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Activity theory as an activist and interventionist theory

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Abstract

This article presents arguments used in current discussions on potential shortcomings of contemporary works within activity theory concerning subjectivity and the use of conceptual models such as the triangular representation of the activity system. It documents the history of activity theory as an activist and interventionist theory. It suggests that advances in activity theory depend on the ability of those within this framework to establish fruitful connections between the classic heritage and challenging possibilities of societal change. The main arguments of the critiques are examined in this historical perspective. Combined with design and implementation of material transformations, both the models and the voices of the subjects act as mediators and are embedded in collective change efforts. The article indicates a possible direction to reorient the current discussions toward interventionist methods developed within the framework of activity theory, namely the Change Laboratory, the Clinic of Activity, and the Fifth Dimension.

Keywords

ascending from the abstract to the concrete, cultural-historical activity theory, double stimulation, interventionist epistemology, interventionist methods

This article contributes to current discussions on the potential shortcomings of contemporary works within activity theory. Critiques strongly emphasize the necessity to overcome the lack of focus on subjectivity in activity-theoretical studies. In these discussions, limitations of the triangular representation of activity (Engeström, 1987, p. 78) are often highlighted as evidence of omission of key issues central in the works of the founders of activity theory. I will discuss the main arguments used in the critiques from a historical perspective, viewing activity theory as a theory grounded in interventions in social practices. On this basis, I will argue for a reorientation of current discussions in activity theory toward interventions.

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The article is organized in five sections. The first section presents foundational and contemporary works in activity theory. The second section summarizes some of the critiques focused on subjectivity and on conceptual models such as the well-known triangle. The third section documents the history of activity theory as an activist and interventionist theory. The fourth section presents two interventionist epistemological principles stemming from the history of activity theory, namely the principle of double stimulation and the principle of ascending from the abstract to the concrete. The fifth section of the article sketches a possible direction to reorient the current discussions by looking at three main interventionist methods in activity theory—the Fifth Dimension, the Change Laboratory, and the Clinic of Activity—as attempts to implement the activity-theoretical principles of double stimulation and ascending from the abstract to the concrete.

Foundational and contemporary works in activity theory

Engeström (1996) proposed the notion of three generations of activity theory. The first generation started with Vygotsky and is characterized by the "mediated act" (Vygotsky, 1978, p. 40) as unit of analysis, depicted in the famous triangular representation shown in Figure 1 (reproduced in Engeström, 1987, p. 59) . The idea behind this representation was that a human act is not just a response (R) to a stimulus (S) but is mediated by a cultural component (X). This unit of analysis was a result of Vygotsky's reading of Marx and an attempt to provide a dialectical materialist view of human action. As such, Vygotsky's notion of mediation represents a turning point of extreme importance in the study of human mind and behavior.

> The insertion of cultural artifacts into human actions was revolutionary in that the basic unit of analysis now overcame the split between Cartesian individual and the untouchable societal structure. The individual could no longer be understood without his or her cultural means; and the society could no longer be understood without the agency of individuals who use and produce artifacts. (Engeström, 1996, p. 132)

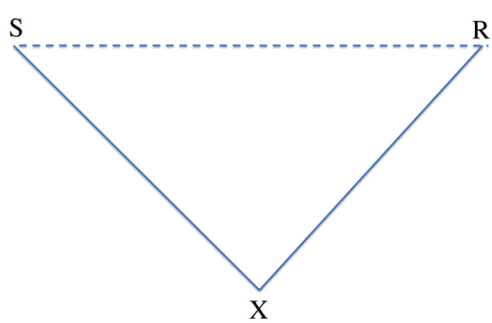

Figure 1. Vygotsky's representation of the mediated act (1978, p. 40)

The second generation of activity theory started with Leont'ev and is characterized by the expansion of the unit of analysis from individual action to collective activity. Leont'ev introduced the critical distinction and complex relation between these two units, illustrating them with the case of the "primeval collective hunt":

> When members of a tribe are hunting, they individually have separate goals and they are in charge of diverse actions. Some are frightening a herd of animals towards other hunters who kill the game, and other members have other tasks. These actions have immediate goals, but the real motive is beyond hunting. Together these people aim at obtaining food and clothing—at staying alive. To understand why separate actions are meaningful one needs to understand the motive behind the whole activity. Activity is guided by a motive. (Leont'ev, 1978, pp. 62–63)

The complexity of the relation between action and activity stems from its dialectical nature. Action and activity are distinct and yet unified phenomena. The dialectical nature of this relation was conceptualized in the second generation by the philosopher Ilyenkov (1982):

> In reality it always happens that a phenomenon which later becomes universal originally emerges as an individual, particular, specific phenomenon, as an exception from the rule. It cannot actually emerge in any other way. Otherwise history would have a rather mysterious form. Thus, any new improvement of labour, every new mode of man's action in production, before becoming generally accepted and recognised, first emerge as a certain deviation from previously accepted and codified norms. Having emerged as an *individual exception* from the rule in the labour of one or several men, the new form is then taken over by others, becoming in time a new *universal norm*. (pp. 83–84)

The movement from action to activity is a transition which implies the transformation of both the action and the activity. Once innovative actions are recognized and adopted by others, they can break through into new forms of activities. At this critical stage in the transition from new actions to new activities, collectives become aware of the contradictions in their present activities and start developing the present activities by relating them to new ones for the future.

Engeström's (1987, p. 78) model of the activity system is a graphic representation of the expanded unit of analysis in the second generation. I will return to the genesis of this representation later in this section. The third generation of activity theory further expands the unit of analysis to encompass relations between multiple activity systems. Engeström's triangle, however, cannot be considered only as an extension of Vygotsky's representation through the reading of Leont'ev. The model of the basic structure of human activity stems from an analysis of the radical conceptual and methodological breakthroughs accomplished in the 19th century by Hegel in philosophy, Darwin in biology, and Marx in the social sciences. Hegel's novel contribution consists in pointing out that historically accumulated and objectified knowledge in material instruments plays a key role in the development of consciousness. Darwin provided a scientific theory of the systemic biological origins of humanity, in contrast with the dominant supernatural explanations available at the time. Marx and Engels assimilated Hegel's and Darwin's contributions by developing a dialectical materialism according to which human beings, beside acquiring knowledge and being the result of the evolution of species, also produce and transform culture. The analysis that leads to the elaboration of the triangular structure of human activity is strongly based on Marx.

The analysis points out that education and psychology have mainly not yet embraced the dialectical and materialistic conception of humanity as "creator and transformer of culture" (Engeström, 1985, p. 18). However, a number of attempts in this direction can be identified in three influential lineages of thought in the 20th century. The first lineage is centered on the idea of the construction of knowledge and meaning in the works of Peirce and Popper; these are seen as still offering an individual and intellectual understanding of activity. The second lineage is traced in the works of Mead and the neo-Medians which open up to a social and interactive perspective. Shortcomings of these two lineages are seen in the limited attention paid to practical construction of material culture. A truly dialectical and materialist attempt to develop a concept of activity is found in the third lineage, represented by the works of Vygotsky and his colleagues, which focus on "material production, mediated by technical and psychological tools as well as by other human beings" (Engeström, 1987, p. 73).

