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Mediated life activity, double stimulation, and the question of agency

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1. Introduction

Life activity is mediated by culturally informed sensory perceptions, engagement with artifacts and the built environment, and communication with conspecifics. Humans readily adapt to historically accumulated cultural practices while improvising anticipatory actions in the process ontology of the unfolding present. Many routine activities are regulated by auxiliary stimuli, such as the use of fingers for counting and measurement of time for organizing schedules. More elaborate examples include the following. A driver's rate of travel in a motor vehicle is mediated by the visual field, a speedometer on the dashboard, digital data displays on navigation units, traffic calming features such as speed humps, rumble strips, and traffic circles, admonishments for driving too quickly from a passenger ('slow down!'), and (in principle) by posted signage reflecting legal speed limits. In the commercial fishing industry, fishers make decisions as to where to set their gear based upon a wide array of instrumentation and displays (radar, sonar, depth sounders, digital chart and course plotters, fish finders, Loran navigation), communication with other fishers on both 'secret' and open radio channels, past log books documenting fishing productivity from prior years, national and international regulations and catch reports, and contingent dynamics such as weather, tides, and the presence of other vessels in the vicinity.

In the contemporary era, sporting activity, while rooted in bodily kinesthetic experience, is increasingly mediated and objectively re-presented to participants through fitness apps which provide GPS mapping of running and cycling (among other) activities and provide average rate of speed, elevation gained, total and moving time elapsed, and ranking of one's immediate performance against other users. These data are typically fed into social networks that allow users to comment, provide accolades (and also taunts), and to compare one's immediate performance with prior performances. Based on personal experience and reports from others, use of such fitness apps incites running or cycling faster (or attempts to do so), violating traffic signals in order to increase overall rate of speed, and adding distance at the end of a session in order to reach a round (but arbitrary) distance number (not 98.6 km, but 100 km!). Related phenomena include debt blogs, focused on publicly externalizing ones difficulties managing credit problems in order to regain self-regulation on spending, food tracking apps for better controlling diet, and participation in academic networks such as academia.edu and researchgate.net, which quantify downloads of academic articles, profile page views, number of 'followers', and

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other impact measures, all of which publicly visibilize countable aspects of academic production and subsequently may come to influence areas such as hiring decisions, competitiveness for external research funding, and the selection of publishing venues for scholarship. Of a sort, and in alignment with the idea of double stimulation, these aforementioned technologies serve the function of a second stimulus.

The above vignettes serve as examples of the ways in which complex networks of meditating artifacts enable, and transform, goal-oriented processes of cognition, sense-making, and agentive action. Adaptation and innovation amidst the complexity and emergence that constitute the human condition are extraordinary in our species (see Tomasello, 1999), but what gives rise to will and action? How is individual and distributed human agency constituted and what are its limits and potentials? These were central questions for Vygotsky (1987, 1994) that continue to be foundational to developmental and educational research (e.g., Karpov, 2005; Kozulin, 1998; Scribner & Cole, 1981) as well as to activist and formative intervention efforts informed by the cultural–historical tradition (e.g., Engeström, Sannino, & Virkunen, 2014; Ratner, 2006; Sannino, 2011; Stetsenko, 2010).

2. Double stimulation

The contributors to this special issue address human agency through a focus on Vygotsky's elaboration of double stimulation, with articles addressing experimental conditions (Sannino & Laitinen), educational reform (van Oers; Barma, Lacass, & Massé-Morneau), the challenge of sustaining innovation (Haapasaari & Kerosuo), and work place interventions (Engeström, Kajamaa, & Nummijoki). In non-technical terms, double stimulation refers to a 'first stimulus,' such as a task, a problem, a contradiction, or a conflict of motives, that is reframed or more readily negotiated through the use of a mediating artifact, which serves as the second stimulus. Second stimulus artifacts assist in a variety of ways, such as helping to organize behavior, to objectify and rend visible relevant information, to support remembering, and to enable a participant or a group to conceptually reinterpret a situation in a new and potentially expansive way. Importantly, the transformative efficacy of the second stimulus manifests as a function of its mutability and by the ways that users creatively construct and/or imbue the second stimulus with situation-relevant value and purpose.

