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Learning as Objectification

In the going educational and psychological literature, learning is conceived of and theorized as the transition from one state of knowledge at some initial point in time, $K(t = t_1)$, to a second state of knowledge at a subsequent point in time, $K(t = t_2)$. Others prefer to write/speak about an initial conception $C(t = t_1)$ and the change to another conception $C(t = t_2)$ at a later point in time that is the consequence of teaching/learning actions and involves a more or less radical restructuring. An apparent problem that psychologists and teachers alike also make thematic is students' apparent unwillingness to learn or change conceptions. To understand the situation, these researchers then see themselves forced to introduce another category, motivation. It allows thinking about what a teacher might do to motivate students in such a way that they do what they do not want to do on their own (learn, change conceptions). As suggested in chapter 1, cultural-historical activity theory approaches the problem in a very different manner.

In cultural-historical activity theory, learning is thought of as a transformation. This transformation is marked by a general movement produced by the subject's encounters with diverse and often conflicting cultural forms of being, knowing, and feeling and the unfolding subjectivity that is continuously produced and updated in the course of those encounters. We can see from the outset how different cultural-historical activity theory conceptualizes learning from other theories. Learning is not about an individual changing concepts from within (as in conceptual change); nor is it about developing more and more powerful cognitive mental structures as the individual tries to adapt to the environment (as in constructivism). Notwithstanding Piaget, there are no ahistorical and acultural universal mechanisms of knowledge production that could account entirely for the way human cognition functions. As Vygotsky argued, the lines of biological and cultural development merge. As a result, the higher forms of cognitive activity (visual, tactile and oral perception, memory, thinking, or symbolizing) are transformed in a way that the biological and the cultural are no longer separable. The cultural phonetic sounds to which the newborn is exposed during the first eight months define progressively the confines of those sounds that will constitute its phonetic repertoire

(Werker and Tees 1984). And those of us who have learned a second language as adults know very well how difficult – if not impossible – is to produce sounds beyond our first language repertoire.

In cultural-historical activity theory the idea of transformation that lies at the heart of learning captures the inseparability of the biological and the cultural and can be summarized as follows. At birth, we all arrive in a world that is already replete with concrete and conceptual objects. The world in front of us is not the Adamic world of untouched nature but a historical world which, through objects and practices, conveys significations and forms of reasoning – aesthetic, ethical, mathematical, scientific, and so on. In this world, the child interacts with others. Because according to Vygotsky (1989), any higher-order psychological function *is* a social relation first, the child's development (ontogeny) is a function of its societal relations with others. Now, precisely because the forms of reasoning that we encounter in the world have been forged and refined through centuries of cognitive activity, and are a result of conflicting ontological, aesthetic, economical, and political views, they are not natural. They are cultural. They are sedimented forms of complex historical sympractical activities and as such appear far from trivial for the students.

Within this context, learning can be theorized as those transformative processes through which students gradually become acquainted with historically constituted cultural significations and forms of reasoning and action. Those processes are termed *processes of objectification* (Radford 2002). They entail a moment of *poēsis*: a moment of 'bringing-forth' something to the realm of attention and understanding. *Poēsis* is a creative moment of disclosure – the event of the thing in consciousness.

Learning leads not only to the renewal and transformation of cultural forms of being, knowing, and feeling, but also, from the individual's perspective, to the creation of room to maneuver and to gain control over conditions within the activity at hand and the larger project of individual life more generally, which interconnects the various activities in which an individual participates in the course of his/her life (e.g. Holzkamp 1993). Intentional learning is *not* the conscious object/motive of the activity. It cannot be the object/motive because it is unknowable from the perspective of the student given that, qua learning, *s/he does not yet know* and therefore is asked to learn. If at all, the object/motive of the activity may reveal itself to the student. When a person has taken up the subject position in an activity, he or she has also taken up its object/motive. The conscious subject may realize that there are obstacles on the way to realizing the object/motive – i.e., concretizing the intended outcome – in which case *s/he* might engage in a form of action that expands his/her possibilities toward realizing the object/motive. This objectifying movement oriented towards new forms of action, possibilities, and control, a movement that is simultaneously cultural and subjective *is* learning. It is inherently associated with a positive valuation. Such learning does not have to be motivated: the subjective-cultural movement constitutes a self-motivating moment of activity. In chapter 2, we observe Mario expressing a lack of understanding and his request for assistance marks a *desire* to overcome this obstacle so that he can work toward

realizing the task specifically and discover the associated object/motive more generally. This is different from Aurélie, who also requested help but who accepts it in a form that does not allow her to understand or to independently end the task and realize its object/motive. Mario's desire to overcome the obstacles – or his *will to knowledge*, to use Foucault's (1971) expression – does not amount to looking for adherence to social forms of doing. If that would be the case, he could have patiently waited for the teacher to conduct a general discussion and see the solution appear on the blackboard. As we interpret it, Mario perceives an opportunity in the creation of new possibilities, which, as his actions express, is anticipated in his seeking of understanding rather than in merely copying from the worksheet of another person.

Creating Action Possibilities

In the previous chapter, we observe how Mario expresses both emotion – frustration – and a reflection on a cognitive state (expressed through the utterance 'I do not understand'). We also observe that the teacher, in approaching and beginning to interact with him, realizes that Mario is stumped, while also realizing his concomitant emotional states. Jeanne 'knows' Mario as a particular 'emotional' individual – though this is not available in this episode itself but through our weekly debriefing conversations with her. There is therefore a mutual understanding of the current need state in which Mario finds himself. This collective attention to need states is of particular relevance to cultural-historical activity theory and the integral relation it theorizes between the individual and the collective. Thus, action possibilities are no longer determined in terms of what the individual can do but – because of the extent and quality of the societal relations with fellow humans – in terms of collective possibilities (Holzkamp-Osterkamp 1978). The consideration of the emotional valuation of objective conditions on the part of others is taken into account and becomes of special signification for the individual, because in the overlapping evaluations of objective conditions is expressed the emotional connectedness as subjective valuation of the exponentiation of action possibilities in the collective. With Jeanne's arrival at the table and her interactions with Mario in particular, learning possibilities did not automatically expand. In fact, as we show here, the continued sympractical activity initially does not lead to appropriate teacher actions and does not open up new possibilities for student action. Knowledge objectification is not realized. The negative result is reflected in the negative cognitive and emotional evaluations.

