LIVING AND WORKING WITH TECHNOLOGY TODAY

The current situation is such that users do not work at just one workstation at a time. People apply multiple devices, with overlapping functionality, some moveable, some more permanently located in a meeting room or, for example, at home. Most of these technologies are not designed from scratch – rather, they are based on standards and to some extent are open to adjustment and tailoring, and to being used together with other devices. Although this may not seem so surprising from the perspective of activity theory, many projects developing these technologies nevertheless seem to make assumptions about designing for isolated use. However, the changing configurations of technology and the understandable design of tailorable and reconfigurable technology are the main focus of the EU project Palcom. Whereas many proponents of ubiquitous or pervasive technology consider it to be the ideal that such technologies basically disappear from the attention of users, Palcom acknowledges that technologies will also always be the focus of users at certain points, and hence that in design, invisibility must be coupled with visibility, control, and understandability (see also Bødker, 2006).

Active user participation is taken for granted in many design settings. This taken-for-grantedness of participatory methods (Bødker & Iversen, 2002) leads to a lack of reflection among designers on their own ways of working. For that reason alone, we should be ready to take on new methodological challenges. In addition, as discussed elsewhere (Bødker, 2006), we are facing a world where we do not design one technology in isolation, but must deal with multiple, reconfigurable artifacts that are used across contexts, including the boundary crossing between work life and home life and so on. To do participatory design research in such settings, we need to work with users who are not only workers in a particular practice. These users need to participate in design as persons who bring their entire life to the design.

Currently, use contexts and application types are broadened and intermixed. Computers are increasingly being used in the private and public spheres. Technology is spreading from the workplace to our homes and everyday lives and culture. New elements of human life, such as culture, emotion, and experience, need to be considered in design. Although new design methodologies are being developed toward this end, they are focusing mainly on a number of perceived negations of work – leisure, fun, emotion, and so on.

THE CHALLENGES OF PEOPLE'S CURRENT EVERYDAY SITUATIONS

Multiplicity

Many challenges still pertain to work. Work across different and changing locations, in particular cross-organizational project work, reflects many of these: ongoing streams of new collaborators, changing configurations of technological infrastructure, new locations and work environments (physical and virtual), and new project goals. DWR recognizes the need to work with multiple streams of activity in terms of knotworking, temporary and changing configurations of collaborators, and so on, and that in this respect, there has been a need to replace such concepts as activity systems and communities of practice with something more dynamic. In my own work, I have happily embraced these ideas and worked with them (Bødker & Christiansen, 2004, 2006). However, when I look, for example, at Virkkunen's dilemmas for DWR (Virkkunen, 2006a), it seems that there is a contrast here between DWR and the reality of participatory design. While visions and ideas may be all-encompassing, we rarely get a chance to disentangle design entirely from what is already there.

While participatory design has been thoroughly inspired by the cycle of expansive learning (Bødker & Christiansen's, 1997, talk about springboards and microcosm, and Mogensen's, 1992, notions of prototyping and provotyping), it has never been easy to point to *one* solution, or to one better world. This is why alternatives are important. In this respect, participatory design research, perhaps even more than DWR, must constantly embrace the dilemma between the understood motive of the development and acute problem solving, the dilemma between applying old concepts and finding new ones, and ultimately, the dilemma between expansion and regression that Virkkunen (2006a) talks about.

Beyond Communities of Work

In the current situation where IT stretches beyond a particular work praxis and into people's everyday lives, what is gained and what is lost when introducing some kind of change may cross these boundaries as well. For example, while 24/7 access to e-mail may support flexible working conditions, it also has an impact on family life; and although the always-on condition may in some ways seem expansive, it may cause regression in terms of leisure and family time. To participatory design,

this emphasizes the need to consider human users not only as workers within a particular community of practice, but in their entire life context (Bødker, 2006). Although we may learn from newer methods (Dunne & Raby, 2001) emphasizing what work is not, we need to look for methods that transcend this proposed dichotomy between work and nonwork. I think that DWR, as well as participatory design research, needs to focus on people's lived lives (McCarthy & Wright, 2004), across communities of practice, whether these are at work or in other human capacities.

Furthermore, this type of focus emphasizes the need to look at design as a process that stretches beyond the implementation of the technology (Floyd, 1987) and into the realm where the technology is used and further developed in everyday activity. I believe that participatory design research and DWR both have roles in providing reconfigurable alternatives, participatory design through technology in a wide sense, and DWR with its main focus on the organizational side. In both instances we talk about instruments that do not just solve immediate problems – they provide seeds for further development. I believe that this way we can make more out of the cooperation and learning possibilities within and across communities.

