Towards a Metatheoretical Basis of an Activity Approach to Architectural Programming Research

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Abstract

Human activity is analyzed in numerous ways within the social sciences, as well as within applied areas such as ergonomics, management, marketing, and education. However, these conceptualizations of human activity are not intended for, nor do they contribute to the productive study of the socio-spatial interactions regarding planning and programming of facilities. The goal of this project is to develop methodological foundations for activity analysis and modeling within the area of architectural programming. Our objective is to contribute to the development of a perspective for analyzing activity systems and to facilitate the creation of activity models that may be used to examine socio-spatial interactions. Specifically, this proposal examines the structures of activity that emerge in the process of interactions between people and the built environment in respect to the conditions and resources necessary for efficient performance. The viewpoint proposed establishes the foundations of a "conditions and resources" perspective on activity.

Keywords: socio-spatial structures of activity, socio-spatial interactions, architectural programming

Activity models in the social sciences are often created for academic pursuits and occasionally for practical applications in fields such as management, marketing, social work, ergonomics, and education fields (Bedny & Karwowski, 2007; Berglind, 1988; Cummings & Worley, 2001; Kaptelinin & Nardi, 2006; Kotler & Veller, 2015; Lamport, Coffey, & Hersch, 2001; Robins, 2003; Staubmann, 2006; Stewart, 1998; Valach, Young, & Lynam, 2002). These conceptualizations of human activity focus on the goal-directed and socio-normative nature of human action. Many of them are excellent in their own way and within their specific fields of application. However, they are not intended for, nor are they usually applicable to the study of activities that take place in the built environment or the ensuing socio-spatial interactions that occur in those locations. While the examination of activity abstracted from its own spatial context may not be a problem in some social disciplines, it is in the area of socio-spatial analysis, especially in the fields of architectural programming and design, deforms the resulting conceptualizations of activity, thereby rendering them useless. Consequently, there is a need for activity models that can guide programming researchers in the study of socio-spatial interactions and assist with the development of the theoretical basis of architectural programming.

Before continuing with a discussion of activity models used for socio-spatial research and architectural programming, we first introduce the concept of architectural programming in order to contextualize our research. Architectural programming is concerned with the development of an information base that supports design decision-making. The core of architectural programming is the study of users, their activities and operation in the built environment and their norms, needs, and preferences. (Cherry, 1999; Kumlin, 1995; Preiser, 1993; Sanoff, 1977, 1989, 1992). An analysis of the literature on programming reveals that human activity forms the foundation for developing user requirements (Bechtel, 1977; Harrigan, 1987; Moleski, 1974; Sanoff, 1977, 1989, 1992). The activity theme exists, directly or indirectly, in almost all publications on programming. For that reason, the concept of human activity has an important role in architectural programming research.

Our research program is oriented towards developing activity models that are productive in programming research. This area is rarely examined and there is no adequate information for building theoretical models and field research protocols. Rather, in such cases philosophers of science suggest we begin with the development of metatheoretical foundations and then proceed towards building theories and developing models that will inform data collection and analysis in architectural programming. Consequently, our objective is to construct a perspective on human activity that will facilitate the analysis of activity components and structures that are relevant to both the built environment and to programming and design research.

Our methodology employs a cultural historical activity approach to social reality (The International Society of Cultural-Historical Activity Research; Leont'ev, 1978; Roth & Lee, 2007). We also engage in a pragmatic interpretation of activity theory based on ideas from the Moscow Methodological Circle (http://www.fondgp.org/mmc). This methodological foundation provides a number of assumptions about the nature of activity – assumptions that guide our analysis and selection of existing theoretical developments regarding human activity. It also informs the construction of our proposal for a methodology on activity research for architectural programming.

Human activity is the medium in which both objects (buildings, in our case) and subjects (i.e., actors, agents, participants) exist (Bertelsen & Bodker, 2003; Blumenthal, 1995; Bodker, 1991, Daniels, 2001; Davidov, 1990a, 1990b, 1999; Engestrom, 1999; Kaptelinin, Kuutti, & Bannon, 1995; Kuutti, 1996, 1999). They interact and develop relationships within that medium (Petrovski, 1989). In the process of human activity the spatial structures are socially appropriated and become part of people's existential environment. Activity is a mode of existence between people and the medium in which interactions and relationships among them emerge. Activity can be viewed as the binding force of socio-spatial entities. The perception of activity as both a medium and a mechanism for interaction and also as a generator of relationships, defines a vantage point of analysis that encompasses in one conceptual entity components of different natures—most importantly, social and spatial components. This bestows the concept of activity with even greater significance as an object of study of socio-spatial research and programming.

Our thesis is that the study of activity for the purposes of architectural design should consider both social and spatial components. The socio-spatial structures of activities emerge in the process of interaction of people both with and within the built environment, and consideration of these structures is necessary for efficient performance. Such structures of activity encompass both necessary conditions and undesirable constraints in respect to facilitating and sustaining activity processes.

These general assumptions will serve as guidelines in the pragmatic search and construction of a new conceptualization of activity that will be productive in socio-spatial research and architectural programming in particular. With this in mind, we have surveyed and analyzed a wide array of views and ideas about human activity in order to develop a springboard for future research in this area. Following our methodological plan, we review and discuss selected perspectives and theoretical models that we believe will bring us closer to discovering those aspects of activity that encompass both social and spatial components.