The triangle stems from this ambitious theoretical analysis of key contributions to non-dualistic human science. This is an attempt at a dialectical analysis by tracing the historical evolution of the formation of the concept of activity in the 19th and 20th centuries. The triangle is the germ cell or unit formulated with the help of this analysis.

The triangular diagram was used for the first time in an article published in 1985 where Engeström (1985) points out "the necessity of reconstructing the history of human activity" (p. 13) in order to understand learning. The article, with the help of a series of models (models 1 to 3 in Figure 2), illustrates key forms of activity and transitions from

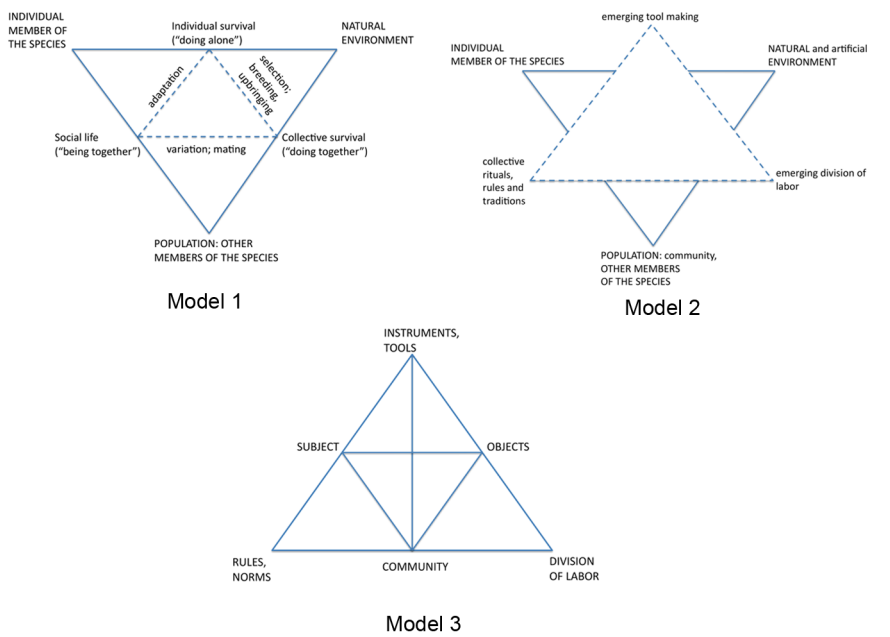

Figure 2. Key historical forms of activities and the transition toward socially and culturally mediated human activities (Engeström, 1985, pp. 13–14)

one form of activity to another in history: that is, from activities based on biological adaptation among animals to socially and culturally mediated human activities.

The model of biological adaptation (model 1) depicts social life and collective production as essential to the survival of the individual and to the development of the species. Model 2 depicts the transition from biological adaptation to human activities. The transition to specifically human activities is characterized by three ruptures and determining factors appearing in the first triangular model: tool making, rules, and division of labor. Tool making emerges as the individual has to face the constraints and use the available resources of the natural environment in order to survive. Rules originate from adaptation and mating as collective and social features of a given population. Sophisticated forms of division of labor, such as those among sexes and members of a given community, evolve from earlier practices of breeding, upbringing, and mating. As Engeström (1987) puts it:

> The breakthrough into human cultural evolution—into the specifically human form of activity—requires that what used to be separate ruptures or emerging mediators become unified determining factors. At the same time, what used to be ecological and natural becomes economic and historical. (p. 76)

The transition depicted in model 2 leads to a qualitative restructuring of model 1 with "the subordination of the biological to the cultural" (Engeström, 1985, p. 14). The triangular model of socio-historically mediated human activity (model 3) crystallizes the relation of subordination between the biological and the cultural: "It points out that what first were emerging mediators have now become determining factors. It also hints at the possibility of analyzing several triangles within the triangle. And it elevates tools up on the top of the triangle" (Engeström, 1985, p. 14).

Models 1 and 2 are "representations of genetically earlier forms of activity" (Engeström, 1987, p. 81). Model 3 is further developed in *Learning by Expanding* (Engeström, 1987) with the addition of the inner relations of production, consumption, exchange, and distribution (p. 78). On the basis of his reading of Marx (1973) in *Grundisse*, Engeström (1987) adds these factors in the triangle (Figure 3).

Consumption, production, distribution, and exchange indicate that the triangle constitutes a unit of analysis as a whole, although it is possible to analyze specific relations between its structural components. Human beings produce goods which can satisfy specific needs. These goods are distributed and further exchanged according to the norms of a given community. Consumption is the feature of activity which directly positions the subject at the core of the relations of production, distribution, and exchange: "[I]n consumption, the product steps outside this social movement and becomes a direct object and servant of individual need, and satisfies it in being consumed" (Marx, 1973, p. 89).

Among consumption, production, distribution, and exchange, production plays a particularly important role as "*there is no activity without the component of production"* (Engeström, 1987, p. 80). The explanation of this statement is found in *Learning by Expanding* where, commenting on Marx, Engeström (1987) writes:

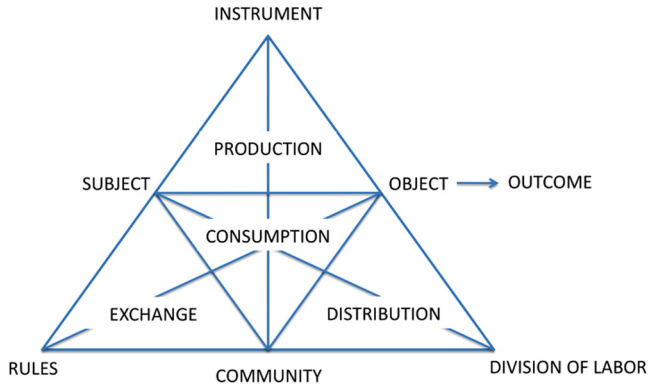

Figure 3. The triangular model of human activity (Engeström, 1987, p. 78)

> Production is always also consumption of the individual's abilities and of the means of production. Correspondingly, consumption is also production of the human beings themselves. Furthermore, distribution seems to be not just a consequence of production but also its immanent prerequisite in the form of distribution of instruments of production and distribution of members of the society among the different kinds of production. Finally, exchange, too, is found inside production, in the form of communication, interaction and exchange of unfinished products between the producers. (p. 79)

In Marx's own words:

> Production predominates not only over itself, in the antithetical definition of production, but over the other moments as well. The process always returns to production to begin anew. That exchange and consumption cannot be predominant is self-evident. Likewise, distribution as distribution of products; while as distribution of the agents of production it is itself a moment of production. …Production is itself determined by the other moments. For example if the market, i.e. the sphere of exchange, expands, then production grows in quantity and the divisions between its different branches become deeper. A change in distribution changes production, e.g. concentration of capital, different distribution of the population between town and country, etc. Finally, the needs of consumption determine production. (Marx, 1973, pp. 99–100)

Individual needs and the role of the subject in the activity system are issues which deserve a special mention, as they are connected to some of the critiques of the triangle which will be discussed in the next section. According to Engeström (1990),

> [T]he system … would not function without the subjects and their representations. They are integral constituents of the system. … Therefore, to disregard the historically evolving, multiple and distributed personal view is to misconstrue the system, to create an oversimplified system view. (p. 178)

Beside depicting the social circumstances in which a subject operates, the triangular representation of the activity system is also an explanatory representation of the systemic and dynamic origins of human labor.