‘Okay. . . What Did You Have to Do?’: Attempting to Get Unstuck

Mario and Jeanne have related and perhaps complementary problems. On the one hand, Mario does not understand the purpose of the activity. Coming to understand this object/motive is in fact the *raison d’être* of the classroom activity. Jeanne could have started the classroom activity by verbally articulating the object for the students, saying something like ‘Today the object of our activity will be to learn to think algebraically about patterns’ and, of course, this would not mean much to the students. In terms of understanding, the students would have practically gained nothing. At this point, Mario’s task at hand is to engage in the sympractical activity so that this object/motive discloses itself in the course of the objectifying process.

On the other hand, Jeanne, as she articulates later (turn 169), is in the process of helping Mario to understand. Her problem is finding the appropriate pedagogy that will do the trick. Her problem is to launch an objectifying process where room is created for a joint work. The two have to work together, as Jeanne will be able to find the pedagogy that works for him all the while exhibiting that she is helping, even though success cannot be guaranteed; and Mario has to assist Jeanne in exhibiting what he knows and understands and what he does not. This collaborative work is possible only because they already share a great deal of intersubjectivity, of common ground, on the basis of which they can knowledgeably engage each other. In fact, every word that one or the other is going to utter implies the other’s willingness to understand. Each word has to straddle the current speaker and listener – or they would fail to understand one another.

In the unfolding activity, emotionality, too, is reproduced and transformed. Initially, in the first two parts of this fragment, negative valuation is available in the expressions of frustration. This valuation therefore is reproduced from the end of Fragment 2.3 where we observe it for the first time. It is only at the very end of this second fragment that Mario will exhibit a positive emotional valence. At this point, the object will have revealed itself in the poetic moment of objectification, and the gap between the state to be achieved and the current state will be reduced.

Mario does not just offer a description of his current cognitive state, but also invites and even asks for help. The request is initially declined as Jeanne begins by asking whether they are discussing (the problem) within the group. Mario says with frustration in his voice that Thérèse ‘just left’ and that ‘they have already written stuff’ (turn 049). After a while, Mario adds that he does not like it. Jeanne responds ‘but yes’ ‘because they are in the process of helping you’ (turn 053). ‘But how’, Mario answers in frustration (turn 054). In response, Jeanne begins a first explanation (see arrow). We can gloss these events in this way. Jeanne initially refers Mario back to the group, but, given his negative response, she begins a teaching sequence. There is both a cognitive and an emotional response in stating that he does not like it and in the intonation that expresses his discouragement. The need for her engagement arises from the interaction with Mario, in response to his expressed emotional needs. If they had been purely cognitive, she could have referred Mario to work with his peers.

Fragment 3.1a

046 M: look this is (.) dUMB, <<p>i dont understAND.>
 ((487>217Hz))
 047 J: =are you having a group discussion?
 048 (0.16)
 049 M: no. tresa is just gone so from:: (0.53) LOOK (0.72)
 like (.) they alrEADy wrote thi:::ngs ((Frustration))
 050 (1.20)
 051 A: <<f>^ma[da:me.>]
 052 M: [i like] i dont like. ((discouraged))
 053 J: but YES because they are GUIDing you.
 054 M: like, ^how:: that.
 055 (0.11)
 056 J: kay (.) first week (0.84) WHY (0.16) ~wOULD (0.75)
 there be? (0.91) why would there be:::sIX (0.61)
 dollars in the piggybank.

Jeanne begins by asking why there should be \$6 during the first week (turn 56), but Mario responds that there are 9 (turn 060). There are longer pauses in her delivery, with repeated elements of the utterance, as if she were seeking the appropriate question. Mario says that there are 9 (turn 060), and Jeanne begins to overlap, asking whether there really are \$6 (turn 061), while closely inspecting the first cell in the table. She insists, ‘there are three plus six’ (turn 64). Between Jeanne and Thérèse, they work out that the deposit during the first week is $3 + 6 = 9$. Jeanne insists on the \$3: ‘Why do you think the three is in yellow?’ (turn 069). Both Mario and Thérèse suggest that they do not know (turns 71 and 73, respectively). Jeanne insists asking where the three are coming from (turn 076), and, when the responses are negative (Thérèse) or about something that has nothing to do with the task (‘the wedding thing’), she asks, ‘but what precisely are the three dollars?’ (turn 080). Thérèse begins by saying that these are the \$3 that she saves (turns 082, 088); Mario overlaps her saying, ‘the ones she takes each week’ (turn 085). Although Thérèse notes that she understands – she does have the searched-for responses on her worksheet and these are ‘like’ (unstated, but perhaps consistent with what Jeanne has said) – Jeanne states a resolute ‘Okay’, and then asks that they re-read the problem (turn 094).

Fragment 3.1

→ 056 J: kay (.) first week (0.84) WHY (0.16) ~wOULD (0.75)
 there be? (0.91) why would there be:::sIX (0.61)
 dollars in the piggybank.
 057 (1.04)
 058 for the first week. (.) what did you ge::t (0.37) to
 do ((she takes the goblet of week 1))
 059 (0.75)
 060 M: becau::se (0.30) ((points to goblet 1))
 [but there is nine] <<dim> [the first week]>
 061 J: [there is, you know] <<crsc>[is it really] six
 dollars? ((points to and looks closely at M’s first
 cell))
 062 M: no:n?
 063 T: no. yea.
 064 J: =ITs three plus six:.



Fig. 3.1. Mario has shaken his head and now gazes with a questioning look at his teacher (turn 071).