The Vision, the New, and Alternatives

Just like DWR, participatory design puts a lot of work into formulating the vision, and sorting between small and large problems. An example of how this has often been done is through future workshops, which help participants air critiques and move beyond them (Kensing & Madsen, 1991). The future workshop (Jungk & Müllert, 1987) is a modest example of what Engeström (1987) refers to as a springboard. Participatory design research has very explicitly expressed the need to do experimental prototyping and working with alternatives. The way in which mock-ups and prototypes were developed in the UTOPIA project (Bødker et al., 1987) served exactly to address the skills and experiences of the typographers, while providing hands-on experience with a future technology that was not there yet. The idea of games and simulations has been developed into ways of helping people formulate visions together (Halskov & Dalsgård, 2006; Hornecker & Buur, 2006). It is not obvious that DWR would see the visionary model of many a participatory design project as visionary enough. However, in my understanding of alternatives in participatory design, these are often not so much about providing running computer technology to specific users as they are about pointing toward alternatives on many societal and social

levels, and about setting up processes through which people can make better-informed choices.

Ehn (1988) places design between tradition and transcendence. Although we may discuss how visionary the vision is and might be, one of the challenges that participatory design and DWR are both facing is exploration beyond the known. Engeström's early work builds heavily on Vygotsky's zone of proximal development and the notion of the more capable peer, and he has extended this perspective significantly. Nonetheless, Bødker and Christiansen (2006) discuss how the situation is much more open when it comes to exploring, for example, awareness in open, flexible work settings, simply because there are no well-understood more advanced use situations and more capable peers. Discussing support for awareness in organizations, Bødker and Christiansen (2004) point out that designers know little about participatory processes focusing on emergent social encounters and that such design needs to be even more exploratory than exploratory prototyping. The paper proposes using technological prototypes to help explore which questions to ask. In these situations, we do not yet know what the new might be, and accordingly, there are neither zones of proximal development nor more capable peers. Engeström formulated his perspective on this challenge as *from breakthrough to breaking away*. In my view, both approaches need to work further on methods and instruments for exploring the unknown.

Consumerism

Elsewhere (Bødker, 2006), I have expressed my concern that much technology designed and introduced today in our homes and everyday lives is developed in a manner that differs from, or even contrasts with, the underlying co-determination framework of Scandinavian societies. As I discussed (Bødker, 2006), it seems ironic that currently the citizens of Nordic societies have more democratic influence on the technology they apply at work than they do on the technology developed for the rest of their lives, be this for leisure, for school use, or for health purposes. I believe that there are alternatives to this: I imagine making use of people's experiences of cooperating and learning, and hence supporting them in making informed choices that would radically shape their lived lives with technology. I imagine that researchers provide reconfigurable alternatives, through design prototyping. As I point out (Bødker, 2006), Scandinavian research may have a chance of doing such projects because of the profoundly non-hierarchical societies and the tradition of participating in the development

of work and technology in the workplace. However, neither the settings nor the methods for such development are clear: Participatory design has little to offer when it comes to specific methods for bringing together life and work experiences, and for empowering life beyond work. Although DWR has focused on other elements of human life, like health and the role of patients in various kinds of activities, Change Laboraties, for instance, are still very much rooted in work and the work setting.

CONCLUSION

I hope that DWR is ready to join forces with participatory design in finding new ways of dealing with our changing everyday lived lives, beyond the take-it-or-leave-it voting with the feet that underpins the above-described consumerism and beyond the equally individualistic expansion of cognitivism (Norman, 2002) that seems to inspire many technology development projects. After all, with its roots in sociocultural psychology, DWR is well suited to this. To a large extent, this invitation is offered to the young researchers of our communities. At the same time, researchers of my generation should not give up doing interesting research just yet. With a bit of luck, we could well be ready to harvest the fruits of the endeavor as active participants in technology-enhanced everyday life experiences among the elderly.

18

Clinic of Activity: The Dialogue as Instrument

YVES CLOT

This chapter highlights three important dimensions of Yrjö Engeström's work. It then examines some objections that have been recently addressed to him. Finally, the chapter presents an original French approach that is not sufficiently well known internationally, although some publications in languages other than French have recently appeared (Béguin & Clot, 2004; Clot, Fernandez, & Carles, 2002; Clot & Scheller, 2006). Engeström has, in his own way, allowed the "French-speaking school" of analysis of activity to come into contact and enter into discussions with the Anglo-Saxon world. In France this discussion was recently relaunched with the symposium "Situated Action and Activity Theory" (ARTCO) in Lyon, where researchers from different countries met to debate their conceptions of "action," "activity," and "collective" (Clot, 2005a; Engeström, 2006b).