> Under the conditions of division of labor, the individual participates in activities mostly without being fully conscious of their objects and motives. The total activity seems to control the individual instead of the individual controlling the activity. Activities are realized by goal-directed actions. … But human practice is not just a series or a sum of actions. … On the other hand, one and the same action may accomplish various activities. (Engeström, 1987, pp. 66–67)

In other words the subject and the activities that he or she inhabits are continuously making and redefining each other:

> The sub-triangles are initially only actions since their object is still a relatively undifferentiated whole … and the temporal, spatial and social boundaries between them are fluid. … However, demanding tasks … very early acquire a division of labor of their own and become relatively independent activities. (Engeström, 1987, p. 80)

Critiques

Why is this agenda necessary today? Theoretical outcomes of interventionist works are not accounted in line with an interventionist epistemology, with the consequence that recent activity-theoretical works in the West based on interventions are not recognized in their full importance. Often interventions are regarded as techniques, rather than an epistemology.

One red thread identifiable through the critiques of the triangular representation of the activity system and related contemporary developments in activity theory is the claim that these works neglect key ideas of the founders. Critiques often refer to shortcomings in understanding a specific classic author or concept. Here I discuss a few representative critiques selected among the most recent and authoritative, namely those by Roth, Kaptelinin, and Bedny and Karwowski.

Roth (2009) argues that the triangular representation excludes subjectivity, sensuous experience, emotion, and ethico-moral issues: "[T]he sensuous nature, emotive, identity-related, and the ethico-moral dimensions of human actions and activities … currently are not highlighted in this representation" (p. 65) and

> without articulating and theorizing needs, emotions, and feelings, we are hard pressed to arrive at more than a reductionist image of activity generally, and concrete activity systems such as the hatchery I studied particularly. Only by including these needs, emotions, and feelings do we capture the activity system as a whole, that is, as intended by cultural-historical activity theory since its inception. (p. 70)

Roth's critique leads to the suggestion of clearly distinguishing the level of activity and the level of action, in order to connect collective needs and emotions to activity, on the one hand, and individual needs, emotions, and feelings to action, on the other. The two levels are described respectively with the help of Engeström's model and another triangular representation specifically conceived for studying human actions. Roth's representation includes possible means that the subject selects in order to realize a specific goal. Roth provides the example of a fish culturist who chose between the scoop or the mechanical sprayer for realizing the goal of feeding the fry. The representation also

depicts the object of the action, namely hungry fish, and its outcome of satiated fish. The community of the fish culturists is also included in the representation, as the action realized by the fish culturist can be immediately recognized by everyone in the hatchery. While this solution to the considered shortcomings of Engeström's triangle is presented as a step "toward an inclusive unit of analysis" (Roth, 2009, p. 70), it actually consists in a unit of analysis merely focused on action. It is not clear how this return to action takes into account the serious theoretical attempts made by the second and third generation of activity theorists to precisely understand human action within activities and networks of activities.

Langemeyer and Roth (2006) claim that "the contemporary, widely known version of CHAT, related to Yrjö Engeström's theoretical and empirical work, neglects different aspects of dialectical thinking and consequently narrows its potential to a socio-critical approach to societal practice and human development" (p. 21). The authors specifically question

> how the single triangle can help to comprehend any change or movement within the activity represented except in its outcome. It is invisible, for example, how the subject transforms the object of activity and how it simultaneously appropriates its own nature, its body, and how it develops its potentials and capacities. The representation appears to suggest that the subject's motives and intentions to become engaged in a certain activity would be identical with its outcome(s). (p. 30)

One might wonder whether Langemeyer and Roth see in the triangle the quality of a unit of analysis or of the analysis itself. The triangle is a unit of analysis which discloses its analytical quality in the process of the analysis, but does not correspond to the analysis itself. The triangle operates as a germ cell whose dynamics are displayed not in its mode of representation, but in its use in analysis and in construction of new solutions.

Kaptelinin (2005) and Bedny and Karwowski (2004) denounce what they see as problematic or erroneous understanding of Leont'ev's work—with regard to the concept of object in the case of Kaptelinin, and the concept of task in the case of Bedny and Karwowski. According to Kaptelinin (2005), Leont'ev's hunting example provides

> an insight into historical transformations of the structure of individual activities rather than to point out that activities can only be collective. Therefore, this example cannot be used as an argument for equating the concept of the object of activity developed by Leontiev … with a similar concept used within the approach developed by Engeström… . It can be concluded that the object of activity, depending on the approach adopted, can be considered either predominantly individual or exclusively collective. (p. 12)

Kaptelinin (2005) argues that Leont'ev's and Engeström's notions of object stem from different domains of theorizing and application, namely from the psychological domain of the individual, on the one hand, and the domain of organizational change, on the other hand:

> Even though the possibility of extending the scope of analysis and applying the concept of activity at supra-individual levels, for instance, to consider activities of individuals as contributors to a larger-scale activity carried out by a group or organization, was clearly indicated by Leontiev, his framework was specifically developed for individual activities. (p. 9)

Davydov (1999) provides an important argument against the separation of disciplinary domains in activity theory:

> The problem of activity and the concept of activity are interdisciplinary by nature. … The issue of activity is not necessarily connected with psychology as a profession. It is connected at present because in the course of our history activity turned out to be the thing on which our prominent psychologists focused their attention as early as in the Soviet Union days. Things just turned out to be this way. (p. 50)

This historical circumstance has given rise to the prominence of activity theory in psychology. However, activity theory is redefining itself and proving its generative potential across a wide range of disciplines and fields of social practice. Today emphasizing the psychological nature of Leont'ev's framework without consideration of its contribution to the understanding of anthropological, sociological, historical, and linguistic characteristics of activity is risky and narrows the focus to the study of specific and limited aspects of activity.

Bedny and Karwowski (2004) consider the concept of task "fundamental in activity theory, and … the major object of study from the activity point of view" (p. 135). They provide the following definition of tasks and the foundational role that tasks play in activity:

> Tasks may be defined as a logically organized system of mental and behavioral actions, directed toward an ultimate task-goal. The task is the basic component of activity and human lives can be conceptualized as an ongoing attempt to solve tasks or problems. (p. 141)

The French psychologist Yves Clot (2009) has recently expressed his distance from this concept of task within activity theory:

> Even if we retain Leont'ev's … definition of the task we realize that it concerns the action or, more precisely, the relation between aims and means. … 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…, 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. (p. 297)

Two claims stand out from these examples of critiques, which address core conceptual issues in activity theory. The first claim concerns the alleged dominance of collectivity over subjectivity. The second claim is that the triangular model distorts key assumptions of activity theory as conveyed by the founders.

I agree with the critiques that mechanical applications of the triangular representation exist. These convey a poor understanding of the epistemology behind it. This is, however, a limitation in the use of the model rather than a limitation intrinsic to the diagram. In *Learning by Expanding*, Engeström (1987) writes the following with regards to the triangular model:

> I maintain that with the help of this model activity can be analyzed in its inner dynamic relations and historical change. However, this claim must be substantiated by using and transforming the model in the analysis of the development of concrete activities. (pp. 81–82)

In this sense the triangle "is not a representation of the system as it is; it is a representation of the central elements and relations of a system to be built and implemented in time" (Engeström, 1985, p. 20). Without this interventionist and perspectival orientation, the triangle can indeed be considered as a sterile representation of abstract interconnected elements.