065 T: ive said <<whispering>[that is what ive said]>
 066 J: [why three plus six:.]
 067 (0.34)
 068 T: because it equals to the deposit of the first week she
 has nine.
 069 J: it EQuals to nine the first week. (0.78) WHY is the
 thrEE in yellow? whydyou think? ((Index finger on
 number in first column))
 070 (0.19)
 071 M: um um, um ((shrugs shoulders, shakes head 'no',
 questioning look, Fig. 3.1))
 072 (0.20)
 073 T: <<all>i dun[no]>
 074 M: [be]cause we are supposed to write it?
 075 (0.44)
 076 J: WHEREE does the thREE come from?
 077 T: donno?
 → 078 M: <<f>a:=u:> (0.24) u:: (0.17) u: dududu: wedding thing
 there?
 079 (0.76)
 → 080 J: but ((exasperation, turns head away from Mario))
 (0.14) the three dO:LLars? is wHAT exACTly? ((Mario,
 who has looked at her, grimaces in desperation, brings
 his hands up and covers face, Fig. 3.2 [6:11]))
 081 (1.61)
 082 T: its its:: its [the three] do::llars there that
 s::he::.
 083 M: [u::h:]
 084 (0.48)
 085 M: she takes [each] week.
 086 T: [ss:]
 087 (0.38)
 088 T: aves ((Jeanne moves head to side over shoulder, gives
 him 'a look'))



Fig. 3.2. Mario brings his hands up and covers his face, his whole body becoming an apparent gesture of frustration (turn 080).

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089      (0.45)
→ 090 M: like i dont understa:nd. ((reacting to teacher look,
      points to his worksheet, Fig. 3.3 460>229 Hz))
091      (0.59)
092 J: <<all>okay.>
093 T: <<len>i understand .h:: ive it l[like ].
094 J:      [reREAd] the problem.
      (0.33) lets reREAd the problem. wHAT does it tell us
      to do here it?

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We see both Mario and Jeanne produce emotional expressions, their overall valuations of the current state of affairs. Mario has introduced, partially in English, ‘the wedding thing’ (turn 078; he may be confusing the anniversary event with a wedding one), and there is nothing at present that has to do with a wedding. Jeanne produces signs of exasperation in the adversative conjunction ‘but’, the exhalation, her turning of the head away from Mario, and then the third iteration of a question about the ‘three dollars’. Mario erects, grimaces, and then covers his face with both hands (Fig. 3.2). When he responds with the description of a fact (still in his normal voice parameters) that has no equivalent in the story problem, Jeanne gives him a look, and Mario responds beginning with a causal conjunctive (‘like’, in French ‘comme’), ‘because I don’t understand’ (turn 090, Fig. 3.3), his voice parameters are consistent with the despair that our cultural competence allows us to hear and see.

In this Fragment 3.1, they do not come closer to the object/motive of the activity, as Jeanne does not succeed in doing what she apparently intends. The objectifying process has not started yet. The current interaction amounts to the creation of the conditions for the birth of objectifying process. However, at this point, there is no guarantee that such a process will start. Jeanne has started with a resolute ‘kay’ (turn 056) and begins another attempt with an equally resolute ‘okay’ (turn 092). In both instances, the beginning of a teaching sequence follows Mario’s description



Fig. 3.3. In response to the teacher's look, while saying with apparent frustration 'I don't understand', Mario takes his hands off the worksheet and turns them upward toward the ceiling (turn 090).

of the situation as not understanding; and this lack is also expressed in emotional terms. Jeanne, too, produces expressions of emotional valuations, here exasperation and facial expressions that are correlates of emotion (Ekman et al. 1987). That is, in their engagement of each other, they produce the activity and, as they realize they are not getting any closer to Mario's understanding of the object/motive, valuation of this distance is available in the emotional expressions. These are integral product and resources of activity, for it is precisely because they are still away from understanding that they continue and attempt to restore understanding by further engaging each other.

For Jeanne, this part is not just a failed attempt. Given that she has not had the opportunity to overhear the students in their prior conversations, she does not know exactly where they are with respect to activity. Although she fails, the segment also constitutes an opportunity for her to better understand the situation generally and what forms of knowing Mario exhibits specifically. In fact, without engaging with the students, or without at least attending to their conversations, she does not have the information required for tuning to, and understanding, the students. Engagement, then, also means search for an appropriate pedagogy, which, in its first attempt, fails – a fact that Mario clearly states.

This is not just a failed attempt: It is in fact an integral part of the activity, which involves identifying new goals when obstacles pose themselves (as recognized by the subject of activity, here Mario and Jeanne). At this point in the episode, we cannot know how this mutual engagement will contribute to understanding, but insofar as they begin another attempt, we see their anticipation that there is still the possibility to succeed. For Jeanne, this entails finding a pedagogy that will move both of them into an objectifying process, which consists not merely in having Mario filling the worksheet but in understanding cognitively and affectively the relevance of the result achieved with respect to the actions that preceded it. For both of them, this means further engagement – with the possibility that they still do

not get closer, a fact that would receive negative valuation, and a negative emotional response. This engagement is of an *ethical* nature: it is a *call* that has to be *answered*. In a previous work, we have called this ethical engagement *togetherness* (Radford and Roth 2010), an invisible ethical relationship that glues the participants in joint activity and makes activity more than additive actions and deeds: togetherness makes activity a real unity.

'Let's Re-Read the Problem': A Second Attempt at Getting Unstuck

To get unstuck, the activity itself has to produce the pedagogy necessary to move Mario along. It is not such that the pedagogy is on the outside of the activity, getting Mario unstuck so that he can re-enter the activity to continue. The very disclosing of where the issue lies is an integral part of the activity, and the understanding may emerge at any one point in the process. Teaching and learning no longer are separate processes, for in teaching Jeanne also has to learn what is impeding the progress and in learning, Mario has to assist his teacher understanding just what his problem is. Teaching is learning and learning is teaching. Teaching and learning are the two ways in which Vygotsky's concept of *obuchenie* [обучение] manifests itself in the way value manifests itself as use-value and exchange-value during the give-and-take of the actual, concrete barter trade. Like Marx/Engel's value, *obuchenie* captures the movement of the teacher-student as well as the student-student and teacher-teacher self-relations. In fact, for Vygotsky (1978), any higher order cognitive function has been a social relation before. Similarly, 'The structures of the world themselves are present in the structures (or, better, cognitive schema) that the agents put into play to comprehend it' (Bourdieu 1997: 180). *Obuchenie* is this social relation, and, as such, it cannot be reduced to its individual members but has to be understood as an overarching category that manifests itself in teaching and learning.