TRANSFORMING FOR UNDERSTANDING

The position given by Engeström to transformative action in the workplace brings him very close to the French-speaking school of analysis of work and activity. Whereas international ergonomics focused on the engineering of task and artifacts, French-speaking ergonomics was organized around activity and health with the intention of preserving and developing the operators' power to act in the workplace. Vygotsky's work is indeed inseparable from this perspective on action. When Vygotsky

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This chapter is a translation from the French by Annalisa Sannino. The quotes of Vygotsky and Leont'ev were originally taken by the author from the available French translations of the works by these Russian psychologists. In the present chapter, these quotes have been replaced by the translations available in English.

analyzed the crisis of psychology, he pointed to practice as a means to overcome the crisis. He even presented practice as a real alternative to the blind empiricism that can paralyze psychology (Vygotsky, 1997a), as is still the case today. That is why the perspective opened by Vygotsky is not only the perspective of a new psychological theory. It is primarily a new way to do psychology, as we will see later in this chapter. That is why it is so difficult to reduce it to a *theory* of activity, even if we connect it with the later work by Leont'ev.

For Engeström, positivism is not the only possible horizon for scientific activity. I share with him a determined opposition to what Comte (2004) himself called the positivist catechism. This positivist catechism adheres to the principle *From science comes foresight, from foresight comes action*. In other words, this principle emphasizes knowing in order to foresee before acting. Within this perspective, real human work becomes in the best case the projection or application of concepts. In the worst case, real human work becomes a simple residue for science and an obstacle to be surmounted for the sake of management. Yet there is indeed an alternative to positivism that leads not to a weakening of scientific activity but rather to a bigger demand for it. Its principle could be the following: acting, without being able to foresee everything, in order to know. In this perspective, aimed at action, the production of knowledge not only remains on the scene but turns out to be strongly developed. Therefore, the question is to understand the mechanisms of action, to understand not only how singular things are in general but rather how, *in general*, singular things are generated. What is at stake is not to explain the eternal but to analyze how the new is produced. It is not a question of examining the general *without* the singular, but of discovering the general *in* the singular that is produced.

In a word, it is a question of provoking through action a movement in ordinary activity in order to reveal the development of the subjects' action. Not only is this radically antiempiricist epistemological concern not bothered by action, but by being basically practical it finds its own object in action. This concern has to be brought together with the indirect methods proposed by Vygotsky. It is necessary to transform in order to understand, because activity does not allow its enigmas to be resolved until it is put into movement. This is also the principle of the laboratory methods used by Engeström (2007d) within the framework of his theory of expansive learning and developmental work research. In this perspective, development is at the same time the object and the method of psychology. The transformation of actions for developing the subjects' power to act is the object itself of

a basic and field-based science of psychology. This is the only way to break away from the false dilemma between applied science and action research, about which Vygotsky could have written that they are less enemies than twins.

MODELS, SCIENTIFIC CONCEPTS, AND EVERYDAY CONCEPTS

The second contribution of Engeström pertains to the theory of intervention. On this question he has repeatedly shown that the nature of a general model of activity is such that it can become an instrument of action for professionals themselves and not only for researchers: "The essential instruments of learning activity are models. With the help of models the subject fixes and objectifies the essential relations of the object. However, the construction of theoretical models is accomplished with the help of a more general instrument – a methodology. Learning activity may be conceived of as expansive movement from models to the methodology of making models – and back" (Engeström, 1987, p. 116). As Virkkunen (2005) points out, learning activity "is a transitory, intermediate kind of activity which lies between science and work activities" (p. 52). In other words, it is a question of engaging in an action of remediation aimed at constructing "new solutions, new model for the practice" (Virkkunen, 2005, p. 54).

In this perspective, it is important to point out that the interventionist's action is not the establishment of a model of transformation that brings solutions or even gives advice. Interventionists aim at providing professionals with tools within the development of their own activity. Research therefore has to be defined as devising instruments of actions for the practitioners themselves. Virkkunen has recently insisted once more on this by mentioning the dilemmas encountered in actions of this type (Virkkunen, 2006a). The project is, however, very clear and has been the object of convincing realizations: "The framework is general and does not prescribe any solutions. It is valuable as a tool for analysis and planning only when people involved start to analyze their work practices by using it, relate the abstract model to concrete facts about their everyday activity, give meanings to the elements and their relations, and change their work themselves" (Virkkunen & Kuutti, 2000, p. 316).

It is striking to realize how in terms of this issue developmental work research comes close to the concerns brought to maturity throughout the history of French analyses of work. We can also connect developmental work research to the approach implemented by Oddone (1981) in Italy at the end

of the 1960s. In both cases it is not so much a question of proposing a new academic discipline, for instance, a new work psychology; it is a question of experimenting with a new way of producing knowledge. This new way consists in testing a different system of knowledge production in action, by changing the principal characters of this production. Professionals become themselves agents of reconceptualization of their activity, by transforming researchers into instruments – in a Vygotskian sense – for developing their professional activity.