Selected viewpoints and ideas about human activity

The conceptualizations presented below draw on the influence of the activity methodology school of thought that was established in the second half of the 20th Century in Eastern Europe. We selectively refer to those authors and publications that have contributed to the emergence of the ideas presented in this paper. However, we will reinterpret their work in a new way, especially regarding our socio-spatial analysis and the theoretical needs of architectural programming.

Our analysis of human activity begins with the conceptualization of activity as a mode and a form of existence of both social entities and human individuals (Batishchev, 1990; Davidov, 1990a, 1990b, 1999; Engestrom, 1999; Fararo, 2001; Lompscher, 2002; Pletnikov, 1990). Such a view helps grasp the universality, the multifaceted nature, and the variety of forms of activity. These human activity characteristics help define its peculiarity as an object of study and lead to the necessity of considering a wide variety of related aspects (Shchedrovitsky, 1975; Yudin, 1978). The number of aspects considered is restricted by our cognitive abilities and research goals. In practice, the problem area that envisages the nature and the structure of human activity is an open system whose intersections and exchanges with the scholarly and design practices lead to extending its boundaries and incorporating new concepts and schemes.

Within the framework of system thinking, human activity is viewed as a complex, multifaceted, hierarchically organized, matrix (lattice) structure (Gordeeva & Zinchenko, 1982; Yudin, 1978; Tobach, 1999). Following this line of thought, we can conceptualize activity as a multistructural, multicentric, and dynamic system. Activity is also a process composed of many components, which may vary in form and content, and which may change, transform, complement, or substitute for one another. Each one of these can at the appropriate time serve as a focal point and an organizing core, until the next stage, when another component might take the leading position (Davidov, 1990b, 1999; Engestrom, 1999; Gordeeva & Zinchenko, 1982). The number and type of active components and the emergence of a leading component are contingent on the goals, resources, and policies of the activity subjects and their organization, as well as the specifics of the environment (Shchedrovitsky, 1975). The dynamics of activity is manifested most openly in the change of the leading and active components, the shift in the significance of the components, and the emerging connections between them, which produce a shift in the importance of the different structures of the activity system.

Social reality can be interpreted as an activity system. From such a point of view it can be described as a functional organization of activities and processes. The participants can be presented in terms of the activities in which they partake. The entire problem area of the social sciences can be construed in terms of activity (Fichtner, 1999a, 1999b; Sagatovsky, 1990). Alternatively, yet in a complimentary way, human activity may be viewed as a holistic entity whose boundaries are established by the actors or participants. The participants constitute the main organizing force in this process. Their existential horizons introduce wholeness and continuity in the activity (Altman, 1977; Davidov, 1990a). Human life can be presented as a stream of behavior and activity processes (Barker, 1963, 1964, 1968), and everyday life can be seen as an activity chain (Hewitt & Shulman, 2011; Perin, 1970). Even when some components become autonomous in space and time, the wholeness is preserved, at least from a social point of view.

Activity may also be viewed as a series of purposeful acts that are influenced by several factors. These are the characteristics of the participants, their goals and objectives, the conditions of the situation (including constraints and restrictions), cultural patterns, and so forth. Analyzed as a process, activity can be presented as a trajectory that evolves irregularly because of impeding situational circumstances (Strauss, 1993). This model is based on the notions of responding to environmental stimuli, minimizing the effort, and sustaining a premeditated course of action. These ideas prepare the grounds for another set of propositions, including the interrelation between the participants and the spatial environment, the role of the spatial factors in the organization of activity, and the type of interdependencies (e.g. causal, associational, etc.) (Michelson, 2002; Rapoport, 1977).

In reality, the flow of activity in space and time is associated with specific practical effects which are usually not taken into consideration in theoretical thinking. The negative influence of these effects can be diminished by segmenting and separating activities in both space and time. This implies the segmentation of activity streams and the isolation of relatively autonomous components. The dependence of activity on spatial and temporal circumstances is the reason for studying these aspects of social situations. Space works as an environmental factor that sets the limits to the implementation of a premeditated trajectory of the activity process (Strauss, 1993). Time, on the other hand, is the specific realm in which the organization, coordination, and implementation of the process takes place (Whipp, Adam, & Sabelis, 2002). Time is also a resource for the development of the planned trajectory (Crang, 2001; Gren, 2001; Stein, 2001; Stone, 2004; Strauss, 1993).

Another important point of view is that the satisfaction of human needs takes place during the activity process (Reinvald, 1987). Production, supply, and consumption of conditions, necessary for the existence of the social subjects, take place in activity processes

(Shchedrovitsky, 1975). The relationships between needs and activities are particularly important for architectural research, because they represent phenomena that relate and connect people with their environments and establish the grounds for alternative (or complementary) approaches to architectural programming. As we have proposed above, activity can be viewed as a medium of interaction and interrelation between participants and spatial structures. The congruence between participants and spatial environments can be conceptualized as a norm or standard that describes the balance in these relationships. Any deviation from that norm requires resources for its rectification. From this vantage point, the norm that embodies and codifies a state of congruence can be conceptualized as a need-phenomenon (Shchedrovitsky, 1975).