In the following section I aim at illustrating the deep-seated interventionist nature of activity theory since the very first works of the first generation.

The history of activity theory as an activist and an interventionist theory

Activity theory has an activist and interventionist history. It has the distinctive characteristic of developing as an integral part of the historical turmoil through which activity theorists have lived. Two main historical phases of turmoil in the development of activity theory are the Russian Revolution, which triggered the engagement of the founders, and the radical student movement, through which activity theory was rediscovered and further developed in Europe and many other parts of the world. Throughout this history, activity theory stands as an activist theory of development of practices, which may be traced back to Marx's idea of revolutionary practice, emphasizing that theory is not only meant to analyze and explain the world but also to generate new practices and promote change. Since Vygotsky's works with children who suffered consequences of the civil war and with illiterates, practically all the founders of cultural-historical activity theory—Luria, Leont'ev, Galperin, and Davydov, among others—have engaged in various kinds of interventions in multiple settings.

In the early 1920s,Vygotsky established a psychological laboratory at the Gomel Teacher Training School (Yaroshevsky, 1989). These were years when the country was actively concerned with the challenge of providing infrastructures for homeless children and for children with special needs. Referring to Vygotsky's work in this period, Luria (2005) writes : "Vygotsky's work at the teachers college brought him in contact with the problems of children who suffered from congenital defects—blindness, deafness, mental retardation—and with the need to discover ways to help such children fulfill their individual potentials" (p. 39). Vygotsky's intellectual work was therefore driven by these practical concerns of his time.

Already before meeting Vygotsky, Luria and Leont'ev shared an intensive period of research on emotions during which they

> decided that one way to overcome … inadequacy in our own and others' previous research was to work directly with people who were experiencing strong emotions in real life situations. The people we chose were actual or suspected criminals. … This work turned out to be of practical value to criminologists, providing them with an early model of a lie detector. (Luria, 2005, pp. 34–36)

Luria's subsequent academic work from the late 1920s on is indivisible from his practice as a medical doctor. He developed new methods of neuropsychological examinations of patients with brain damage through his medical practice at the Burdenko Institute of

Neurosurgery. Also, beside diagnoses, Luria's work resulted in the development of a number of treatments for restoring speech: for instance, in patients who experienced traumas or suffered from aphasia.

Leont'ev worked actively with injured solders for the rehabilitation of their lost movement functions. Gal'perin, Zaporozhets, and Rubinstein were among a group of prominent scientists who collaborated with him in this endeavor. As underlined by Levitin (1982), this work led to theoretical results and concrete innovations which were strongly practice-based:

> It was shown that the rehabilitation of lost movement essentially depends on the general character of the patient's activity and the motives, goals, and means of this activity. The research data thus obtained was used to develop new effective methods of labour therapy and therapeutic exercises which were widely used at military hospitals. (p. 106)

In a volume that reports a number of results of this work, Leont'ev and Zaporozhets (1960) explicitly refer to the role of rehabilitation practice for understanding the symptoms connected to injured limbs.

Davydov's (2008) work is an impressive set of large-scale interventions of developmental teaching covering entire schools for years. These inquiries aimed at promoting scientific and theoretical forms of thinking through new methods of designing school subjects in line with the dialectical method of ascending from the abstract to the concrete.

Similarly, Meshcheryakov devoted his life to the education of children with multisensory impairment. His book *Awakening to Life* (1979) is a thorough report of the development and implementation of his method in the Zagorsk boarding school (Levitin,1982). Among the classic authors within activity theory, even the most theoretically oriented representative—the philosopher Ilyenkov—grounded his philosophy in the educational practices as they were carried on in the boarding school directed by Meshcheryakov in Zagorsk.[1]

In the following I present in more detail two important historical cases of interventionist research, conducted by Luria and Meshcheryakov. Luria and Yudovich (1971) report on an educational experiment conducted to study speech development and the specific influence of speech on related complex forms of behavior. Such a study was possible because given natural conditions allowed them to isolate the speech factor otherwise strongly intertwined with the dynamics of the child's maturation and development:

> We were able to find appropriate subjects, a pair of identical twins of five years of age who suffered from a peculiar defect which created conditions for a retardation of speech development; added to this was the "twin situation" which did not create an objective necessity for developing language and so constituted a factor which fixed this retardation. (p. 105)

By studying the case of these twins, Luria and Yudovich intended to trace the genesis of speech from primitive toward higher and more sophisticated forms of speech. As theoretical bases of this study, the authors refer to the three fundamental conceptual propositions of Soviet and materialist psychology (pp. 21–22): (a) complex forms of mental life are approached by taking as a point of departure the interrelation between

the organism and the environment, rather than supernatural explanations; (b) the basic laws of complex forms of mental life can be disclosed if it is recognized that throughout the different stages of development the individual is confronted with new problems and challenges stemming from concrete forms of activity; and (c) complex forms of mental development are the result of social circumstances such as joint activities and verbal interactions with others, through which the individual acquires the experience of previous generations.

The interest of this study for the purpose of the present article lays in its strong interventionist nature. In the book the way the authors proceed is clearly reported. For instance:

> Having separated the children, and thus created a situation which impelled them into speech communication, we singled out one of the twins… and began to give him special speech training with the aim of developing a better differentiation of sounds, better pronunciation and, of paramount importance, the acquisition of a developed speech system. (Luria & Yudovich, 1971, p. 58)

and

> Twin A was given systematic exercises during which he was specifically trained to speak. These lessons … took the form of dialogue conversations, verbal analysis of pictures, the relating of stories. (p. 92)

The authors conclude that "by changing the given situation and so creating an objective necessity for speech communication we can call forth a rapid development of the child's speech and then investigate how this effects changes in the structure of mental processes" (p. 37). In other words, the interventionist aspect of the study was instrumental in pursuing the research agenda of tracing the way speech development affects mental processes.

The specific function of the word in the development of mental processes played a key role in Luria and Yudovich's study:

> The word has a basic function not only because it indicates a corresponding object in the external world, but also because it abstracts, isolates, the necessary signal, generalizes perceived signals and relates them to certain categories. … The word, handing on the experience of generations as this experience is incorporated in language, locks a complex system of connections in the child's cortex and becomes a tremendous tool, introducing forms of analysis and synthesis into the child's perception which he would be unable to develop by himself. (pp. 23–24)

The word thus serves processes of generalization though which the complexity of the surrounding world is abstracted in specific isolated connections. These generalization processes necessarily involve interactions with other individuals and lead to the formation of sophisticated tools for elaborating meaning, interpreting the world, and acting as competent individuals.