'Re-Read the Problem' The activity continues with Jeanne's request that Mario read the problem again, followed by a re-iteration that *they* re-read the problem, and an invitation to articulate what it tells them to do (turn 094). Why might the teacher invite him to re-read the problem? Mario accepts the invitation and begins, 'For her birthday', then stops for almost a second, staring at his worksheet, then uttering with rising intonation, 'what?' He grimaces, his hands turn palms open against the ceiling, as if her were saying, 'what's going on here?' (turn 096). Jeanne confirms, 'Yes, for her birthday' (turn 098). That is, we have here a statement/question–confirmation sequence, which reveals Mario's question about the context in the word problem, which he previously characterized as being related to a wedding (turn 078). Jeanne and Thérèse assist Mario in reading the text by articulating some of the words that he pronounces slowly or incorrectly. After the first two sentences, Jeanne summarizes, 'So she receives a piggybank', and continues by offering a question, 'How much money does she have in her piggybank?'



Fig. 3.4. Mario, in the apparent attempt to explain, moves his left hand forward until it is above goblet 1; but he withdraws as his teacher, who has overlapped his speech, continues to talk (turn 118–119).

(turn 108). Again, we see here a clear attempt to create the beginning of an objectifying process.

Fragment 3.2a

094 J: [reREAD] the problem.
 (0.33) lets reREAD the problem. WHAT does it tell us
 to do here it?
 095 (0.58)
 096 M for her anniversary- (0.97) what? ((grimace, hand
 gesture, open toward ceiling, 'what's going on here?')
 097 (0.50)
 098 J: ^yes (0.25) for her ANniversa:ry
 099 M: <<len>marie-na:in (0.52) receives (0.15) a piggyb
 100 (0.15)
 101 J: a piggy[bank]
 102 T: [piggy]bank
 103 M: <<p, len>a piggybank?> (.) containing six dollars
 (0.80) she deCIdes (0.15) ah tos[ave][(.)ave]
 104 T: [sa:][:v::e:]::
 105 J: SA:Ave,
 106 M: save three dollars (0.50) per week.
 107 (0.35)
 108 J: so. (0.35) she receives a piggybank; how mUCH money
 does she have in her piggy [bank]?

At this point, they have established the fact that there are \$6 in the piggybank to which \$3 are added each week. Jeanne asks how much money there is in the bank, and Mario responds with a facial expression as if his teacher had asked of him something self-evident, 'six', and then continues, 'plus three equals nine' (turn 112). There is an exchange over how much is added and then Jeanne points to goblet 1 uttering 'so' in a constative rather than questioning fashion (turn 117). 'We are nine', Mario suggests (turn 118) moving his left arm and hand forward so that the hand comes to hover over goblet #1 (Fig. 3.4). At the same time, Jeanne articu-

lates ‘three plus six’ articulatively stressing the first numeral (turn 120). In fact, we have a mini-IRE sequence here, for we can hear Jeanne ask a question, which is confirmed as such when Mario says ‘nine’, which is the number of chips in goblet #1, the one in question and the one that Mario reaches out for (and thereby designates as the currently relevant and salient one).

Fragment 3.2b

108 J: so. (0.35) she receives a piggybank; how MUCH money
does she have in her piggy [bank]?
109 M: [six] ((facial expression
as if teacher had asked the ‘self-evident’))
(0.54)
111 T: [six dollars]
112 M: [plus three] equals nine.
113 (0.22)
114 J: so each week, she saves (0.13) how much money.
115 M: three dollars
116 (0.68)
117 J: three dollars (0.11) so: ((points to cell 1))
118 M: we [are nINE?] ((holds ‘pick-up’ hand over goblet 1,
as if wanting to grab it, Fig. 3.4))
119 J: [three plus] six. ((continues pointing))
120 A: <<plaintive>are we sup[posed to do this?>] ((Points to
Mario’s page))

Although Mario has provided the correct response, it is not the correct response in this obuchenie (i.e., teaching-learning) relation in respect toward the anticipated outcome that is to overcome the obstacles that interfere with understanding. Jeanne’s emphasized articulation of ‘three’ constitutes the reiteration of the previously asked-for weekly saving, which now is augmented by ‘six’. Three plus six *does* add up to nine, but this is not the sought-for signifier for the contents of the first goblet, though it *also* is a correct one. The knowledgeable person – Jeanne and the reader – is aware that the algebraic pattern for calculating the goblet contents for any given week requires the realization of the repeated addition of \$3, one such amount per week, so that the total amount added by week n equals to $n \times \$3$. This repeated addition does not become salient if Mario uses the signifiers 9, 12, 15 and so on for the contents of the goblets rather than the signifiers $3 + 6$, $3 + (3 + 6)$, and $3 + (3 + (3 + 6))$. From the latter, there appears to be a much shorter step to generalizing the total sum to $n \times 3 + 6$ then from the sequence 9, 12, 15, and so on. The object of activity (thinking about patterns in an algebraic manner) appears refracted differently in the participants: while for Jeanne, the object appears refracted in the materiality of the expressions $3 + 6$, $3 + (3 + 6)$, and $3 + (3 + (3 + 6))$, for Mario it appears as a total. There is a dialectical contradiction here in the way the object/motive of the activity shows itself to the participants. The didactic problem is to invite Mario to consider the saving process not as totals, but as a process of successive additions and, later on, to see the successive additions as multiplications. This shift of attention requires a transformation in the manner in which actions can be perceived. Realizing or becoming aware of these new forms of seeing the saving process is what objectification is about.



Fig. 3.5. Mario, with an intonation as if the teacher was asking him the self-evident snaps his fingers of the left hand against goblet 2 and utters ‘twelve’ (turn 128).

