is reflected in the word like the sun is reflected in a droplet of water” and “the word ... is related to consciousness like a living cell is related to an organism” (Vygotskij 2005a, p. 1018).

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