The research and intervention implications of double-stimulation are many. Vygotsky (1978) and his colleagues used this methodology for studying the agentive qualities and sociocultural basis of higher order thinking and actions (for an in-depth review, see Sannino, submitted for publication). In Vygotsky's double stimulation experimental research, subjects were given a task as a first stimulus, such as the classic experiment of remembering a list of color terms (i.e., the Forbidden Colors Task). They were then provided with a second stimulus to help them navigate the task, in this case a set of colored cards that participants used to keep track of color terms they had already used as the task progressed. The second stimulus helped particularly older children to regulate their behavior and to successfully complete the task. Vygotsky and Luria (1994, p. 159) described the rationale for this innovative method as follows:

> We do not limit ourselves to the usual method of offering the subject simple stimuli … to which we can expect a direct response; we simultaneously offer a second series of stimuli which must play a functionally special role, serving as a means by which the subject can organize his own behavior. In this way, we study the *process of accomplishing a task by the aid of certain auxiliary means*, and … this way of bringing auxiliary means of behavior to the surface permits the tracing of the entire genesis of the most complex forms of higher psychological processes.

3. Double stimulation in experimental and educational contexts

In the article most closely tied to the Vygotsky and Luria quotation above, Sannino and Laitinen (this issue) explore double stimulation by reproducing one of Vygotsky's experimental conditions described as the 'meaningless situation' or the 'waiting experiment.' The authors document the compelling and somewhat fragmentary history of this experiment (initially conceived by Lewin) and outline the ways that Vygotsky utilized it as part of his project to radically reframe the discipline of psychology (see also Laitinen, 2012). In the authors' replication of the meaningless situation experiment, a subject is escorted into a room and told that the experiment would soon begin. The researcher then leaves the room and does not return. The subject is video recorded and if she or he remains in the room for the full duration, the experiment is terminated after 30 minutes has elapsed. If the participant left the room before this time, the experimenter would intercept them. Both those who stayed and those who left early participated in follow-up semi-structured interviews.

The premise of the meaningless situation is rather simple in that it involves the conflict between the motives of remaining in the testing setting due to obedience, following rules, behaving in expected ways, and feeling commitment to a contractual obligation, and leaving the setting when nothing, in fact, happens that follows the expected frame/script.

The power of the meaningless situation experiment is that this conflict of motives evokes complex behaviors and forms of decision making, which in turn shed light on the human condition in the areas of intentionality and agency. In addition to confirming the general validity of their innovative phase model for understanding will formation in the context of double stimulation, Sannino and Laitinen's analysis revealed two 'channels' of behavior in evidence during the waiting period. The first aligns with Vygotsky's findings and the expected protocol in experimental contexts. The second channel, however, illustrated the participants' agentive repurposing of the experimental context by bringing outside 'life activity' into the experimental condition. They also identified two patterns of leaving the experiment early: 1) breaking away in a determined fashion, and 2) compromised leaving in which some

conformity was present,; as well as three types of staying: 1) conformity to the experimental condition, 2) compromised staying that involved the incorporation of some aspects of life activity, and 3) a primary focus on life activity. This research shows the potential for human agents to volitionally shift their subject position within the discursive field initially defined by the first stimulus. The innovative creations of second stimuli, such as measuring time or engaging in life activity pursuits, provided support for ad hoc rationales for new courses of action, such as departing the testing room at a defined time or appropriating the waiting period for work, both of which show how subjects transformed and to a greater or lesser degree came to control the situation. As the authors describe it, "the emergence of transformative agentive actions is a complex journey across channels and fluidly evolving phases … [which reveals] the wide array of possibilities we have to willfully influence ourselves and the world around us."