These notions imply that activity is a mode of existence for the participants in various social situations and because of that, should be taken into consideration when designing the spatial environment. Our interest in activity processes can be explained by using the viewpoint that activity is a bonding, "gluing," organizing factor that interrelates and connects components of social and spatial origin into a coherent system. This perspective on activity creates a platform for organizing complementary notions of activity into a composite model. It also provides guidance in the search for aspects of activity that need to be supported by spatial structures.

Structures and components of activity relevant to socio-spatial research

One of the most common analytical strategies relevant to socio-spatial research is the dissection of activity according to the anthropological status of its components. Regarding the activity of a human individual, these components can be construed as physiological, psychophysiological, and psychological. Many authors also add motor processes (Brannick, Levine, & Morgeson, 2007; Lamport, Coffey, & Hersch, 1989; Wilson, Winston, Gibson, & Alliger, 2012). The physiological processes are relatively similar for all user groups, with the exception of specific groups formed on the basis of health or age status. In those cases, parameters can be measured with an accuracy that is adequate to architectural design. Because of the relatively tangible and measurable nature of physiological processes, we will redirect our attention to psychological processes, as they generate relationships that are more complex and lead to more complicated analytical tasks.

We assume that psychological processes can alternate their functional status and be treated as simple constituent activities depending on their role in the overall activity system. From the three main types of processes—cognitive, emotive (affective), and conative—the first group forms the basic medium of environmental interactions. Regarding socio-spatial analysis, we consider cognitive processes in terms of perception, cognition, and evaluation (Rapoport, 1977). In addition, we would include spatial memory and thinking. For example, after entering a particular environment (or setting), the activity subject/participant evaluates the situation, develops attitudes and displays reactions towards the environmental conditions that exist. Such attitudes may be either rational or emotional. The emotional processes are related to conative processes and can be viewed as an integral, although not conscious, evaluation of the situation. Meanwhile, the affective processes are influenced by the course of all other psychological processes, by environmental characteristics, and by their relations to individual goals and expectations. All these groups of psychological processes work simultaneously and the conceptualization of one of them as cognitive or affective is often arbitrary, relative, and relational, depending on the prevailing components.

According to Rubinstein (1989), the specific forms of psychological processes depend on the material conditions of the situation. This assumption is important for the development of a vantage point for environmental analysis. It directs the study of activity and psychological processes again toward the identification of the necessary conditions. Another important notion comes from the fact that psychological processes take place within the context (framework) of activity, and it is within that context that they acquire the specificity of their occurrence.

The analytical segmentation of activity into the psychological processes mentioned above is instrumental for understanding the circumstances of congruence between the physical environment and the components of activity. This type of micro-scale analysis is pertinent and productive in ergonomics and thus is applicable to both furniture design and interior design. However, this approach would not produce substantial contributions to the architectural programming of entire buildings or urban environments.

Another approach to the analytical segmentation of activity is to break it down in accordance with the scale of its components and to create a hierarchical structure of somewhat autonomous and holistic components. Every level of that hierarchical structure has its own specificity and can also be horizontally segmented according to functional criteria. Usually, the components constituting one level are combined to form an entity at a higher level, and this procedure can be repeated several times. Authors conceive of different numbers of levels depending on the purpose of analysis.

One of the most popular models of that type in both psychological and human factors is "activity-action-operation-act" (Brannick, Levine, & Morgeson, 2007; Davidov 1990b; Gordeeva & Zinchenko, 1982; Engestrom 1999; Leont'ev, 1978; Wilson, Winston, Gibson, & Alliger, 2012). This model is relevant to small-scale activity entities and is productive in the design of smaller artifacts like instruments and gauges (Coovert & Thompson, 2014; Brannick, Levine, & Morgeson, 2007; Schutz & Schutz, 2009; Sutton, 2015; Wilson, Winston, Gibson, & Alliger, 2012). Other alternative conceptualizations are the concepts stream of behavior/activity (Barker, 1963, 1964, 1968; Hewitt & Shulman, 2011; Perin, 1970; Reinvald, 1987), activity/behavior chain (Zavalova, Lomov, & Ponamarenko, 1986; Leont'ev, 1978; Perin, 1970), and behavior/activity episode (Reinvald, 1987; Barker, 1963, 1964, 1968). These models are comprised of larger components, comparable to the daily occurrence of activities and human behavior in buildings and urban environments.

Another analytical model is based on the concept of "substance" or "content" of activity. This perspective views activity as segmented into several constituent actions or semiautonomous entities. They differ from each other in multiple ways, including: the number of participants, the type and mode of physiological and psychological processes, the type and organization of operation performed, goal structure, and function and importance (Shchedrovitsky, 1975). When all of these components and aspects are conceptualized from a cultural historical perspective, they constitute the "content" specificity of activity. In contrast to physiological and mainstream psychological viewpoints, cultural historical psychology is more often interested in analytical units that are molar (self-sufficient and holistic) rather than molecular (constituent units) (Kuutti, 1999). These units are entities that display wholeness and a somewhat autonomous existence within the boundaries of the activity chain. In order to carry out transactions with other activities and activity systems, "input" and "output" contact nodes or outlets are established. The major criterion that sets apart these constitutive activities and delineates their boundaries within the activity chain is their functional role, not to mention the importance of their results (Shchedrovitsky, 1975).