In this part of the episode, therefore, Jeanne has asked and Mario completed a re-reading of the problem. Having thereby asserted the conditions of the task, Jeanne asks for an articulation of the steps taken. From the perspective of Mario, she is asking the self-evident, as he has already provided the answers before Jeanne asked the question: Each goblet contains the number of chips corresponding to the number of dollars specified in the task. He has placed \$6 in the first goblet and, as instructed in the task, added \$3 that Marianne has added at the end of the first week. But undistracted and undisturbed by the expressions, as if these had not occurred, Jeanne continues engaging with Mario.

‘Second Week’: Positive Evaluation They then move to the second week, as Jeanne picks up the corresponding goblet, and asks, after Thérèse and Mario already offer to begin responses, ‘How much does she have already in the piggybank’ with a stress on the ‘she’ (turn 126). Mario completes a question–response pair, ‘twelve’, with some exasperation in his voice, which marks her question as having asked the self-evident. He simultaneously snaps with his fingers while hitting the goblet (Fig. 3.5) as if he were saying, ‘of course there are twelve in this goblet’. After all, he had been counting them out and placing them there. But Jeanne asks the question again, ‘How much money does she already have in the piggybank’ (turn 130), but intonationally different, as she emphasizes ‘already’; and Mario responds with a literally exasperated (frustrated) ‘What?’ (turn 132). A repetition is not just saying the same thing, but is produced with the previous utterance as background, therefore articulating something different all the while leaving it the same (Bakhtine [Volochinov] 1977). Here, Jeanne and Mario have enacted a question–response turn, but the teacher repeats the utterance. This repetition therefore can be heard as an evaluation that the preceding response to its first iteration is incorrect. There is a contradiction: Mario expresses in his question ‘What?’ a non-understanding and an assessment simultaneously. Jeanne repeats the question again, emphasizing, as in the previous iteration of the question, the adverb ‘al-

ready' (turn 134). Thérèse says 'six', but, when Jeanne repeats 'the second we-', articulates an interjection of surprise, 'Oh' (turn 140). Mario, who had begun a first response with an 's' sound (as in *six* [Fr.], *six* [Eng.]), then self-corrects, 'No', and he says, 'nine' (turn 137). He repeats this response, which Jeanne, by a constative statement of the same word while nodding, confirms. She then explicates, 'the six she started with and the three dollars'.

Fragment 3.3a

120 A: <<plaintive>are we sup[posed to do this?>] ((Points to his page))
 121 J: [second week] ((she takes the goblet of the second week))
 122 (0.89)
 123 T: <<p>[yes I think]>
 124 M: [we:=ave:;]
 125 (0.17)
 126 J: how much does SHE have already in the piggybank.
 ((continues to hold goblet 2))
 127 (0.18)
 128 M: twELV::e. ((rapid confirming gesture toward goblet, Fig. 3.5, intonation of exasperation, as if she has asked the 'self-evident'))
 129 (0.42)
 130 J: well the sECond week, how mUCH does she have AL:REAdy:
 ((nods with each emphases))
 [in the piggybank.] ((still holds goblet 2))
 131 A: <<p>[me [i=m done]
 132 M: [whAT h?] ((frustration))
 133 (0.63)
 134 J: how mUCH money does she have ALrEAdy in her piggybank?
 ((still holds goblet 2))
 135 (0.55)
 136 T: <<p>[six]>
 137 M: [a s:] (0.53) no[n. nINE:]
 138 J: [the second] wee ((holds goblet 2, on 'wee' points to it with other index finger))
 139 (0.38)
 140 T: <<f>O:H:.>
 141 (0.22)
 142 M: nINE

As teachers, *we* (authors and readers) know what Jeanne is aiming at, even though this is not yet evident to the students. In fact, Jeanne's actions would be unnecessary if Mario and Aurélie knew what she is attempting to make salient. And what she does has arisen from the obvious realization that the two students do not conceive of the contents of each goblet as the repeated addition of \$3 for each week. In a sense, the way in which the activity unfolds, the requirement of the task to have a different goblet representing each week changes from what would have been the lived experience, the one that Jeanne *actually* wants them to articulate and make salient. If Jeanne had operated with one and the same goblet, then Mario could have added \$3 for each week. Jeanne's question 'how much does she already have in the piggybank' might have been recognized as descriptive of the content of

the one piggybank. To expand her own possibilities of teaching, Jeanne has to bring this repeated addition out and make it salient from a state of the activity, where the addition is enfolded and hidden. It has to be inferred from the contents of the first and second, second and third, and so on goblet. The entire sequence of turn pairs from turn 134 to turn 142 constitutes the work of making salient that *after* the first week there are \$9 in the piggybank. It is to this amount that another \$3 are added at the end of the second week to yield the result that Mario has already signified in uttering ‘twelve’, but which hides rather than reveals and exhibits the addition that he has conducted at the beginning of the task when he counted out 3 chips for each week and added them to what he knew was contained in the goblet standing for the preceding week.

The same turn sequences actually show surprise on the part of Thérèse when Jeanne repeats pointing to and asking about the second week. Mario is giving the anticipated response and, following Thérèse’s interjection marking surprise, repeats this answer. Jeanne now has sufficient evidence at least from these two students that the \$9 at the end of week 1 are salient. She nods and repeats Mario’s utterance, thereby confirming it. That it is confirming can further be taken from the fact that she actually continues, which she would not have done had she noticed and oriented to some form of trouble. Instead, she rearticulates the process of arriving at the \$9 contents of the first goblet, ‘the six that she started with and the three dollars’ (turn 143). Thérèse responds by uttering ‘three’, which is accepted in the constative utterance ‘one more three dollars’ that Jeanne produces. Mario insistently says ‘it’s twelve’, and Jeanne confirms ‘it’s twelve’ (turn 150). Jeanne then continues to the next goblet, picks up the one for the third week and says, ‘how much money is there in’ and then self-corrects ‘already in the third week’.