Interventions are also at the core of Meshcheryakov's work (1979) with children with multisensory impairment: "While in the case of normal children much development takes place without special educational intervention or control, for the deaf-blind *each* mental step forward has to be the specific objective of a specially devised educational process" (p. 29). The key role of the use of object is at the core of Meshcheryakov's interventionist methodology. "Materially intervening" is in the case of children who cannot see or hear even more important than with children who do not have these impairments. While verbal interactions were emphasized in Luria and Yudovich's interventionist method, a more material interaction based on the manipulation of concrete objects was considered necessary in Meshcheryakov's interventionist method:

> Until he begins to receive proper training, the deaf-blind child's world is empty and devoid of objects. … They are discovered by him only insofar as he knocks into them, but they do not exist for him with functions and designations—with their social significance. … It is clear that the path to knowledge of the world can follow only one course for such an individual; it must be effected via analysis through touch and movement. … However, experience in teaching deaf-blind children has shown that such a path is impracticable. Deaf-blind children, before they receive special training, … have no need to discover the world. ... If such a child is given objects to "peruse" he drops them at once without even bothering to familiarize himself with them. This is understandable insofar as the objects given to such a child have no significance for him. … It is necessary to provide conditions in which getting to know objects would become a need for the child. … Basic natural wants (to eat, excrete and protect himself)… do not in themselves constitute true needs in the psychological sense of that word. … These wants become true needs only after they start to be objectivized and satisfied through human methods involving tools and implements. … The adult teacher, while feeding a child, teaches it to use a spoon, plate or napkin, holding the child's hands in his own. In the course of this practical activity a child is obliged to become familiar with various objects. "Obliged" insofar as this encounter with objects at meal-times is essential if he is to receive direct sustenance in the form of food. … [A]t the table… these objects… become significant for him and he begins to feel them. Gradually … the child's orientative and analytical activity begins to develop. (pp. 86–88)

The interventionist practices developed by Meshcheryakov were pathbreaking in applying Marx's idea that "man shapes his mind, his ideas and attitudes, while transforming the world around him" (Meshcheryakov, 1979, p. 85). While comparing common educational practices at the time with those introduced in the Zagorsk boarding school, Meshcheryakov emphasizes the "humanizing influence of objects, as the products of social labor" (p. 85). He points out that "it is precisely this behaviour with objects, that is, the ability to use objects in accordance with their intrinsic logic, which constitutes the essence of human behaviour" (p. 85). A clear connection emerges between the generalizing function of the word in the case of the twins in Luria's and Yudovich's study and the appropriate use of objects in the case of Meshcheryakov. Both the use of words and the use of objects involve processes of abstraction and generalization of the complexity of the surrounding world and the mastering of experience accumulated by previous generations. In this way, children in Meshcheryakov's school formed sophisticated instruments for independently moving in the world: "In the course of being taught to behave

in the world of things, as it masters actions correlated with various things, a child comes to grasp their social significance, their essence" (p. 86).

The practices that Meshcheryakov (1979) conceived ultimately led the child to change given circumstances through the use of appropriate tools. This process corresponds also to a dialectical movement toward grasping the essence of things:

> This essence is revealed in transforming action. Transforming action is effected through a tool, i.e. one object is changed by the subject by means of another (the tool). Action with a tool of necessity brings out the objective properties of a thing. … It is the totality of the objective properties of a thing, that are necessary and sufficient for its utilization in social practice, that constitutes its essence. (p. 293)

In the following sections I suggest that in order to appreciate the degree of appropriation of the founders' legacy, we need to see contemporary contributions to activity theory in the perspective of the overall historical lineage outlined in this article. The advantage I see in doing this is to redirect discussions in this field toward a fruitful joint effort around the wide academic and practical interest in interventions.

Epistemological principles for interventionism in activity theory

There are two foundational epistemological principles for interventionism in activity theory that are applied, although not necessarily explicitly articulated, in the cases of the twins and the Zagorsk boarding school: the principle of double stimulation and the principle of ascending from the abstract to the concrete. The principle of double stimulation stems directly from Vygotsky. With this principle, Vygotsky aimed at overcoming the behaviorist idea of human action as a response to external stimuli. The principle of ascending from the abstract to the concrete stems from Marx, was explicated by Ilyenkov, and was put into practice in Davydov's interventionist work.

The principle of double stimulation

Vygotsky's principle of double stimulation (1978) refers to the mechanism with which human beings can intentionally break out of a conflicting situation and change their circumstances or solve difficult problems. Counting to three to solve the conflict between wanting to sleep and wanting to wake up is an example of double stimulation in which the counting is the second stimulus:

> Upon waking, a person knows, on the one hand, that he must get up and, on the other hand, that he would like to sleep a little longer. A conflict of motives develops. The two motives alternate, appear in consciousness, and replace each other. … A typical, developed voluntary act in the same situation exhibits the following three instants: (1) I must get up (motive), (2) I don't want to get up (motive), (3) counting to oneself: one, two, three (auxiliary motive) and (4) at the count of three, rising. This is the introduction of an auxiliary motive, creating a situation from within that makes me get up. … I got up at the signal "three" … but I, myself, through a signal

> and a connection with it, got up, that is, I controlled my behavior through an auxiliary stimulus. (Vygotsky, 1997, p. 211)

A classic example of double stimulation is the experiment of the meaningless situation as reported by Vygotsky (1997) on the basis of his discussion with Kurt Lewin:

> The subject is asked to wait for a long time and to no purpose in an empty room. She vacillates—to leave or to continue waiting, a conflict of motives occurs. She looks at her watch; this only reinforces one of the motives, specifically, it is time to go, it is already late. Until now the subject was exclusively at the mercy of the motives, but now she begins to control her own behavior. The watch instantly constituted a stimulus that acquires the significance of an auxiliary motive. The subject decides "When the hands of the watch reach a certain position, I will get up and leave." Consequently, she closes a conditioned connection between the position of the hands and her leaving; she decides to leave through the hands of the watch and she acts in response to external stimuli, in other words, she introduces an auxiliary motive. (p. 212)

In double stimulation, the first stimulus is the problem itself. Human beings employ external artifacts which they turn into signs by filling them with significant meaning. These signs are used as second stimuli with the help of which the subject gains control of his or her action and constructs a new understanding of the initial circumstances or problem. Through this process, according to Vygotsky (1987, p. 356), the subject transforms a situation which is meaningless for him or her into one that has a clear meaning.

The principle of double stimulation was central in Vygotsky's (1999) experiments in that "specifically this way of bringing up auxiliary means of behavior allows us to trace the whole genesis of the most complex forms of higher mental processes" (p. 59). As the elaboration of meaning is central in double stimulation, this principle was also used by Vygostky in his studies of concept formation (Vygotsky, 1987, p. 127). In some of these experiments the experimenters themselves prepared the external stimuli for the participants and made them available to them while they were facing the given problem task. In other experiments, instead, the experimenters waited until the participants spontaneously applied the second stimulus by involving specific auxiliary means as symbols discerned by themselves (Vygotsky, 1999, p. 60).

The principle of double stimulation shows how an individual can gain the power to use outside resources to determine his or her own behavior. This principle is presented as a key factor in the human ability to transform at the same time the world around and him- or herself:

> The individual… thus enters into a principally new relation with the environment, arrives at a new functional use of environmental elements as stimuli signs, by means of which relying on external means, he guides and regulates his own behaviour externally masters himself externally forcing the stimuli signs to influence him and to provoke and stimulate the desired responses. … Responsive action provoked and organized by man himself ceases to be responsive and becomes purposeful. In this sense, the phylogenetic history of man's practical intellect is closely tied, not only to mastering nature, but also to mastering himself. The history of labour and that of speech can scarcely be understood without each other. Man not only invented tools, by means of which he conquered nature, but he invented also stimuli that motivated and

> regulated his own behaviour and by means of which he subjugated his own forces to his will. (Vygotsky & Luria, 1994, p. 164)

The principle of ascending from the abstract to the concrete

The principle of ascending from the abstract to the concrete is the fundamental method of dialectical thinking already described by Hegel (1977). In activity theory, Davydov, inspired by Ilyenkov, turned this principle into an interventionist method for changing schools. All thinking and learning is abstracting meaning from some initial sensory-concrete diffuse entity, a whole. The learner abstracts from the whole a particular aspect and attributes a meaning to it.