Such a conceptualization of activity is different from most of the models in psychology, which are usually intended for the study of operations, tasks, individual processes, and reactions, all of which present somewhat fragmentary pictures. The cultural historical alternatives tend to embrace larger units of study and to represent them in a larger context (Davidov, 1990a, 1999; Hewitt & Shulman, 2011; Kuutti, 1999; Pletnikov, 1990; Shchedrovitsky, 1975). The basic assumption in such a perspective is that it is not the separate individual processes, acts, and operations that define environmental interactions, but rather the syncretic result of the synchronized and coordinated flow of the constitutive components (Shchedrovitsky, 1975; Tobach, 1999). The cultural historical approach is more inclined to search for a holistic representation of the object and to create a complex picture that is different from the sum total of all constituent processes. In this respect, the "content" approach to activity is not focused on separate processes and structures, but on self-sufficient entities. It is implicitly construed by everyday consciousness as a holistic image that connects several factors within one entity, among them individual processes, operational patterns, necessary conditions, and activity outcomes/result (Davidov, 1990a, 1990b; Shchedrovitsky, 1975; Tobach, 1999).

Both the basic principles of person-environment interactions and the objectives of programming research delineate another aspect of analysis and, in agreement with it, another type of segmentation for activity systems—one that is according to the conditions they need (Shchedrovitsky, 1975; Tobach, 1999). These conditions constitute the fundamental points in environmental interactions. The interrelation of activities and spatial structures brings about the issue of environmental conditions, and in particular, the consideration for necessary conditions. The artificial physical environment is created with the purpose of producing and supplying necessary conditions for activities and processes (Shchedrovitsky, 1975). In accordance with that purpose, architectural programming engages in identifying needs and related phenomena in order to inform designers of what design objectives they have to develop and what criteria and considerations they should use for generating and evaluating design solutions. In this respect, the necessary conditions for optimal person-environment interactions delineate an aspect that becomes the goal of activity studies within the design arena. Correspondingly, this perspective provides the basic criterion for assessing activity models for their relevancy to and productivity in architectural programming.

To a certain degree, the activity aspects and models discussed above reflect to a spatial dimension of social reality and the influence that material configurations exert on actors and their activities. Although created for the social sciences and professions, these selected models are to a certain extent relevant to the analysis of environmental conditions. The overview and critical assessment of these models are preliminary steps in the process of building a composite model that will guide the analysis of the structures and components of activity systems, streams, and chains in respect to necessary conditions. Such models are prerequisites for the identification and explication of the needs that are to be satisfied by built environment. Further, the models selected in this study are not among the most common conceptualizations of activity in traditional social science disciplines, where research priorities are typically placed on goals, motivations, and meanings. To the extent possible at the present time, the ideas just discussed will be used to develop conceptual prerequisites for reconstructing the socio-spatial structures of activity and for putting them together in comprehensive models

Relationships among activities in terms of spatial organization

From a socio-spatial perspective, the relationships among activities evolve along several lines: operations, space, time, conditions, and restrictions. Operations can be analytically segmented into several types of exchanges: exchange of materials and objects, exchange of participants, exchange of energy, and exchange of information. When we apply a flow analysis approach (Blanchard, 2004; Keuning, 2007), all of these exchanges produce flows of people, materials, energy, and information (Becker, Kugeler, & Rosemann, 2003; Keuning, 2007; Galbraith, 2014). In complex social organizations, the flows acquire particular importance, and the specific way in which they are organized exerts a profound effect on the overall organizational structure (Becker, Kugeler, & Rosemann, 2003; Keuning, 2007; Galbraith, 2014).

Because actors are more than inanimate objects, that flow of people is strongly affected and even directed by factors that are related to the use of space and time, as well as the principles of minimal effort and maximum comfort. This flow is also influenced by the subsequent impact of all factors affecting activity strategy and trajectory, as well as by the attitudes of the participants towards any particular course of action. The information flows are of several types, and some of them emerge from formal and informal communication (Blanchard, 2004; Keuning, 2007). Communication is an important dimension of social interaction and is of crucial importance for cooperation and organization of activity. Regarding the programming and design of built environment, particular interest should be paid to face-to-face communication, which requires special considerations and conditions that can be provided by appropriate space planning.

The problems of movement and communication are so important that they overshadow all other considerations and strongly influence the organization of space in most socio-spatial systems (Hillier, 1996; Peponis & Wineman, 2002). More importantly, movement and face-to-face communication are strongly interrelated (Hillier, 1996; Peponis & Wineman, 2002). Specifically, face-to-face communication requires close proximity. Proximity is created by movement. The problems of movement and communication in architectural programming projects deserve special attention and analysis in conjunction with a number of psychological and sociocultural factors.