Fragment 3.3b

142 M: nINE
 143 J: nINE. ((nods)) (0.64) she had ((places goblet 2)) the SIX that SHE started with, ((demonstrative la gesture to left)) (0.19) and the three dollars ((rH index pointing into goblet 1)) (0.58) do (0.23) how mU::CH (0.24) do we ((rH index points into goblet 2)) add here.
 144 (0.80)
 145 T: [three.]
 146 M: [what] (big? [one?])
 147 J: [one] more thrEE DOLLars.
 148 (0.18)
 149 M: <<insisting>ITs <<f>tWEL:v:e.
 150 J: its <<f>tWELve ((confirming, nods deeplu, open rH gesture, palm upward)) (0.94) so (.) how much money is there in, how much money (0.92) ((she lifts the third week)) (2.50) how mUCH money is THERE (.) IN, (0.29) already in the third week ((raises goblet, jingles it, places it back))

There is a potential source of confusion in that the question ‘How much money does she have in her piggybank?’ may be answered both by stating the sum and by stating the repeated addition. It is only the second, the representation of the re-

peated addition that was required in the process of filling the goblets that leads to the emergence of the pattern and the algebraic formula $3n + 6$. At this point (turn 143), then, she has confirmed that Mario has provided a response that unfolds the total amount into two components. The point has been to bring out how much there was *already* in the piggybank in the second week. That is to say, to notice or to objectify an essential feature of the manner in which the amounts of money can be expressed. She articulates the composition of the \$9 in Mario's response as being composed of the \$6 plus \$3 saved at the end of the first week, which she denotes with a gesture to the goblet marked '1'. She then points to the second goblet to ask what will be added to it.

It is perhaps not surprising that Mario would be confused. When Jeanne asks him how much there is in the piggybank in week one, the correct response was '9', which Jeanne explicates as being derived from '6 + 3'. In response to the first iteration of the question how much she already has in her piggybank, Mario responds by saying 'twelve'. As previously, he has stated the amount that is in the piggybank modeled here by the goblet. But as the event unfolds, it becomes clear that this is not the sought-after response. As the emphasis of 'already' in the two repetitions of the question that follow suggests to the knowledgeable hearer, Jeanne is after the amount that in the second week already is in the piggybank, and to which, as her final utterance makes clear, \$3 are to be added. This would yield the \$12 in Mario's response. Jeanne then moves onto the third week, asking the structurally identical question again, this time concerning the 'third week' and lifting the goblet numbered with the '3' (turn 150). Resorting to structurally identical questions is indeed part of the repertoire of the teachers' objectifying processes (for other examples, see Radford 2010).

Another potential problem for understanding lies in the change of the signifier for the piggybank. That is, although Jeanne first holds up the goblet marked '2' and then the goblet marked '3', the two goblets, though materially and markedly different are intended to refer to the same piggybank that appears in the story. As before, there are two signifiers, functioning like two different though similar words, referring to the same signified but at a different point in time. Whether this is apparent to students is not revealed in the situation. It is evident to the knowledgeable adult that the particular representation is to capture the dynamic of the situation, but, because the learners are confronted with two static representations, the movement has to be inferred. And this inference is precisely the point of trouble, the one that is addressed in the current obuchenie activity. As much as Mario is to learn and realize the repeated addition, Jeanne has to find a form of interaction that allows Mario to become aware of the repeated addition. But Jeanne cannot just know what is in Mario's mind. To learn, she has to interact with Mario, who, in and with his responses, teaches Jeanne about what he knows, whether she was successful in bringing about a realization, and what she might have to do to get the blocked understanding back in movement again. But the road is rocky and slippery, and there is no easy way to get from lack of understanding to understanding. The activity itself has to produce the obuchenie situation as much as its content, which is Mario's understanding of what the task requires and Jeanne's finding of

an appropriate pedagogy. They keep on slugging; and that the road is thorny and obstructed rather than clear can be found in further expression of frustration.

'How Much Money is There Already During the Third Week' Jeanne asks in the same way as she has asked for the second week; she even holds the corresponding gobble as she had done for the goblet labeled '2' (turn 134). In the articulation, therefore, we find a repetition, of the same structure of the repeated addition of \$3 from week to week. Thérèse is the first to respond, 'fifteen', thereby naming the number of chips in the goblet. Mario, however, responds 'twelve', and repeats this answer when Jeanne repeats the question (turn 160). Jeanne responds by asking, 'Why? It is composed of what?' (turn 162), to which Mario responds in turn with apparent frustration in his voice, open-hand gesture toward the worksheet, while uttering 'What? But look' intonationally stressing parts of the verb (turn 164). In these repeated expressions of frustrations we find the apparent sensuous-valuational expression for the status of the activity from the perspective of Mario, who utters questions in response to questions. We could gloss his utterance as 'What are you asking me? Take a look at the worksheet.'

Fragment 3.4

150 J: its <<f>tWELve ((confirming, nods deeplu, open rH
gesture, palm upward)) (0.94) so (.) how much money is
there in, how much money (0.92) ((she lifts the third
week)) (2.50) how mUCH money is THERE (.) IN, (0.29)
already in the third week ((raises goblet, jingles it,
places it back))
(0.79)
151
152 T: um um u::m.
153 (1.12)
154 M: u:[m::]
155 T: [fifteen]
156 (0.30)
157 M: <<p>tWELve. >
158 J: =how mUCH should thERe already be.
159 T: u:h:
160 M: twelve
161 (0.21)
162 J: wHY. ITs composed of what.
163 (0.68)
→ 164 M: what well LOOK ((frustrated, hands stretched out, palm
up, toward worksheet, Fig. 3.6a))
(0.27)
→ 166 J: twelve dOLLars contAINS the::? ((Mario places head in
hand, arm resting on table [Fig. 3.6b])) (1.48) six
dOLLars that we start wITH?(0.46) and how mUCH money
in the other two weeks beFOre? ((Jeanne places right
palm on goblet 1 & 2, sticks left finger for '\$6'))
(2.01)
167
→ 168 M: what? (1.56) that makes- (0.80) i dont understAND (.)
thOUGH. ((460>228 Hz)) ((Places both elbows on desk,
head into his hands, Fig. 3.7))



Fig. 3.6. a. Mario's frustration is apparent from his intonations and gestures (turn 164). b. Gazing at his worksheet, Mario seems to abandon as Jeanne asks him again about the contents of the goblet (turn 166).