Addressing formative intervention projects in educational contexts, articles by van Oers and Barma, Lacass, and Massé-Morneau both describe significant impediments to innovation within the increasingly 'fixed structures' (van Oers, this issue) that operate in most instructed educational settings. These two papers span primary and secondary education, with van Oers describing challenges faced by teachers in a play-based educational program at the primary school level while Barma et al. explore the challenges of implementing an open-ended and critical-thinking secondary school science program focusing on the controversial topic of climate change.

van Oers' study illustrates that a double stimulation approach can help to clarify and objectify problems that teachers face in an alternatively structured play-based curriculum. van Oers begins the article with the astute observation that contemporary schooling sits at the contested nexus formed by the contradiction between "cultural–economic exigencies," where a school's performance is often tied to the outcome of high stakes testing, and on the other hand, the widely held belief that schooling is a "value based endeavor to promote personal well-being and personal agency in pupils and teachers" (this issue). Indeed, a historical perspective would suggest that institutionalized education is highly resistant to change, with the exception, perhaps, of its recent slide into the maws of neoliberal ideology, which has become the naturalized economic reality across much of the world (Harvey, 2005). As van Oers notes, capital market forces have permeated state-sponsored schooling and resulted in many schools operating according to business models. This situation requires providing teachers with new auxiliary means that support core aspects of child development, such as strategies for encouraging meaningful activity embedded in play and the sensitive integration of children's emerging senses of agency and efficacy with curricular goals such as literacy and numeracy. The author describes an approach developed in the Netherlands called Developmental Education (DE), which itself is innovative, is play-based, and while not framed by the double stimulation method, it is theoretically informed by Vygotskian developmental theory. DE represents a radical shift from earlier fixed and prescriptivist curricula. Instead, students explore, experiment, and engage in free and structured play activity. For teachers, DE presents the opportunity, and obligation, to make choices and to modify the learning environment in a flexible manner. As reported by van Oers, this openness creates a complex working environment since there is no longer a prescribed method for teaching and many teachers are apprehensive about departing from fixed curricula. The evolved solution was for teachers, supervisors, and researchers to co-construct and share auxiliary means with one another. In this case, these efforts resulted in the creation of an instrument (Action-Oriented Observation and Registration of Basic Development) teachers could use for assessing children's development in various curricular domains in a way that acknowledged students' needs and interests. The key to the success of this program is collective creation of auxiliary means, careful teacher preparation via observation of expert instructors and reflection on what they experience there, and support for teachers' own personal and professional development.

In a case study of two secondary school science teachers, Barma et al. describe conditions similar to those faced by van Oers and his colleagues in that content based teaching with an emphasis on evaluation formed the initial problem space. The context for this study dates to 2006, when a curricular reform in Quebec, Canada, resulted in a top-down initiative to promote environmental education and the learning of 'science in context' using a discussion based approach. Teachers, however, were struggling with the new format, the controversial nature of climate change, and also felt challenged by the need to balance a question-based curriculum with expectations by the school administration and parents for maintaining control over the large number of students in classes.

This ethnographically informed project included analysis of recorded conversations with two focal teachers who had approached the authors for assistance. Additionally, multiple informal meetings were held with the teachers, and focus groups with students, and the researchers also collaborated as co-teachers and evaluators in the classroom. Early in the project, three conflicting motives emerged in the data: 1) teaching strategies and the need to develop an interactive and question-based style, 2) the conceptual structuring and controversial nature of environmental issues as a topic, and 3) the conflict between the new curriculum and the values and expectations promoted at the school where the two teachers were employed. In response, the teachers and researchers collaboratively developed a second stimulus, a science curriculum that was iteratively designed over a period of two years that integrated critical thinking and open discussion around the topic of climate change.