There are two types of abstractions: empirical and theoretical. Empirical abstraction is a classification of superficial features of phenomena. Theoretical abstraction refers to the identification of the genetic origins of phenomena that may externally be not alike at all. A theoretical abstraction is based on a functional relationship, also called a germ cell. While observation and categorization are actions at the root of empirical abstraction, practical transformation, change, and experimentation are actions at the root of theoretical abstraction. Theoretical abstraction allows one to generate and project complex, theoretically mastered concrete manifestations and developmental forms of the reality under scrutiny. In Davydov's (1984) words: "The substantially general is a particular relation of real objects which … does not exist outside development and transformation" (p. 23) and "theoretical thinking is based on sensory objective activity which reconstructs and transforms the world around us" (p. 25).

While Luria was studying the classification tasks in Uzbekistan, local illiterate participants assembled objects such as a tree, a saw, and an ax in the same category, because of the systemic functional connection between these items (one needs a saw and an ax to cut a tree). By contrast, in our Western culture a saw and an ax would belong to the category of tools, and the tree would belong to the category of plants. According to Davydov (2008), the typical Western mode of classification is a formal logical or empirical generalization, which can refer to any number of superficial features arbitrarily assembled. However, if one aims at genetic or theoretical generalization, one has to identify a basic functional connection, also called a germ cell, between the phenomena.

A classic example is Marx's analysis of capitalism (Ilyenkov, 1982) or of commodity as the germ cell of capitalist economy. The original contradiction of capitalism is condensed in its abstract form in every commodity as the tension between its use value and exchange value. In the concrete life of present-day capitalism, the same contradiction pervades every sphere of life and takes constantly new and more complex forms. The germ cell of capitalism is any commodity which carries the basic functional contradiction between use value and exchange value. A pen, for instance, has a use value because I can write with it. Also, a pen has exchange value because I can buy or I can sell it. A germ cell thus must be understood as a dialectical unity. In the case of this example, the dialectics can be found between use and exchange value. A pen that would not write would be deprived not only of its use value, but consequently also of its exchange value, because nobody would pay for a useless pen. The

system of capitalism can generate very diverse commodities. A pen is an object completely different from a shirt. However, they are functionally connected by being commodities sold on the market. This example obviously concerns a large-scale system of a socio-economic formation.

Another example comes from Engels (1972) and concerns the steam engine (Vygotsky, 1997, p. 321). The germ cell of a steam engine as it was designed by its inventor in his drawings looks very different from any particular steam engine. Later, starting from this germ cell, steam engines were built in many different ways and forms, and for many different purposes—for ships, for locomotives, and so on. The system of using steam power is thus based on the discovery of a very simple relation which has then been understood and modeled for making different variations of it.

Theoretical generalization requires experimentation with problematic situations in order to find the germ cell behind them. Then, from this original abstract principle one can observe its different material manifestations, and even conceive further new variations. Categorization of problematic phenomena within empirical generalization might be useful for a while as an intermediate analytical step, but that is not enough if the subjects aim at changing their practices. Subjects have to look for generating mechanisms behind the problematic phenomena they refer to. This mode of generalization has a very different potential because it brings subjects to think dialectically about their practices, to establish connections with many other phenomena that initially remained in the shade because they looked different, to explain this systemic constellation of problematic phenomena, and to construct new solutions (Engeström & Engeström, 1986).

Dialectical thinking is also the ability to look for dysfunctions and anomalies, which are privileged phenomena for those who aim at theoretical generalization. In empirical generalization it is exactly the opposite: one looks at clear examples that belong to a category. However, according to Davydov, the most interesting phenomena are not at all empirically general. They are emergent early symptoms. When a germ cell is formed early enough, a model of the genesis of these symptoms can be elaborated and used to work proactively on a situation before it becomes a crisis.

Although Luria and Yudovich and Meshcheryakov did not specifically articulate the connection between the respective intervention cases and the two principles, double stimulation and ascending from the abstract to the concrete are clearly applied in the studies of the twins and of the children at the Zagorsk boarding school.

A key starting point in Luria and Yudovich's analysis is the identification of a problem or challenge stemming from concrete daily activities and that the twins were encountering in their present stage of development. The problem or challenge concerned the development of speech, as the twins had difficulties with sound differentiation, pronunciation, and acquisition. Another starting point in Luria and Yudovich's analysis is the emphasis on social joint activities and verbal interactions which convey the knowledge acquired throughout previous generations and are instrumental for the development of the individual.

The twins, who had always lived together, were put in two different classes in the kindergarten, in order to establish social circumstances which would evoke in each twin the need for appropriate and articulated speech. These new circumstances needed to be filled with meaning by using external stimuli provided by the other children in the

kindergarten and by the experimenters in the speech training sessions. In this way the twins progressively gained control of their speech and a new understanding of social interactions. The use of the word in Luria and Yudovich's training sessions is explicitly related to processes of generalization through which the twins abstract the complexity of the new social circumstances in concrete verbal connections.

Meshcheryakov points out that for the children arriving at the Zagorsk boarding school the objects of the world were devoid of meaning. The main efforts of the educators in Meshcheryakov's school consisted in creating the circumstances to "awaken" the need of discovering the world in these children. For this purpose, the tools involved in the satisfaction of basic needs, such as eating, for instance, were used as second stimuli. While using a spoon to satisfy his or her hunger, the blind and deaf child begins to grasp the essence of things, namely that things can be used to satisfy human needs. The complexity of what used to be for this child a meaningless chaotic world is abstracted in the basic logic of the use of tools—that is, their social significance—which allows human beings to competently move in the world of things.

The principle of double stimulation and the principle of ascending from the abstract to the concrete are behind the dynamics of transformation toward what Vygotsky called "higher psychological functions." Double stimulation may be seen as the principle behind the genesis of will. Ascending from the abstract to the concrete may be seen as the principle behind the genesis of theoretical generalization. "The undeveloped state of Marxist philosophical literature in those years" (Davydov & Radikhovskii, 1985, pp. 52–53) might explain why Vygotsky did not explicitly elaborate on the dialectical nature of this latter principle. The principle of double stimulation and the principle of ascending from the abstract to the concrete have not yet been discussed together in a comprehensive way. Moreover, Davydov's texts are not widely accessible and the existing translations are often problematic.[2]A key challenge for future activity-theoretical research is to elaborate on the intertwined nature of these two epistemological principles.

Three examples of interventionist methods in activity theory

The two interventionist epistemological principles—double stimulation and ascending from the abstract to the concrete—that stem from the history of activity theory lead to a perspective different from the critiques. Within an interventionist epistemological perspective, theoretical knowledge results from engagement in dialogical and practical change efforts. Subjectivity within such a perspective is an achievement rater than an assumption. The claim that the triangular model distorts dialectics is decontextualized from the interventionist epistemological perspective. Dialectics is not intrinsic in the model. Dialectics is a process; more precisely, it is a process of ascending from the abstract to the concrete. Combined with design and implementation of interventions, the structural model of activity does not exclude subjectivity, sensuous experience, emotion, and ethico-moral issues. Instead, these dimensions of activity are embedded in collective change efforts in which both models and the voices of the subjects act as mediators.