169 J: <<p>you dont understand that> its what i=m trying to help you understand (2.40) LOOK well (3.50) are we LOOKing (0.65) trèse?

Jeanne does not reject his answer, but asks how the \$12 are composed. In so doing, Jeanne invites Mario to envision the creation of new possibilities of looking at the problem. The ethical commitment that she displays through her posture, utterances, attentiveness, and the very act of exposing herself to failure constitute a *call* that Mario, despite his frustration, is willing to answer. This ethical commitment creates social links that make the interaction far from authoritarian. She is exposed as much as Mario is. She begins by articulating the \$6 they started out with and then, with rising intonation toward the end and an interrogative 'how many?' offers up another question (turn 166). There is a long pause, which Mario breaks with markers of disarray (Fig. 3.6b). There is an interrogative reinforced by rising intonation toward the end, an attempt in responding, 'this makes' that is preceded by a longer pause, and then a cognitive assessment, 'I don't understand' (turn 168). All prosodic indicators are consistent with what psychological research has identified as vocal correlates of despair (Scherer 1989): although his answer has been correct, the unfolding events have led him to a negative affective valuation. He does not understand where the line of questioning takes, and perhaps why these questions are asked, given that he has already provided the correct response from his perspective. The emotional assessment is a global one, as it also takes into account the questioning with respect to the overall object/motive that the obuchenie activity is supposed to reveal.

Across the extent of this fragment, Mario expresses what any culturally competent individual hears and sees to be frustration. His intonation and his gestures (Fig. 3.6a, 4.6b, 4.7) are consistent with his verbal assessment 'I don't understand' but also provide an emotional tone of frustration and despair. He does not know what to do, which is why he has called Jeanne, and he does not even understand



Fig. 3.7. Jeanne, right, uses gestures to orient and point; Mario for considerable stretches holds his heads with both hands, sometimes as if in desperation (turn 168).

her questions, as his repeated utterance of ‘what?’ with increasing intonation that follows her utterances grammatically formed as questions.

Jeanne articulates for Mario and everyone else overhearing the exchange – she has oriented previously to the camera, and, as clear in turn 169, also seeks the other students in this group to attend – that she is trying to help him to comprehend what he does not yet understand. That is, at this very instant she formulates (describes) for Mario what she has been doing so far ever since she followed his request for help. She says not merely that she wants him to understand, but more specifically that she wants him to understand his incomprehension. For her, too, their mutual engagement in this obuchenie activity has not brought them closer to their individual goals. It is not only that Mario’s problem of incomprehension has not been addressed; Jeanne has also been unsuccessful in addressing the problem, and perhaps in understanding precisely what the problem is. But to get to this point, the two must have a minimal inter-comprehension on the basis of which they can contribute to the obuchenie activity. This engagement promises them to come to understand that their mutual efforts have not brought them closer to the goal of the task, the revelation of the object/motive of the obuchenie activity in the subjective experience of Mario.

It is important that we do not look at the observable expressions through a constructivist lens. If we were to do so, then the contents of the expression would be outer forms of internally pre-configured content. This content would be the result of mental structure, which brings about the content to be externalized by the various means available for doing so. But there are many analyses suggesting to us that this would be an inappropriate move. Thus, coming from very different theoretical backgrounds, both Merleau-Ponty (e.g., 1945) and Vygotsky (e.g., 1986) suggest that we actually find out what we are thinking *in* and *through* our expressions. That

is, we *find* our thoughts in the words we speak, and we find our emotions in the typical bodily expressions that go with these (e.g., prosody, body movements, body positions). The term ‘expression’ must not be taken as something pressed outside but as an articulation in which the subject can find its own position on the current situation. The various body movements and positions do not just present a position to the outside world; they *are* the taking of a position in a world always already shot through with significations. ‘The phonetic gesture realizes for the speaking subject a certain structuration of experience, a certain modulation of existence, exactly as a comportment of my body invests – for others and for me – the objects that surround me with a certain signification’ (Merleau-Ponty 1945: 225). Other scholars agree. Thus, ‘the moment constituted by the performance of thoughts, feelings, words, practical deeds is an actively answerable attitude that I myself assume’ (Bakhtin 1993: 37). Each performance is perfused by moments that we often attribute to different realms of experience, the intellectual, the emotional, the practical, and so forth. Bakhtin tells us that they are all different forms and manifestations of the same unity, an expression and a particular attitude toward the real living and lived situation as a whole: ‘an emotional volitional attitude toward a state of affairs in its entirety, in the context of actual unitary and once-occurrent life’ (ibid.: 37).

We are Going – But Where?

The events at the heart of this chapter begin when Jeanne is joining the group after Mario has clearly raised his hand, turning about and apparently looking for the teacher. That his comportment can be seen as such, and in fact was seen as such in that situation is evident from Jeanne’s joining the group. There is a first attempt to get unstuck, but apparently without success. The fact that Jeanne makes Mario re-read the problem is an expression of her assessment that they are still stuck and that they have to go back to the beginning and re-read the problem. They re-read the problem and do figure out how much money there is after week one and what it is composed of. Jeanne then orients the effort to the second week, insisting on the articulation of the amount there already is separate from the amount added. She then moves on to the third, obviously repeating the structure of the orientation (pointing, holding goblet), pointing, and structure of the question. Knowledgeable readers recognize in the structure of the questioning that its point is the repeated addition of \$3 to the goblet and the thereby increasing number of chips. But it is evident from Mario’s expressions that this structure is not apparent in his consciousness. He verbally expresses a lack of understanding and also provides sensual-valuational expressions that mark the distance between their current state and the – from Mario’s position unknown – endpoint of the task.