In my read of this study, a pivotal shift occurred when it was decided that the learning goal was not mastery of scientific concepts per se, but rather that students should develop the ability to autonomously engage in societally relevant debates. At the end of year one of the project, however, students expressed frustration with the decreased scientific content, lack of direct instruction, and anxiety about their preparation for a high-stakes provincial examination. Upon reflection, the teachers incorporated more structure in the next offering of the course, including the viewing of a documentary on climate change, a visit from a scientist, laboratory work focused on the carbon cycle, and evaluation matrixes for student projects. In this iteration, students were reported to be much more highly engaged and to be autonomously and volitionally seeking out relevant information for the course, a seeming success story. In the end, however, the resolution to the initial two contradictions of teaching strategies and the controversial nature of climate change had intensified the third contradiction in the form of complaints from parents and pressure from the school administration. This study usefully describes the complexity of designing and implementing formative interventions and documents

the considerable resistance that innovations, and innovators, face in view of long-term sustainability, a topic that will be revisited below in the discussion of the article by Haapasaari and Kerosuo (this issue).

4. Double stimulation in workplaces and in the wild

Contemporary formative intervention research has adapted double stimulation and applied it in structured ways to a variety of workplace and educational settings. In a process that began in the mid-1990s, Engeström (2007) and colleagues (see Virkkunen & Newnham, 2013, for a detailed history) have developed and refined the Change Laboratory method, an approach that aims to cultivate 'critical design agency' among participants playing heterogeneous roles in often highly complex systems that include parties directly involved in the institutional or commercial context at hand, and potentially, multiple other groups or organizations with shared interests. With researchers and trained students serving as collaborators and facilitators, the first stimulus is typically ethnographic data (video, reports, transcripts of discussions) produced by and representing the participants' problems and conflicts. This is then 'mirrored' back to participants in open forum workshops with the aspiration of making objectively visible the elicited problems as well as innovations and solutions that may have been contributed.

The second stimulus is often (but not always) the triangular representation of an activity system (Engeström, 1987) accompanied by other mediating artifacts such as flowcharts, diagrams, and additional relevant information. With the assistance of the interventionist-researchers, participants are encouraged to construct and creatively reimagine their activity system(s) via a collaborative process of identifying and naming the object and outcome of their activity, the resources and artifacts needed to work toward the object, the interplay of rules, community, and division of labor that enable outcomes, and how exogenous and aligned activity systems impact on these processes. Particular attention is focused on identifying contradictions within and between connected activity systems, developing new practices leading toward expansive learning (Engeström & Sannino, 2010), and the participatory development of processes that enhance the scope, viability and effectiveness of the commercial or service enterprise.

In their forward thinking article, Haapasaari and Kerosuo address the critical issue of creating conditions of possibility, to paraphrase Foucault, that would sustain extended chains of continuing innovation. As the authors aptly describe, sustaining transformative agency requires ongoing effort if it is to continue beyond the external support provided during the initial intervention period. In a follow-up to a Change Laboratory intervention at the Itella Corporation in Finland, which provides e-commerce services, precisely this conflict of motives emerged: a desire to continue the formative intervention process in the face of work pressures and anxiety about how to efficiently continue developing expansive practices without the resources of outside interventionists. To observe post-intervention dynamics, the authors attended and recorded numerous meetings (as researchers, not interventionists) and then analyzed the transcriptions using a method designed to identify discursive expressions associated with transformative agency (Engeström, 2011; Sannino, 2008). The results indicated that expressions correlated to transformative agency were high. Further, the employees came to realize that lack of opportunities to participate and share concerns was itself the problem and creating a new team meeting practice was the second stimulus they needed to sustain continuous development. Sustaining innovative reinvention was not a linear process, however, and the longitudinal tracking of the frequencies of discursive expression types showed peaks and valleys. This said, the participants successfully appropriated double stimulation as a method that enabled them to agentively contribute to the ongoing development of their own work conditions.