Different modes of communication constitute some of the most important logistical structures of activity. These structures provide the integration and coordination of a multitude of heterogeneous components (Keuning, 2007). Their multifunctional character and, especially, their ability to satisfy basic personality needs generate a tendency for autonomy. Very often, communication transcends the status of a logistical structure and emerges as a separate activity system, complementary or competing, infused with its own problems, goals, and requirements.

The "demand/supply" and "input/output" aspects of human activity provide the basis for conceptualizing yet another structure (Blanchard, 2004). This structure is concerned more with performance and function than with operation. The functional view of activities outlines a major activity structure and delineates its social role and meaning (Gordeeva & Zinchenko, 1982; Shchedrovitsky, 1975). Functional analysis describes the most important relationships between and among activities in terms of their spatial organization. Function is a major principle for conceptual reconstruction of the activity system that is to be accommodated by the building. If "function" is envisaged as a relationship or a connection, then the analysis of operations and communications is the starting point for studying it.

From a functional perspective, activities can be categorized according to the outcomes they provide and their role in the broader context (Gordeeva & Zinchenko, 1982). The list of functions is virtually endless, and the number of functions depends upon the specificity of the situation and the objectives of each analysis. Some functional designations can be conceptualized on the grounds of importance of activities. For example, consider basic (i.e., according to the importance of the functions they provide) and secondary (or complementary) activities. Another group of activities is "service activities," which can be defined as activities that support basic and secondary activities.

The flows of people, materials, energy, and information are important considerations in spatial analysis and design. In order to optimize the connections and exchanges, and to minimize travel and travel time, as well as the resources used to support these flows, designers group together activities with large volumes of transactions and place them in close proximity. This is summarized in the design principle of adjacency. According to this principle, those activities with the largest volume of transactions among them are grouped together and located adjacent to each other, or at least in close proximity. The study of flows of people, materials, energy, and information is essential for design.

Activities take place in time and they have to be organized along that dimension (Crang, 2001; Stone, 2004). Temporal synchronization is even more important than spatial coordination, because the flow of time is unidirectional, and disrupted connections cannot be restored or substituted, as is possible with disruptions in space. The temporal aspect is of primary importance in organizing cooperative action, because in such cases there is a need for synchronizing the flows of people, materials, energy, and information. If these flows are scattered in space, the problems can be overcome by technical means and/or loss of time, but if temporal coordination is lacking, then connections are disrupted and exchange becomes impossible, thus breaking the chain into a sum of meaningless efforts. In this respect, the synchronization of the beginning, the end, the duration, and the order of activities is of great importance. By organizing the sequence of components, the whole process becomes manageable. Exercising control over the beginning and end points is one means of synchronization. Duration is another parameter that is often influenced by the actual possibility of the social system to carry out all its activities within the limits of natural cycles. In brief, the temporal organization of activity is a priority at all levels of management of social reality.

The space and time relationship is a two-way occurrence. Moving through space takes time; using one and the same room/place for different activities requires a time schedule, and the spatial isolation between activities may be substituted by temporal separation (Crang, 2001, Gren, 2001, Stein, 2001). For example, different and often incompatible activities can be carried out in the same room if they occur at different time slots according to a time-schedule. Temporal organization is the simplest means of solving such problems. Furthermore, it is a good way to save resources, because room use may be intensified and thereby decrease the need for new rooms.

Towards a methodology for activity research in architectural programming

As we have already mentioned, the socio-spatial structures of activity systems are comprised of relations about necessary conditions and undesirable influences (e.g., impeding and blocking factors, restrictions, and limitations). The study of activity in respect to the necessary conditions requires a new viewpoint, different from those conventionally used in the social sciences. This viewpoint focuses on the process of socio-spatial interactions and the emerging relationships among activities in respect to necessary spatial conditions and resources. These relationships constitute the socio-spatial structures. They represent a way for social phenomena to exist in space. These socio-spatial structures also encompass the social functioning of buildings and become the foci of socio-spatial research. In this respect, they constitute a platform for formulating research goals and criteria for identifying relevant research aspects and tasks. All other structures of activity are studied with respect to acquiring information for reconstructing the socio-spatial structures. One simple guideline for socio-spatial research and for researching the socio-spatial structures of activity is to look for necessary conditions. Although this is still a general and abstract principle, it can be operationalized later by focusing only on the conditions that are produced by space or which affect the organization of activity in space.

This conceptualization has the potential to become a major methodological proposition for activity studies in architectural programming research. It establishes the grounds for a specific "conditions" perspective to activity. In management and education, the emphasis is on objectives, operations, technology and organization. Research goals and tasks are formulated in accordance with these concerns. The purpose of built environment (i.e., to supply necessary conditions) defines the information needs of designers and the goal structures of architectural programming and activity research for architectural programming. The difference among the research agendas of the design and the social professions presupposes the demand for a new approach that emphasizes different aspects of activity and produces representations that are unconventional or neglected in the social professions.