The process is a tricky one, as Jeanne and Mario engage in interactions that produce the obuchenie (teaching-learning) situation. That is, at a minimum – even if the object/motive of the activity is not yet clear to Mario – the interactions need to

be such that a recognizable event emerges. But it is not such that Jeanne is in the know. It is apparent that the first attempt to allow the emergence of an understanding of the task does not succeed: in and as integral part of the obuchenie activity, Jeanne has to search for a pedagogical approach that allows the situation to get unstuck. She cannot do it without Mario. Simultaneously, Mario wants to get unstuck, he wants to understand. Yet he cannot do so without Jeanne. Both have to engage the other so that together they expand their action possibilities. It is not that there is a flow of something from a teacher to a student. Together, in their turn taking, in the course of an objectification process, they produce the obuchenie situation all the while they get unstuck. That is, their sequential turn taking produces the process and the outcome simultaneously.

We can see that the turn-taking routines produce question–answer pairs in which the desired responses emerge. Thérèse and Mario do provide, as validated by Jeanne, the sought-for answers. And yet, Mario expresses frustration. Why might this be the case? From his perspective, not knowing the object/motive, he cannot know the sense of the actions (speech acts). Mario’s interrogative terms that follow those that Jeanne utters as parts of recognizable questions exhibit that he does not know the pertinence of her question to the current task, and where this task is taking them. At the same time, his expressions are an integral part of the activity. Even though they do not appear to move anywhere, let alone closer to completing the task, they do move because the lack of success is as much part of the teaching-learning (or obuchenie) process that we need to understand and theorize as the eventual success. For Jeanne, this process also is a learning process, for it is in the social relation that she finds out and learns to assess what a student knows from his expressions. Together they articulate the current stand of the activity, produce a sufficient understanding of the obstacle to get moving, and they bring about movement (see chapter 4). In other words, in an objectifying process, the student and the teacher are transformed: both learn.

The activity does not exist apart from the effort of getting unstuck. Therefore, we observe movement to get moving again. Both forms of movement have to be understood at the collective level, which is irreducible. We cannot therefore ascribe non-movement to Mario (‘because he does not understand’); but we cannot ascribe it to Jeanne either (‘because she does not know how to lead [Mario] to see what is to be seen’). We cannot ascribe the fact that they come unstuck to either Mario or Jeanne, because it is the societal relation, the sequential turn-taking that we need to look at and understand.¹

Getting unstuck is a form of movement to get moving again. They have to do it together, although Mario cannot know where they are heading and where they are to end up. It does not help that Jeanne knows where she would like them to end up. Success is only achieved when they get there *together*. But the point is not just to get the table of values filled, for there are faster ways to get this done. The point is

¹ The choice of the adjective ‘societal’ is purposeful, as the relation that Jeanne and Mario enact is institutional, and, because schooling is a societal activity, contributing to the reproduction and transformation of society, the relations themselves are societal (Bourdieu and Passeron 1979).

not for Mario to articulate the anticipated responses into the cells of the table. The point is for Mario to ‘have an image of the object/motive’, which is not only the articulation of a model for calculating the amount of money for week n (i.e., $n \times 3 + 6$), but the personal sense for each of his actions. In the absence of the image, he cannot have a personal sense of each action, but without the actions, the activity does not even come to be realized. What the two therefore are doing over the course of this chapter is engaging in movement: the work of refining, increasing, and transforming their action possibilities so that they can work toward the completion of the activity, which includes the revelation (i.e., the objectification) on the part of Mario to come to know why he has done what he has done. At this point, Jeanne too will have achieved her part of the activity, which is to find a pedagogy that works to get Mario to the realization. Together, in and out of their societal relation, they come to realize success. The success of the activity looks differently from the different perspective, but these perspectives are but one-sided manifestations of the success of the obuchenie activity.

‘Any higher psychological function was external’, writes Vygotsky (1989: 56), and he continues, ‘this means that it was social; before becoming a function, it was the social relation between people’. He summarizes his conclusions in a general form: ‘the relation between higher psychological functions was at one time a physical relation between people. I relate to myself as people relate to me’ (ibid.: 56–57). If we assume that both Mario and Jeanne were changed in the course of this episode, Mario becoming more knowledgeable in algebra and Jeanne becoming more knowledgeable in teaching algebra, then it is the result of the societal relation between the two. Having become more knowledgeable – i.e., having more room to maneuver and being in control over the conditions – not only is the trace that the societal interaction has left in the interaction participants; it also takes the form of the societal relation. Their forms of knowledgeability are of the relational type. If these traces come to be mobilized again, they inherently are of the social type. They are not singular and idiosyncratic but inherently intelligible.

It is precisely in the movement to come unstuck, of seeing something that until then had remained beyond reach, that the agential room to maneuver and control over the situation is transformed. This transformation constitutes learning. If Mario had simply filled the table as expected by simply copying the numbers from someone’s table, there would not have been an opportunity to expand knowledgeability. Mechanical or senseless copying or reproduction cannot create transformation. It creates a mere formal imitation. For learning to occur, the object of activity has to become an object of consciousness. And in becoming an object of consciousness, consciousness changes, and transformation occurs.

At this point, however, although the situation seems to be moving, it is not yet. Objectification is only a possibility on the horizon. More interactional work is required, more reproduction and transformation of the social relation needs to be done until it leaves the kinds of traces that subsequently are recognized as higher psychological functions. Objectification and the obuchenie activity has not yet been successfully completed.

We can also see in this chapter how the emotion is itself an outcome of the activity all the while it is unfolding. Emotion is not a constant phenomenon, but, because it is a particular form of reflection of the material and ideal state of the activity, it is transformed at the same time, and, in fact, is part of what shapes subsequent actions that realize the activity at hand. That is, signs of frustration become resources for the subsequent actions of the other; and such signs are produced, as we see, by both participants in this interaction. Mario's understanding that he does not understand also is the result of the activity, which therefore is *not* some form of meta-activity in the way psychologists think about meta-cognition as a different form of cognition that accompanies the latter. This understanding and the emotional expressions *are* the obuchenie activity as much as the movement or non-movement that occurs with respect to the purely intellectual-mathematical moment. Our performative perspective makes the different aspects integral moments of the same phenomenon. It is only when we look at this phenomenon as an integral, irreducible whole that we can actually understand why it is moving in the way it does, and how the sensuous-valuational moments are related to the cognitive-volitional ones.