Within this developmental perspective, we can observe two properties. The first property is that generalization is not an abstraction; it happens by developing the local and the concrete itself. Generalization is realized downward rather than upward. The second property is that professionals are invited to step outside their present situation in order to turn it into a means for living something different. As a consequence, the difference between developmental work research and the approaches to situated action is important. Developmental work research consists less in localizing the routines of action or identifying the communities of practices than in encouraging their reconfiguration by proposing "a collective mirror in front of the practitioners" (Engeström, 2000c, p. 153). Developmental work research engages in encounters that renew each community – the community of researchers and the community of professionals – by getting involved in practices that are different from habitual routines. It is a question of transforming the social division of labor by means of producing new instruments of action.

Here I would like to provide a psychological remark drawing on Vygotsky (1987). In *Thinking and Speech* he writes, "It [was] also important for us to show that scientific concepts are as inadequate in some contexts as everyday concepts are in scientific contexts, and that this pattern corresponds with the fact that the strengths and weaknesses of native and foreign languages are manifested in different contexts" (p. 222). On this basis one can understand that the development of instruments of professionals' action could not be only one-way, by appropriating the conceptual instruments of researchers. According to Vygotsky, the development of scientific concepts and of everyday concepts takes shape in a discordant way. The two develop in opposite directions.

For Vygotsky scientific concepts and everyday or spontaneous concepts are two sources of intelligibility that can meet but can never become identical. Everyday concepts are saturated with empirical contents, filled up with the sense of the singular experience. Scientific concepts do not take things directly as starting points, and their relation to the object is itself mediated

by the system of concepts. They are indeed really two ways of thinking that do not coincide. And we can without doubt affirm that this is the case for both the professionals concerned with the intervention and the interventionists themselves. Consequently, development cannot consist in eliminating the difference between these two ways of thinking. Vygotsky (1987) justifiably criticized Piaget, for whom "development is comparable to a process in which one liquid – forced into a vessel from the outside – replaces another that had previously filled the vessel" (p. 175). Understanding everyday concepts would then be useful only "in the same sense that we must understand an enemy" (p. 176). Yet it was difficult for Vygotsky to admit that we could acquire scientific concepts "without reworking them, that they simply drop into his mouth like hot cakes" (p. 179).

For Vygotsky the formation of scientific concepts and spontaneous concepts starts when we acquire a new meaning. The two forms of conceptualization develop, therefore, simultaneously without eliminating each other, and this creative mismatch must be the focus of research efforts. Each one of the modalities of thinking must become an instrument of development for the other so that the opposition between practical and theoretical models of action develops the power of the subject to act. It is precisely this tension that is the source of effective thinking. Theoretical thinking does not generate action. It does not explain real activity. It is rather this real activity and its unpredictability that *explicates itself* – in the two senses of the term – with theoretical knowledge. Theoretical knowledge is a decisive resource but certainly not the source of thinking with regard to reality. When Vygotsky (1987) anticipated the future of the two modes of thinking, he clearly mentioned a double development: "The links between the two processes and the tremendous influence they have on one another is possible because their development takes such different paths" (p. 220).

The fact that these two modes of grasping reality intellectually are not "encapsulated or isolated in the child's consciousness" (Vygotsky, 1987, p. 177) has as a consequence a double generalization. Speaking of generalization, one often thinks about a formal and categorical approach. This line of thinking is very important. Vygotsky, however, insists on the other line: the discovery of the connections and the relations between a given object and other objects of the real world, the diversification that does not move away from materiality but, on the contrary, multiplies the connections between the objects of practical activity in order to reorganize the activity. This second generalization belongs to the development of spontaneous concepts, and although it can be served by the first type of generalization

and therefore by scientific models, it is realized in the field of practice itself. This is what is simply called the development of experience.

One may think that interventions in the workplace have, first of all, the objective of development of experience and that the scientific models utilized must serve the interlocutors for this purpose. However, the changes they make of their own experience are for us researchers inversely instruments of development of our scientific models.

NO ACTIVITY WITHOUT THE COLLECTIVE

Another important contribution of Engeström concerns the promotion of the collective dimensions of human activity. He has seen better than others that the cultural-historical approach was in opposition, without possible reconciliation, with the cognitivist paradigm that looks for the source of action in the subject (Engeström & Blackler, 2005). Engeström's work stands against mentalism, according to which the subject learns by finding in him- or herself resources of a constructive activity for acting on a physical world of material objects. Engeström has highlighted the rupture that Vygotsky introduced when he affirmed that the subject's constructive activity does not belong primarily to the subject. It originates in the relations that the subject has to build with others in order to live. The subject of Vygotsky does not live in a context. He needs to build a context in order to live. This is possible only if the subject succeeds in appropriating constructs that others put more or less at the subject's disposal. The subject's constructive activity is nothing but a reconstruction of the world of others. It originates primarily in collective work.