Regarding socio-spatial aspects and relationships between and among activities, we need to consider a number of important elements of activity, such as goal structure, necessary conditions, resources, products, emissions, and effects on other activities. Activities interact and enter into relationships with respect to these elements. Such relationships can be conceptualized as cooperative and synergistic, or competitive and conflicting. The management of these relationships by spatial or temporal means produces new derivative relations among activity elements or between them and the spatial environment. Examples include such relationships as compatibility or incompatibility; succession or parallelism; complementarity and symbiosis; autonomy or dependency, and so forth. These dimensions of activity interactions influence the organization of space when activities are organized in real situations/settings. On the other side, the arrangement of activities in space often brings about changes in their structures and specificity. The influence of space on activities and the corresponding effects are natural phenomena in the two-way person-environment interactions. In reality, this is a cyclical, iterative process. The subsequent modified configurations interact again with each other and the spatial environment. A change takes place in the activity organization. Then this new organization leads to new relationships with the environment and to a restructuring of the socio-spatial configuration. This can be a continuous process of adaptation and fitting together until congruence is achieved. In reality, very often it is necessary to assume an end to the adjustment processes and to artificially delimit them in order to start analyzing the activity situation as they are and to collect information for the needs of architectural programming.

Concluding remarks

In sum, we offer several basic propositions. In a metaphorical sense, activity defines the medium or the "plane" on which are situated participants, their social organizations, their needs, and the spatial-material structures. This is the "plane" on which their interactions occur, and it is a type of a screen on which their components and relationships are projected and delineated, and occasionally studied. In that sense, activity binds the components of the socio-spatial system into a whole and takes the role of a "system-building" factor. The study of activity as a "plane" or medium of interaction is the very approach to identifying and unveiling the socio-spatial structures and aspects. These qualities can make activity an object of analysis and a methodological principle for designing socio-spatial research.

This reflective paper presents our vision for future research on activity modeling for architectural programming and design. The ideas proposed in this paper represent progress toward developing new and innovative methodological directions for the future study of activity and for creating activity models and frameworks that will provide additional insights into socio-spatial research. We are aware of the limitations of our project and the challenges connected with applying our insights at the present time. However, we believe that the successful formulation of metatheoretical principles and guidelines is a major prerequisite for successful research and the development of models and frameworks. Following the philosophy of the activity methodology school of thought, we believe that metatheoretical developments should always precede theoretical pursuits. Next, theoretical endeavors should precede field research and the practical application of findings. The strength of activity methodology is its systematic approach to discovery and invention, the engineering of new knowledge and technologies, and control over the direction of the research process. Our future research will move forward with this vision as we challenge and encourage others to do the same as they attempt to develop studies that more closely connect applications and practice.

References

Altman, I. (1977). Research on environment and behavior: A personal statement of strategy. In D. Stokols (Ed.), *Perspectives on environment and behavior* (pp. 303-324). New York: Plenum. https://doi.org/10.1007/978-1-4684-0808-9

Barker, R. (1963). *The stream of behavior: Explorations of its structure and content*. New York: Appleton-Century-Crofts. https://doi.org/10.1037/11177-000

Barker, R. (1968). *Ecological psychology*. Stanford, CA: Stanford University Press.

Barker, R., & Gump, P. (1964). *Big school, small school*. Stanford: Stanford University Press.

Batishchev, G. S. (1990). The category of activity: Inexhaustible possibilities and limits of applicability. In V.A. Lektorsky (Ed.), *Activity: Theories, methodology & problems*, (pp. 7-14). Orlando, FL: Paul Deutsch Press, Inc.

Bechtel, R. (1977). *Enclosing behavior*. Stroudsburg, PA: Dowden, Hutchinson and Ross.

Becker, J., Kugeler, M., & Rosemann, M. (Eds.) (2003). *Process management: A guide for the design of business processes*. New York: Springer. https://doi.org/10.1007/978-3-540-24798-2

Bedny, G., & Karwowski, W. (2007). *A systemic-structural theory of activity: Applications to human performance and work design*. Boca Raton, FL: CRC Press/Taylor & Francis.

Berglind, H. (1988). *Towards an action theory for social work: Five essays*. Stockholm, Sweden: Almqvist & Wiksell International.

Bertelsen, O., & Bodker, S. (2003). Activity theory. In J. Carroll (Ed.), *HCI models, theories, and frameworks: Toward a multidisciplinary science*, (pp. 291-324). Amsterdam; Boston, MA: Morgan Kaufmann. https://doi.org/10.1016/B978-155860808-5/50011-3

Blanchard, B. (2004). *Logistics engineering and management* (6th ed.). Upper Saddle River, NJ: Pearson Prentice-Hall.

Blumenthal, B. (1995). Industrial design and activity theory: A new direction for designing computer-based artifacts. In B. Blumenthal, J. Gornostaev, & C. Unger (Eds.), *Human-Computer Interaction*, (pp. 1-16). New York: Springer. https://doi.org/10.1007/3-540-60614-9_1

Bodker, S. (1991). *Through the interface: A human activity approach to user interface design*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Brannick, M. T., Levine, E. L., & Morgeson, F. P. (2007*). Job and work analysis: Methods, research, and applications for human resource management* (2nd ed.). Los Angeles, CA: SAGE Publications.

Cherry, E. (1999). *Programming for design: From theory to practice*. New York: John Wiley.

Coovert, M., & Thompson, L. (2014). *The psychology of workplace technology*. New York: Routledge.

Crang, M. (2001). Rhythms of the city: Temporalised space and motion. In J. May & N. Thrift (Eds.), *TimeSpace: Geographies of Temporality*, (pp. 187-207). London, New York: Routledge.