In a novel use of double stimulation "in the wild," Engeström, Kajamaa, and Nummijoki (this issue) describe a formative intervention carried out in the homes of elderly citizens that is designed to enhance and maintain their physical mobility. Since the home visit settings are much smaller scale than is the case with typical Change Laboratory interventions, this project importantly extends the application of double stimulation into the domestic sphere of one-to-one interaction in quotidian everyday situations. The authors build upon Sannino's (submitted for publication) model of the phase structure of double stimulation (Sannino & Laitinen, this issue) and introduce and empirically test a new analytic structure called 'critical encounters.' Critical encounters aims to model and foster the emergence of volitional actions and conceptualization efforts in situations driven by a conflict of motives. This approach carries forward aspects of earlier intervention models (i.e., boundary crossing) in that the problem space involves individuals with functionally different roles and perspectives — in this project, home care workers and their elderly clients. As is the case with boundary crossing interventions, the goal of the critical encounters model is to transform the first stimulus, a potentially shared object involving a conflict of motives, into jointly created opportunities for volitional action and conceptualization efforts, the latter defined as often fragmentary efforts to positively reframe situations that can include making agreements and decisions, sketching new possibilities, and forming new commitments. Progress toward volitional action and conceptualization efforts is facilitated by the incorporation and/or creation of mediating artifacts, which serve as the second stimulus.

Engeström, Kajamaa, and Nummijoki base their analyses on 26 video-taped sessions of home care specialists visiting elderly clients in their homes. Many of the recorded sessions involved the implementation of a Mobility Agreement, comprising a set of expectations that are negotiated between the client and the home care worker and which encourages the client to carry out physical exercise and routine household chores. Analysis of the video taped sessions resulted in five representative profiles of home care visits that ranged from minimal opportunities for elderly clients to engage in volitional action to sessions in which the worker and the client initiated and implemented novel actions together. Additionally, each instance of the introduction or use of artifacts was noted and categorized along two dimensions: 1) restrictive (maintaining care provider–client separation) vs. expansive (joint action and new behaviors) and 2) incidental (improvisation, ad-hoc) vs. planned use (e.g., documented in the Mobility Agreement). The inclusion of four representative case studies provided a more detailed description of the home care sessions. A key finding of this study was that expansively used artifacts correlated with 77% of volitional actions and 81% of mobility-oriented conceptualization efforts. When implemented

systematically and consistently, the authors note their 'cautious optimism' for the efficacy of the Mobility Agreement as a second stimulus, with the caveat that it is critically important for home care workers to "identify and nourish subtle forms of client-initiated and expansive uses of artifacts" (this issue).

As an addendum to this research, and building on the case study of the individual who counted the number of times she walked around a table (a good example of a second stimulus) as part of her Mobility Agreement, additional second stimuli could be considered, such as a pedometer that would provide an objective measurement of steps taken. In situations where elderly residents live in close proximity, their Mobility Agreement might include assisting one another with routine tasks such as taking out the trash or getting in and out of a chair multiple times, with the additional value of increased social interaction and the possibility of creating game-like scenarios that could potentially catalyze increased physical activity.

5. In closing

Research on double stimulation has demonstrably contributed to a clearer understanding of agency as a theoretical construct and lived experience. In terms of ongoing efforts to refine formative intervention methodologies, conceptions of agency could be further operationalized to assist with the analysis of empirical data emerging from these settings (Engeström et al., 2014). This said, adhering to the logic of formative interventions means that there is no end point to improving humane and pro-social intervention approaches and methods.

The contents of this special issue make clear that artifacts and social relationships do more than neutrally mediate human activity; they enable the re-mediation of human activity to create new morphologies of action. As Shaffer and Clinton (2006) have argued, drawing upon Latour (1996), this position builds upon Vygotskian principles of mediation (Engeström, 1987; Wertsch, 2007) while also eschewing a dichotomization of tools as distinctly separate from the humans who use them. In this strong view of mediation, artifacts, like people, are actants in consequential networks of meaning making, and as such, they co-weave with human activity based on their material and ideal properties, emergent cultures of use (Thorne, 2003, 2012), and contingent roles in ongoing activity.

The studies comprising this special issue help to explicate the essence of humans as sense makers, or perhaps more accurately, the notion that humans integrate with a wide array of auxiliary means to creatively interpret and agentively produce the actions and environments that comprise life activity. It is precisely this broad and empirically robust approach to understanding human meaning making that makes this special issue particularly worthwhile as a contribution to the cultural–historical framework for formative interventions, and beyond, as a contribution to understanding the nature of willful activity as a fundamental quality of the human condition.

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