Vygotsky's (1987) critique of Piaget is original because it is made by utilizing data from Piaget's work from which Piaget himself did not draw full conclusions. In *Thinking and Speech*, Vygotsky writes that for Piaget it was necessary to explicate the genesis of the child's reflection starting from controversy: "Piaget demonstrated that reflective thinking appears in the child only after argument appears in the child's social collective, that reflective thinking develops only when – in argument and discussion – the child encounters the functional characteristics which provide its beginnings" (Vygotsky, 1987, pp. 74–75).

Consequently, for Vygotsky social activity appears twice in the individual activity, considered here to be the only way in which subjects connect to objects and the people with whom they live. Being first the source of individual activity, social activity becomes a resource for this individual activity. It changes status in the history of development. It changes place

through the life of the subject. In this movement of sources and resources, collective life obeys what might be called functional migrations (Vygotsky, 1987, pp. 334, 337). First, individual activity develops *in* social activity. The subject does what he or she has first experimented with and built with others by being with them "above his or her head," in a zone of proximal development.

This activity redeems itself from social forms of conduct in a precise way: not by denying them, but through their development. Subjects, by engaging their own activity in the history of somebody else, can bring in their personal contribution and, paradoxically, become unique in their genre. For Vygotsky, and in contrast to Piaget, psychological development does not go from the subject to the social, but inversely, from the social to the subject. Individuals become psychological subjects when they start using for themselves and in their own ways forms of conduct that others have used first with respect to them. Subjects appropriate the social and reshape it for their own activity. That way social activity develops by means of the activity of each subject. This is why for Vygotsky it is simplistic to understand the social only as an external collective. The social is not a collection of individuals. It is there even when the individual is alone. In other words, if the human subject originates in collective work and is always engaged in it, the collective never remains outside the subject. It is in the subjects and reappears in the subjects as a resource of their individual activity. This is what leads Vygotsky (1971) to write that the object of social psychology is "the psyche of the single individual" (p. 17).

Although Engeström has mainly insisted on the collective as cooperation between subjects, on social and collaborative activity, I believe that my own emphasis as a psychologist on the psychological function of the social in individual activity does not contrast with his main concern, which I deeply share: rehabilitating the collective dimensions of human activity. The system of collective activities around the objects of the world exists in two forms: between the subjects and within each of them. This is why it can develop between them and in each of them, but it can also die between them and in each of them. A. N. Leont'ev (1978) writes: "Actions and operations have various origins, various dynamics, and various fates. Their genesis lies in the relationships of exchange of activities; every operation, however, is the result of a transformation of action that takes place as a result of its inclusion in another action and its subsequent 'technization'" (p. 66). The force of this proposition is in the definition that the architecture of human activity applies to both the practical external activity and to the internal thinking activity of the subjects.

For Leont'ev (1978), the most interesting issue is the movement of one into the other: "These transitions are possible because external and internal activity have a similar general structure. The disclosure of the common features of their structure seems to me to be one of the more important discoveries of contemporary psychological science" (p. 61). Of course, the similarity of structure between individual and collective activity does not at all imply their correspondence. Given that individual activity is derived from collective activity, on the contrary, it is their conflict that is a source of development when these mismatches are creatively used. They can also be destructive and a source of obstacles. Engeström (2000a) and Virkkunen (2005) have already pointed out this problem: "Resistance is often interpreted as an obstacle to development and learning. However, resistance is not only an obstacle but also a dynamic force that may be triggered to generate learning. The 'foreign' or 'unknown' must be one's own. This requires attacking, testing and questioning the new" (Engeström, 2006a, p. 22).

With regard to both the individual and the social, as Vygotsky (1997a) has shown, activity is a "continual struggle or collision" (p. 70), and "man is every minute full of unrealized possibilities" (p. 70). Let us imagine, he says, "the narrow doors of some big building through which a crowd of many thousands of people wishes to enter in panic. Only a few people can enter through the doors. Those who enter successfully are but a few of the thousands who were shoved aside and who perished. This better conveys the catastrophic character of that struggle, that dynamic and dialectic process between the world and man and within man which is called behavior" (p. 70). This idea is also applicable to the action and its object, coming out of the conflicts of activity. Observable action realized at both the social and the individual levels is most often the possibility that remains after what was ideally wished had to be dismissed. This does not take anything away from the action. On the contrary, it allows the collectives and the subjects to delineate a transformable object, never completely definitive. It also allows action, by means of the operations that carry it out, to make visible what might be realizable and what one had not even suspected. The object of the action has its own life. It is, however, a double life. The action, by realizing itself, reduces the activity, but simultaneously opens it up to other possibilities.