Cummings, T., & Worley, C. (2001). *Organizational development and change* (7th ed.). Cincinnati, OH: South-Western College Pub.

Daniels, H. (2001). Bernstein and activity theory. In M. Hedegaard & J. Lompscher (Eds.), *Learning Activity and Development*, (pp. 99-112). Aarhus, DK; Oakville, CT: Aarhus University Press.

Davidov, V. V. (1990a). On the place of the category of activity in modern theoretical psychology. In V.A. Lektorsky (Ed.), *Activity: Theories, methodology & problems*, (pp. 75-82). Orlando, FL: Paul Deutsch Press, Inc.

Davidov, V. V. (1990b). Problems of activity as mode of human existence and the principle of monism. In V.A. Lektorsky (Ed.), *Activity: Theories, methodology & problems*, (pp. 127-132). Orlando, FL: Paul Deutsch Press, Inc.

Davidov, V. V. (1999). The content and unsolved problems of activity theory. In Y. Engestrom, R. Miettinen & R. Punamaki (Eds.). *Perspectives on activity theory*, (pp. 39-52). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511812774.004

Engestrom, Y. (1999). Activity theory and individual and social transformation. In Y. Engestrom, R. Miettinen, & R. Punamaki (Eds.), *Perspectives on activity theory*, (pp. 19-38). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511812774.003

Fararo, T. J. (2001). *Social action systems: Foundation and synthesis in sociological theory*. Westport, CT: Praeger.

Fichtner, B. (1999a). Activity theory as methodology – the epistemological revolution of the computer and the problem of its societal appropriation. In M. Hedegaard & J. Lompscher (Eds.), *Learning Activity and Development*, (pp. 71-92). Aarhus, DK; Oakville, CT: Aarhus University Press.

Fichtner, B. (1999b). Activity revisited as an explanatory principle and as an object of study – old limits and new perspectives. In S. Chaiklin, M. Hedegaard, & U. Jensen (Eds.), *Activity theory and social practice: Cultural-historical approaches* (pp. 51-65). Aarhus, DK: Oakville, CT: Aarhus University Press.

Galbraith, J. (2014). *Designing organizations: Strategy, structure, and process at the business unit and enterprise levels*. (3rd ed.) San Francisco, CA: Jossey-Bass.

Gordeeva, N. D. & Zinchenko, V. P. (1982). *Funkcionalnaiya struktura deistviya*. [The functional structure of action]. Moscow.

Gren, Martin. (2001). Time-geography matters. In J. May & N. Thrift (Eds.), *TimeSpace: Geographies of temporality*, (pp. 208-225). London, New York: Routledge.

Harrigan, J. (1987). *Human factors research: Methods and applications for architects and interior designers*. Amsterdam, The Netherlands; Oxford, UK: Elsevier.

Hillier, B. (1996). *Space is the machine: A configurational theory of architecture*. Cambridge, MA; New York, NY: Cambridge University Press.

Hewitt, J., & Shulman, D. (2011). *Self and society: A symbolic interactionist social psychology* (11th ed.). Boston, MA: Allyn & Bacon.

The International Society of Cultural-Historical Activity Research (ISCAR). Retrieved from https://www.iscar.org/

Kaptelinin, V., Kuutti, K. & Bannon, L. (1995). Activity theory: Basic concepts and applications. In B. Blumenthal, J. Gornostaev, & C. Unger (Eds.), *Human-computer interaction*, (pp. 189-201). New York: Springer. https://doi.org/10.1007/3-540-60614-9_14

Kaptelinin, V., & Nardi, B. (2006) *Acting with technology: Activity theory and interaction design*. Cambridge, MA: MIT Press.

Keuning, D. (2007). *Management: A European perspective* (3rd ed.). London, New York: Routledge.

Kotler, P., & Veller, K. (2015). *A framework for marketing management.* (6th ed.). Upper Saddle River, NJ: Pearson Prentice-Hall.

Kumlin, R. (1995). *Architectural programming: Creative techniques for design professionals.* New York: McGraw-Hill.

Kuutti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. Nardi (Ed.), *Context and consciousness: Activity theory and human-computer interaction*, (pp. 17-44). Cambridge, MA: MIT Press.

Kuutti, K. (1999). Activity theory, transformation of work, and information systems design. In Y. Engestrom, R. Miettinen & R. Punamaki (Eds.). *Perspectives on activity theory*, (pp. 360-376). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511812774.024

Lamport, N., Coffey, M., & Hersch, G. (1989). *Activity analysis: Handbook*. New York: McGraw-Hill.

Leont′ev, A. N. (1978). *Activity, consciousness, and personality*. Englewood Cliffs, NJ: Prentice-Hall.

Lompscher, J. (2002). The category of activity as a principal constituent of cultural-historical psychology. In D. Robbins & A Stetsenko (Eds.), *Voices within Vygotsky's non-classical psychology: Past, present, future* (pp. 79-100). New York: Nova Science.

Michelson, W., & vanVliet, W. (2002). Theory and the sociological study of the built environment. In R. Dunlap and W. Michelson (Eds.), *Handbook of environmental sociology*, (pp. 70-95). Westport, CT: Greenwood Press.