The separation of the triangular model from the epistemology of intervention generates the issues at the core of the critiques. In effect, the critics first reify the triangle or a

given concept by separating it from its interventionist use. Then they criticize the triangle or the interpretation of a given concept for being reified and lacking dialectical dynamics. A way to reorient the current discussions is to focus on three examples of interventionist methods developed within the framework of activity theory, namely the Fifth Dimension, the Change Laboratory, and the Clinic of Activity. In the following I present these three methods, briefly referring also to key interventionist studies in which they have been applied.

The Fifth Dimension

The Fifth Dimension (5thD) is a model of learning and teaching activity that stems from cultural-historical psychological theories of learning and development (Cole & The Distributed Literacy Consortium, 2006). It was conceived in the 1980s by Michael Cole and Peg Griffin at the University of California, San Diego. The 5thD originated on the basis of a previous experience of a setting called "The Field College" established as a voluntary after-school activity for children who had difficulties with reading (Laboratory of Comparative Human Cognition, 1982). This model emerged as a computer-mediated activity which emphasizes children's potential and initiatives through individualized learning. The 5thD is implemented today as a research intervention within projects of collaboration between universities and local communities in many countries.

5thD activities are characterized by the participation of undergraduate students in dyads or in small groups with children and by the use of a rich variety of ICT-based and other artifacts (Cole, 1996). One of these artifacts is a maze through which children move according to rules but also independently choosing learning tasks of their interest. Learning tasks are illustrated to children by task cards in which one can select among progressive levels of difficulty. Children are encouraged to communicate by writing with a mysterious figure generally called the Wizard. Cole (2005) summarizes the theoretical underpinnings and the purpose of the 5thD intervention as follows:

> Children's educational activity is not confined to standard classroom environments, with strict teacher control and one-to-many forms of discourse associated with transmission forms of education. Rather, the modes of participation are more "horizontally" organized to encourage active student participation. ... The basic idea [is] that while computer and modern communications technologies are important tools, it is the social use of the technology that is essential in determining its effectiveness. In particular, the ways in which such technologies are deployed is crucial for creating horizontal social learning environments where children, teachers, community members, members of ethnic minorities, college students, and researchers can collaborate in design and re-design and where each has a voice and is involved in that ongoing co-design. (pp. 10–11)

The Change Laboratory

The Change Laboratory (Engeström, 2007; Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996) is an interventionist method for transforming work used by researchers within the broad theoretical and methodological framework of developmental work research (Engeström, 1991, 2000). Developmental work research was conceived in

parallel with the elaboration of the theory of expansive learning (Engeström, 1987). From 1986 to 1989, Engeström led a study with the primary health care practitioners and patients of the city of Espoo, which was struggling with excessive waiting times and lack of continuity of care for individual patients. In this study, Davydov's ideas, originally applied in experimental schools, were used to understand radical change at work. The transformation of practice where professionals, with researchers, engage in changing their own work is considered a particular kind of learning. This is the type of learning, brought to fruition, that Davydov (1990) called learning activity, pointing out that such learning can hardly be observed in schools. Engeström's main argument in *Learning by Expanding* (1987) is that this kind of learning can be seen in full maturity in the process of transformation of work.

Developmental work research was initially formulated in terms of long developmental cycles of interventionist work, lasting three to five years (Engeström & Engeström, 1986). Organizations in the 1990s could not afford to engage in this kind of transformation venture. The intervention methodology of the Change Laboratory, with its compressed cycles of transformation, was elaborated in order to meet the needs of these organizations.

During the Change Laboratory sessions, participants and researchers rely on a set of representational tools for joint analyses and for developing new practices. The main tools they use are writing surfaces, such as whiteboards. There are three sets of surfaces. One is called "mirror" and serves as a first stimulus to bring in the discussions of critical events or innovative solutions from the workplace. These experiences are reproduced in general by playing videotaped episodes or interviews filmed during preliminary ethnographic fieldwork, by examining documents, or by inviting into the laboratory sessions key figures involved in the activity the group is developing. Another set of surfaces is called "model and vision." It is used as a second stimulus for elaborating conceptual models of the activity under scrutiny in order to analyze its inner contradictions. Engeström's (1987) triangular model of an activity system is often used, but it is also common for the practitioners themselves to elaborate their own conceptual models (see, e.g., Engeström, Engeström, & Kerosuo, 2003; Nummijoki & Engeström, 2009).

The visual representation of the triangle is a way to condense and convey theory in research collaborations with practitioners. In the first work-related interventionist study conducted by Engeström with cleaners (Engeström & Engeström, 1984), Vygotsky's simple triangular representation was used as a basis to depict the distinction between object and tool. This use of the basic triangle was possible because the cleaners Engeström studied worked mainly alone in the evenings in offices. Issues of community, rules, and division of labor in the work of cleaners were all but invisible. In health care and other settings, by contrast, these issues appeared as dominant.

The third set of surfaces used in the Change Laboratory is called "ideas and tools" and is located between the two other sets of surfaces. The denomination "ideas and tools" refers to initial conceptualizations which require further elaboration and discussions. This surface is used as an intermediate "empty" stage between the experiential mirror and the theoretically structured model/vision in order to capture emerging ideas and representations in progress.

Each set of surfaces is also used as a "time travel" device for tracing the historical roots of the activity and for identifying the sources of its contradictions. For that purpose, participants in Change Laboratory sessions move from current problems in their activity to problems experienced in the past. They model their activity as it used to be in the past and then move on to elaborate models of the current activity and its contradictions. The next step consists in designing a future model for their activity and a number of concrete partial solutions connected to that vision, to be implemented and monitored in practice. In a recent publication Engeström (2007) describes the Change Laboratory process carried out in Finnish post offices:

> In each phase of the Change Laboratory process, there was back-and-forth movement between the problems or the first stimuli presented on the *mirror surface* and the conceptual models or the second stimuli worked out on the *model/vision surface* ... . When a vision for the future organization of work was constructed, the participants were asked to identify practical problems and difficulties that the new model would generate. These were worked out in more detail by the practitioners. (p. 379)

The Clinic of Activity

The Clinic of Activity is an interventionist method developed by Yves Clot and his colleagues in France in the 1990s. It is an indirect method inspired by Vygotsky which focuses on the way practitioners experience the object of their work (Clot, 2004). The explicit research purpose of the Clinic of Activity is to understand and transform ordinary work activities by bringing together researchers and practitioners to share psychological analyses of work. The interventions in the Clinic of Activity are organized as dialogic frames, which support debates between professionals on the basis of jointly produced cross-commentaries of videotaped images which depict daily actions at work.

The cross-commentaries on the videotaped materials in the Clinic of Activity are based on the technique of "instructions to the ringer" (Oddone, 1981). A practitioner is asked to instruct the researcher how to perform the practitioner's job in such a way that nobody would notice any difference in the work done. After the practitioner has told the researcher how to perform his or her work tasks, the practitioner gives similar instructions to a colleague. That way the practitioner's view on the activity becomes accessible from different angles: one view is the result of the instructions that the practitioner gives to the researcher, another view is accessible when the practitioner gives instructions to a colleague (Clot, 2004).