Let us take an example:[1]

> In June 2005, Sally Ramsey, a 63-year-old chemist, was about to make an experiment. Her company, Ecology Coating, specialized in very

[1] From *Le Monde*, December 18, 2005.

fine coats of substitute paint based on nanoparticles. She recollects: "I wanted to show to a potential client that one of our products for coating plastics dried rapidly under ultraviolet." The experiment, however, did not go as she expected. "I stained my clothes, and some product fell on the floor, which I protected with paper sheets." To repair the damage caused by her clumsiness, Mrs. Ramsey collected the paper sheets and dried them under ultraviolet "in order to safely throw them away."

As a scientist she was tempted to see "whether the sheets show interesting properties." She found out that "The appearance, the color, and the softness of the paper have not changed; I am even able to write on it with ink or paint. I rinse the sheets under running water and I realize that they are completely impermeable!" The result is visibly permanent. "I still have some paper sheets soaking since June on which I have written. Nothing has disappeared." Mrs. Ramsey has even removed them from water, written again on them, and then reimmersed them. The ink and the paper remain intact.

Impermeable paper is not a new product, but it is expensive – about 30 U.S. dollars for 50 sheets – because its manufacture requires mixing vinyl and polypropylene. Mrs. Ramsey's discovery should make it possible to reduce the manufacturing expenses by 10 times. She explains: "One has to be able to use ordinary paper. This will be easier to make and less harmful for the environment." Mrs. Ramsey's company, too small to produce the impermeable paper by itself, is at the moment negotiating with manufacturing companies.

Ecology Coating now sharpens its commercial arguments. The company affirms that this paper could first serve logistics groups such as DHL or FedEx, by protecting tags on packages and eliminating the need for the current plastic wrapping. Important official documents could also be printed on impermeable paper. The company also mentions the creation of impermeable surfaces – sleeping bags or sports equipment – on which all kinds of text could be written.

In this particular example, we can precisely locate how the new emerges and the conflicts in which development originates. The objects of the action in progress are transformed under the impact of the real world in which the discovery happens. The surprising occurrence of the initial action, first in the service of a commercial activity with a client, transforms the commercial activity of Mrs. Ramsey into a scientific activity, which is then realized in a new action of experimentation. In this collision between two objects we can see disconnection and reconnection of the action in progress. This action re-indexes itself. It changes its sense, to use Leont'ev's (1978) terminology.

Facing the result of this action, the commercial activity regains the upper hand to search for new manufacturing services and new clients. We observe that the emergence of new aims of action implies an exchange between scientific and commercial activities within Mrs. Ramsey's activity itself. And it is this mismatch in the internal activity – source of new actions and of concrete operational achievements – that transforms, by means of a backward shock, the external recipients of her activity: from the initial client, to the new manufacturing company, to finding potential clients. Here the "psychological division of labor" in the subject's own activity, between scientific and commercial activity, and the internal exchanges of activities that follow the surprising initial action, authorize fine movements between individual and social activity.

Mrs. Ramsey's social cooperation finds itself transformed by new collective connections. But this can only happen because there are many potential activities that lie dormant within her] – in other words, because there is indeed "the collective" in the individual. The concrete movement of activity "goes" from external activities to internal activities. It happens in immediate actions that are accomplished in effective operations and that "wake up" other possible but "sleeping" activities in the life of the subject. These other activities, first dismissed without being abolished in her life, are then revitalized in the course of the action.

There are, therefore, different types of collectives. Besides the collaboration that brings people into a relationship with one another within action on an object, there exists another type of "collaboration": Each subject tries to "resist" the internal "collectivity" of activities that push each other and that the subject tries to contain. This effort of containment is challenged in the action. The movement from these internal activities to external activities and inversely is one of the most difficult problems to solve for a psychological theory of activity. This direction of the research, however, is without doubt very promising for a developmental approach to subjectivity in the workplace.

To sum up, work activity is defined by two conflicts that cannot be suppressed. First, activity is always addressed (always has a recipient). It is simultaneously directed toward its object and toward the activity of others on this object. As a consequence, this object is always an object of collision in transformation, even when an agreement on it is reached. Second, all activities are never realized in the action. The activity realized in the action inhibits other possible realizations, which do not disappear and explain further development.