Moleski, W. (1974). Behavioral Analysis in Environmental Programming for Offices. In J. Lang, C. Burnette, W. Moleski, & S. Vachon (Eds.), *Designing for human behavior: Architecture and the behavioral sciences* (pp. 302-315). Stroudsburg, PA: Dowden, Hutchenson & Ross.

Moscow Methodological Circle. Retrieved from http://www.fondgp.org/mmc

Peponis, J., & Wineman, J. (2002). Spatial structure of environment and behavior. In R. Bechtel & A. Churchman (Eds.), *Handbook of Environmental Psychology* (pp. 271-291). New York, NY: John Wiley.

Perin C. (1970). *With man in mind: An interdisciplinary prospectus for environmental design*. Cambridge, MA: MIT Press.

Petrovski, A. V. (1989). *Obshchaiya psihologiya*. [General Psychology]. Moscow.

Pletnikov, Y. K. (1990). The place of the category of activity in the theoretical system of historical materialism. In V.A. Lektorskii (Ed.), *Activity: Theories, methodology & problems* (pp. 41-47). Orlando, FL: Paul Deutsch Press, Inc.

Preiser, W.F.E. (1993). *Professional practice in facility programming*. New York: Van Nostrand Reinold.

Rapoport, A. (1977). *Human aspects of urban form*. New York: Pergamon Press.

Reinvald, N. I. (1987). *Psihologiya lichnosti*. [Psychology of personality]. Moscow.

Robins, S. P. (2003). *Essentials of organizational behavior*. (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Roth, W., & Lee, Y. (2007). “Vygotsky’s neglected legacy”: Cultural-historical activity theory. *Review of educational research*, *77*(2), 186–232. https://doi.org/10.3102/0034654306298273

Rubinstein, S. L. (1989). *Osnovi obschei psihologii, Vol.1*. [Fundamentals of general psychology, Tom 1.]. Moscow.

Sagatovsky, V. N. (1990). The categoric context of the activity approach. In V.A. Lektorskii (Ed.), *Activity: Theories, methodology & problems* (pp. 33-40). Orlando, FL: Paul Deutsch Press, Inc.

Sanoff, H. (1977). *Methods of architectural programming*. Stroudsburg, PA: Dowden, Hutchinson & Ross.

Sanoff, H. (1989). Facility programming. In E. H. Zube & G.T. Moore (Eds.), *Advances in environment, behavior, and design: Vol. 2.* (pp. 239-286). New York: Plenum Press. https://doi.org/10.1007/978-1-4613-0717-4_8

Sanoff, H. (1992). *Integrating programming, evaluation and participation in design: A theory Z approach*. Aldershot, England; Brookfield, VT: Avebury.

Schutz, D., & Schutz, E. (2009). *Psychology and work today* (10th ed.). New York, NY: Routledge.

Shchedrovitsky, G. P. (1975). Izhodnie predstavleniya i kategoriyalnie sredstva teorii deiyatelnosti. [Starting-point mental pictures and categorical tools of theory of activity]. In *Razrabotka i vnedreniya avtomatizirovannih sistem v proektirovaniya (Teoriya i metodologiya)*. [Development and application of automated systems in design. (Theory and Methodology)] Moscow.

Staubmann, H. (Ed.). (2006). *Action theory: Methodological studies*. Wien, Austria: Lit Verlag.

Stein, J. (2001). Reflections on time, time-space compression and technology in the nineteenth century. In J. May & N. Thrift (Eds.), *TimeSpace: Geographies of Temporality*, (pp. 106-119). London, New York: Routledge.

Stewart, R. (Ed.). (1998). *Managerial work*. Brookfield, VT: Ashgate.

Stone, F. (2004). *The essential new manager's kit*. Chicago, IL: Dearborn Trade.

Strauss, A. (1993). *Continual permutations of action*. New York: Aldine De Guyter.

Sutton, A. (2015). *Work psychology in action*. New York: Palgrave Macmillan. https://doi.org/10.1007/978-1-137-30231-1

Tobach, E. (1999). Activity theory and the concept of integrative levels. In Y. Engestrom, R. Miettinen, & R. Punamaki (Eds.), *Perspectives on activity theory*, (pp. 133-146). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511812774.011

Valach, L., Young, R., & Lynam, M. (Eds.) 2002. *Action theory: A primer for applied research in the social sciences*. Wesport, CT: Praeger.

Whipp, R., Adam, B., & Sabelis, I. (Eds.). (2002). *Making time: Time and management in modern organizations*. Oxford, UK; New York, NY: Oxford University Press.

Wilson, M., Winstion, B., Gibson, S., & Alliger, G. (Eds.) (2012). *The handbook of work analysis: Methods, systems, applications and science of work measurement in organizations.* New York: Routledge.

Yudin, E.G. (1978). *Sistemniy podhod i princip deyatelnosti*. [Systems approach and the principle of activity]. Moscow.

Zavalova, N. D., Lomov, B. F., & Ponamarenko, V. A. (1986). *Obraz v sisteme psihicheskoi regulacii deiyatelnosti.* [Image in the system of psychological regulation of activity]. Moscow.

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