Because the researcher does not have the level of expertise that a colleague has, the practitioner who gives the instructions to the researcher must make explicit a number of procedures which typically remain tacit when he or she is giving instructions to a colleague. The historically accumulated professional experiences of the subject are at the core of the analyses in the Clinic of Activity. Through the routines of ordinary work activities, individual experiences tend to get isolated in one-sided and limited professional views (Clot, 2004). Interactions between different experiences within a professional collective are considered the creative motor for developing work practices in the Clinic of Activity.

> The subject struggles against an incomplete comprehension of his or her activity by the interlocutors. The subject aims at appropriating their respective thoughts concerning his or her work, in order to modify them, and consequently the subject sees his or her own activity "with the eyes" of another activity. The subject experiences, deciphers, and sometimes develops her emotions through the emotions of the other. That is how he or she finds, without necessarily searching for it, something new in him- or herself. However, the differences between the two recipients become crucial. The subject looks at his or her own activity "with the eyes" of the other two activities, in themselves discordant. Our methodological inquiries are attempts to fully utilize the resources of this social dissonance within a historical and developmental perspective. For us, the conflicts between accounts addressed to different recipients mobilize the activity, serve to develop thinking and to renew the objects of action. (Clot, 2009, pp. 301–302)

The Clinic of Activity has been applied in multiple work settings, from schools to churches to the automobile industry and railway transport, among others. Clinic of Activity interventions in the postal delivery service are among those reported in more detail in works by Clot and colleagues (Clot, 2004; Scheller, 2004).

Conclusion: The three methods as implementations of the two principles

The central idea behind the three interventionist methods is that social practices can develop through collective, cognitive, and material reconceptualization of the object of the activity. The Fifth Dimension is a method that allows children to reappropriate the role of active learners. The Change Laboratory is a method for reconceptualizing the object of work. The Clinic of Activity is a method that brings practitioners to reappropriate the actions they engage in at work. These reconceptualization/reappropriation processes are mainly mediated by theoretical models, texts, videotaped discursive actions, or computer programs used as first or second stimuli.

The three methods can be seen as implementations of the two basic epistemological principles of double stimulation and ascending from the abstract to the concrete. Table 1 summarizes the characteristics of the two principles in relation to the three interventionist methods.

Double stimulation has three main characteristics: (a) a given, self- or co-constructed conflictual problem, also referred to as the first stimulus; (b) an auxiliary artifact provided by the interventionist researcher(s) or created by the participants themselves as a second stimulus—that is, a neutral artifact turned into a sign; and (c) gaining of control by the participant over his or her behavior and a new understanding of the problem.

The first stimulus is usually provided by the researchers through the mirror material in the Change Laboratory and through video excerpts for the self- and cross-confrontation in the Clinic of Activity. In both cases the first stimulus is highly conflictual and its use is aimed at provoking and arousing agentive initiatives in the participants in the intervention. In the Fifth Dimension the first stimulus mainly consists of the learning problems described in the task cards. The nature of these learning problems is not necessarily

Table 1. Summary of the characteristics of the two principles in relation to the three methods

Characteristics of the two principles	Fifth Dimension	Change Laboratory	Clinic of Activity
Conflictual problem (1st stimulus)	Problem tasks, not necessarily conflictual	Yes, in the mirror material	Yes, in the video excerpts
Use of auxiliary artifact (2nd stimulus)	Yes, with support from undergraduates	Yes, with conceptual models	Yes, with feedback from colleagues
Gained control and new understanding	Yes, of the task	Yes, of the activity	Yes, of key actions
Experimentation with(in) a problematic situation	Yes, with "what if" questions	Yes, with "why" questions	Yes, with "what if" questions
Identification and modeling of germ cell	Occasional, mainly at the level of action	With a strong focus on activity	With a strong emphasis on action
Testing the germ cell	Possible	With a strong focus on activity	With a strong emphasis on action
Implementing the theoretically mastered solution	Possible	With a strong focus on activity	Possible

conflictual, although previously acquired conceptions and ways of learning are likely to conflict with the tasks and the vision of the Fifth Dimension when participants start experimenting with the problem tasks.

The use of auxiliary artifacts or second stimuli is part of all the three interventionist methods. Support from the undergraduates or from the wizard represents a key second stimulus in the Fifth Dimension. Conceptual models provided by the interventionist researchers or created by the participants themselves are explicitly referred to as second stimuli in the Change Laboratory literature. Feedback from colleagues functions as auxiliary artifacts in the self and cross-confrontation sessions of the Clinic of Activity.

The three methods envision that the participants in the interventions gain control over the learning task or process (in the case of the Fifth Dimension), or over their activities (in the case of the Change Laboratory), or over key actions in their daily life at work (in the case of the Clinic of Activity). Participants' ability and will to shape their learning is therefore an important anticipated outcome of the three types of interventions.

The principle of ascending from the abstract to the concrete has four main characteristics: (a) practical transformation, change, and experimentation with(in) a problematic situation; (b) identification and modeling of a germ cell behind the problematic situation (initial abstraction); (c) testing the germ cell in its different material manifestations and possible variations; and (d) projecting a theoretically mastered solution to the initial problematic situation.

Practical transformation and change, or involvement in concrete experimentation within the problem, is often the result of "what if" questions in the case of the Fifth

Dimension and the Clinic of Activity. In the Change Laboratory, participants mostly deal with "why" questions. The "why" question is inevitably and strongly addressed in the Change Laboratory because this is the type of intervention among the three methods which explicitly focuses on identifying and modeling the germ cell of an entirely new activity. Identification and modeling of a germ cell seems instead to occur in the Clinic of Activity, mainly with a strong emphasis on specific professional actions. In the Fifth Dimension this seems to occur occasionally as well, mainly at the level of action. Also, the Change Laboratory appears as the most sophisticated among the three methods in terms of testing the germ cell and implementing new solutions to the initial problematic situation.

The strong focus on activity in the case of the Change Laboratory is, however, not only a strength. This can also represent a significant limitation if the study of activity is not systematically intertwined with a study of the transformative actions that generate new forms of activities. In Change Laboratory literature one can observe a lack of specific focus on actions, which was there in the early work on cleaning (Engeström & Engeström, 1984, 1986). A recent new opening toward the documentation of participants' involvement in the transformation of their activities can be observed through analyses of critical conflicts (Engeström & Sannino, 2011; Sannino, 2008). This kind of opening could also have an impact on the two other methods to examine, for instance, the consequences of innovative actions on the overall approach to the learning activity of participants in the Fifth Dimension, or on the overall work activity of the professionals taking part in a Clinic of Activity intervention.

In spite of these differences, the Fifth Dimension, the Change Laboratory, and the Clinic of Activity can be seen as consistent attempts within the historical lineage and the epistemological foundations of activity theory. They put into practice the interventionist epistemology of activity theory. They are also ways of elevating the themes of subjectivity and conceptual models explicitly to the level of methodology. For these reasons, more than just innovative research methods which aim at achieving practical change in work and educational settings, they can be seen as instantiations of dialectical materialism and implementations of activity-theoretical interventionist epistemology.

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Notes

1. For a more extensive presentation of this historical account, see Sannino, Daniels, & Gutierrez (2009).
2. One exception is Davydov's *Problems of Developmental Instruction* (2008).

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