OBJECTIONS AND DISCUSSION: AN EXAMPLE

Some objections to Engeström's work have been voiced. In the field of ergonomics, Bedny and Karwowski (2004a) criticize the West European use of activity theory. In order to restore the function of the task in defining activity, they take up the following example:

> We can consider Engeström's (2000a) study of children's medical care. He described different actions performed by a junior physician. However, what he describes as actions are really tasks in the framework of activity theory. For example, examination and diagnosis of patients is not an action as was stated by Engeström, but rather a diagnostic task. This task includes distinct actions, and not only subject–object interaction, but also subject–subject interrelationships as well. Engeström, in this example, formulates a physician as the subject and the patient and his father as the object. However, in the rubrics of activity theory the patient and his father are subjects; the object of the physician's activity is the health condition of his patients. Moreover social interaction is also critically important. Therefore, in the physician's diagnostic tasks the subject–object relationship is transformed into subject–subject relationship, and vice-versa. When a physician evaluates a patient's health, we refer to subject–object aspects of a task; when a physician speaks with a patient and his father we refer to that as subject–subject aspects of a task. (p. 135)

We can discuss the assimilation of the patient and his father into the object of the action while we accept the idea that the patient's health is this object. This allows us to understand the emergence of a conflict in which the doctor's activity is simultaneously oriented toward its object and toward the patient's activity on the same object. The activity of the patient and of his father are better understood that way in the activity of the doctor. I do not believe, however, that the task directly determines the activity, as Bedny and Karwowski maintain. What we can do is discuss collectively ways to work within this tradition in our concrete research. This is the only way to keep this tradition alive, by our willingness to put it at risk in different contexts.

Moreover, it is difficult to accept what Bedny and Karwowski (2004a) affirm in the following: "The concept of task is fundamental in activity theory and it is the major object of study from the activity point of view" (p. 135). One may agree with Bedny (see also Bedny & Meister, 1997; Bedny, Seglin, & Meister, 2000), but the argument cannot be defended on the basis of Vygotsky's or Leont'ev's texts. Also, in France, for instance, the tradition

of analysis of work has for a long time made a distinction between task and activity. Activity is always a re-creation of the task. And even if we retain Leont'ev's (1978) definition of the task, we realize that it concerns the action or, more precisely, the relation between aims and means: "The action being carried out is adequate to the task; the task then is a goal assigned in specific circumstances" (p. 65). According to Leont'ev, activity gives its sense to the task or makes the task lose sense. Drawing on the relation between sense and meaning (Leont'ev, 1978), we can say that it is the activity that is concretized in the task, rather than the task being manifested in the activity. Activity is in no way potentially contained in the task. Activity is generated by practical contact with concrete objects that solicit, resist, deviate from, modify, or enrich it.

The subject's practical activity is never only an effect of external conditions, and psychological activity is not the internal reproduction of these conditions. The activity – practical and psychological – is always a site of vital investments: It transforms the objects of the world into means for living. The subject's activity is not mechanically determined by its context; it makes the context undergo a metamorphosis. It frees the subject – by always taking the risk of failing – from dependency on the concrete situation and subordinates to itself the given context. The object of activity is this very subordination, or rather this taming, so specific to the human species, which turns everything, in one way or another, simultaneously into a social object and a psychological object. Even in the most constrained work situations, we know now that this is the case and, when this is not the case, psychopathology of work is never far away. In other words, activity does not exist in a context but rather produces the context in order to exist.

This is why, for the subject *in the course of an activity*, external dimensions are internal and internal dimensions are external. We can therefore speak about activity as an appropriation, always original, reciprocal, and practical, of the world and of the subject. As Vasilyuk and Zinchenko point out in the epilogue of the French edition of Leont'ev's book (Vassiliouk & Zinchenko, 1984), "The object is then not simply a thing, it is a thing integrated into the human being and becomes a necessary organ of this being, subjectivized by the vital process itself before any specific cognitive assimilation" (p. 345). In this movement of appropriation, the immediate object of action is thus never only an object functional to the activity of the subject. For the subject, the object is a means to live. If it loses this status, the object of the action is devitalized, it becomes disused in the activity of the subject, and loses its value for the subject. In these dynamics of valuation and devaluation in the formation of objects of the action, the sense is located as

the central regulator of activity. A task may have or not have a sense in the activity of the subjects. This is where its psychological energy is developed or lost. This is where new aims of action are invented and formed. That is why the activity of the subjects has never had its last word, which is not the case for an action. We can always define action by its expected or obtained results. The activity or the interaction between activities can therefore produce or fix tasks to be accomplished, but the task does not produce the activity, contrarily to what Bedny and Karwowski (2004a, p. 136) so much want us to believe.

We may recall Leont'ev's (1978) commentary on the work of Galperin, in which he at the same time praised its fecundity and highlighted its limits. Galperin studied the directed and "non-spontaneous" formation of mental processes, while subjects accomplished tasks given from the outside: "The analysis concentrated on carrying out assigned actions; as far as their origins were concerned, that is the process of goal formation and motivation of activity that they realized (in the given case, training), that remained beyond the limits of direct investigation" (Leont'ev, 1978, p. 87). Psychological inquiries start when one is interested in this latter aspect of the life of the subjects, added Leont'ev. The task realizes or solicits the subjects' activity. If this is not the case, the task loses its sense for the subjects. If we do not pose the problem in those terms, we risk diverting the analysis from human subjectivity.

This is, by the way, what Bedny and Karwowski seem to recognize in another very interesting article: "The difference in the interpretation of the same task by different subjects, or an analysis of how the subject interprets the task as different task components are either excluded or included, makes the discovery of the unconscious elements of activity possible" (2004b, p. 138).[2] In the example of the medical doctor discussed by Engeström (2000a), one can demonstrate the impact of this "subjective" approach, which is necessary to analyze the activity. In the example it was actually a question of a "junior" practitioner. His activity is certainly not the same as that of a "senior" practitioner, yet the diagnostic task is identical.

The junior practitioner, for instance, has to demonstrate something to his peers, to the patient, to the patient's father, and to himself. His actions directed toward the object and toward his interlocutors are affected by these aspects in a different way than in the case of a senior practitioner who no longer has anything to prove. If, in addition, the junior practitioner has,

[2] It would be useful to discuss the conceptualization of the unconscious in this article by Bedny and Karwowski (2004b), in which it is defined only as "nonverbal."

for instance, to account for his work to a supervising senior practitioner, his action is going to be affected differently once more, and he will give it yet another sense. In this case not only will he need to engage in the action, but in the action he will have to prepare himself to explicate later how he performed with the patient. We could continue imagining possible variations of activities that are realized in the action. I prefer, instead, to focus on the Clinic of Activity, which allows provoking these variations in order to develop thinking and action at work.

CLINIC OF ACTIVITY: A DIALOGICAL INTERVENTION

The method I present in this section can be defined as a historical and developmental method (Clot, 2005b; Clot, Prot, & Werthe, 2001; Yvon & Clot, 2003). One may describe it in terms of its phases, each of which includes multiple steps.

The first phase includes the following steps.

1. The construction of a collective of professionals who volunteer to design with researchers what we can call the social perimeter of the zone of proximal development of a trade.
2. The systematic observation of situations in which the work is "difficult to do" and is likely to be the object of a critical reevaluation by "experts."
3. The selection of a shared sequence of activity to be video-recorded. This is by definition a sequence in which the activity of each professional is at same time unique and replaceable.

In this first phase the activity is observed in great detail in its real conditions, as in the French ergonomic tradition. The analyses are elaborated at the level of the collective with the aim of "denaturalizing" the activity. We rediscover each time that the subjects at work carry history and experience that an observer from the outside easily confuses with automatisms and routines. These are in fact supported by choices, subjective engagement, and social determinations. The first phase aims at instructing individually and collectively this rediscovery of experience, of its richness but also of its limits and dilemmas. In this phase, subjects search for a connection-to-the-object, which is "difficult to explain."

The second phase involves three steps.

1. Video recordings of a few minutes of a sequence of activity. This way we establish traces of the activity that will become the object of repeated analyses.

2. Confrontation of the professional with the video recording of his or her activity in the presence of the researcher. This step is called "simple autoconfrontation."
3. Confrontation of the same professional with the same video recording in the presence of the researcher and of a colleague who has already been confronted with his or her own sequences of activity. This step is called "crossed autoconfrontation."

The second phase is devoted to collecting two types of video data: data of the activity and data of the confrontation. The researcher does not aim at understanding "why" what is done is done. This "truth" is not directly accessible. The researcher rather aims at making the practitioners question themselves on what they see themselves doing in the video. In other words, the researcher invites them to describe as precisely as possible the gestures and the operations observable in the video, until the point at which the limits of this description appear. This is the point at which *conventional truths* fail in the face of unexpected developments of the dialogic exchange.

The organized "professional dispute" opens up ways of dissecting professional gestures. The reevaluated activity acquires another status: it turns from object of thinking into means of thinking of other possibilities. Instead of isolating the elements of the activity, which the researcher then logically recomposes, the subjects make over and over again the connections between what they see themselves doing, what needs to be done, what they would like to do, what they could have done, or what should be done over again. In other words, the result of the analysis does not lead to knowledge about the activity. It rather leads to astonished reactions about real events that are difficult to interpret within the rules of established discourses. Crossed commentaries orient the dialogue to confrontation between different "ways of doing" in order to pursue the same objectives or in order to determine other objectives. The diffusion of professional experience opens up a cycle between what practitioners do, what they say they do, and, finally, what they do of what they say.

The third phase allows us to move the confrontation "upward" or "downward" to other levels of engaged cooperation:

1. The initial collective of professionals
2. The steering committee of the action, where the organizers and those who conceive the work can rethink their own trade.
3. The extended professional collective, that is, the overall group of pairs facing the same professional challenges