

**MOTOR SKILLS, LIVE MOVEMENTS AND THE
POSSIBILITIES OF FUNDAMENTAL PSYCHOLOGY:
TOWARDS NON-LINEAR DIMENSIONAL MODEL OF
DEVELOPMENT**

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Abstract

The paper discusses the problem of the necessity of "fundamental psychology" approaching mental phenomena from the perspective of fundamental principles. The paper proposes a non-linear model of mental development.

Introduction

It seems to be usual to distinct between "fundamental" and "applied" sides of contemporary scientific disciplines, like physics, chemistry, biology, etc. As for psychology, the state of affairs does not look as clear. In a great amount of psychologies both theoretical and practical, it is hardly possible to find a branch that could be indisputably identified as fundamental psychology. Even more, psychology as a science finds itself in a state of permanent crisis from the beginning of the XXth century, from the times of W. James until now.

Any attempt to build a sort of all-embracing psychological theory brings embarrassing rather than celebration. The possible way out from permanent crisis in psychology is highly connected with the task of creating of the fundamental psychology, that does not unify different approaches, but reflects the roots and bugs of their subject-matters, but not the flowers or fruits.

In fact, psychology as undeveloped science passes the same way as developed sciences did, it goes from the domination of "umbrella-like" theoretical constructions covering certain set of mental phenomena, to the appearance of basic ultimate foundations constituting the fundamental science per se. The logic of development of sciences does not leave the alternative.

Fundamental science does not start from stating, selecting and interpreting of a certain fundamental facts in order to bring the universal status to them. In the contrary, it finds fundamental methodological problems, brings a new understanding of them and then explains the known and familiar empirical facts from radically different perspective, showing the limits of their previous understanding. New understanding finds and shows the links between the facts that were seen before as being different and not connected to each other.

This means, particularly, that the "fundamental science" becomes possible if the science itself has been face with methodological difficulties, which cannot be neglect, on one hand, and cannot be resolved with the customary explanatory tools and means, on the other.

Does contemporary psychology bring any grounds for this? Is fundamental psychology possible? What is clear is that psychology as a scientific discipline, despite differences in approaches, obviously experiences a set of deep methodological difficulties. They might be detected locally within the frames of the existing theories, yet they are essential for the whole psychology as a science.

1. *Development.* Empirical methods of analysis in psychology are only able to *describe* different stages (levels, phases etc.) of development. To compare *State A* and *State B* of the certain system does not mean to explain developmental change taking place between the states. The process of development itself as qualitative change, as the reorganization of the given system remains unachievable for empirical methods.

2. *Psychology and physiology*. There is an obvious gap between psychological and physiological approaches to development of mind. Human mind could hardly be explained by morphological brain structures - on the other hand, the ignorance of physiological and neuro-physiological activities (at least as prerequisites of mental world) could hardly lead to success.

3. *"Internal" and "external"*. From the time of R. Descartes these two realms are viewed as two separate and different worlds. The riddle of psychology is how internal becomes external and how external becomes internal. The famous concept of internalization seems to be limited and does not cover the whole process. B. Spinoza proposed different approach applying the idea of one substance with two attributes with no border between the two. Spinozian idea of the moving body did solve the problem of "external" and "internal" on the philosophical level, whereas for psychology both "external" and "external" retain as something that is absolute (like "absolute time and space" in Newtonian classical physics). Are there any grounds to assert that they are not absolute, but in some sense are relative, as generated dynamical results coming from one and the same root? How far can we move in our understanding of the nature of human mind if we take this assertion as a point of departure?

4. *Voluntary - involuntary actions*. How voluntary and involuntary (motor) actions are interconnected? What is the psychological structure and the nature of the actions we call "skills"? Where do they originate and in which form?

These difficulties might be resolved, or rather resolved by different means and tools, from different perspectives; doors might be opened with different keys. I have no intention to discuss these keys and their validity- my task is simpler. I just want to present *the possible way* of how to open these doors with ONE AND THE SAME key. This key is an approach, that we define as the "dimensional model of development" we try to develop with our colleagues in Kajaani and in Turku. It is just an assumption, a hypothesis, which only advantage is that it could bring the way of how to resolve these mentioned difficulties using only one key, only one explanatory principle.

Background

The effect of "psychological space and time" is not new for psychology (see, for example K. Lewin's considerations on this in Lewin, 1936). Traditionally, psychology brings explanation to such a phenomenon by appealing to the mechanisms of sensory perception of space and time. In our experimental work with children of different ages we went to the paradox: The child and adult live

and interact being in *different* spaces and times. Even physically for the child the same room is much bigger than for an adult, one day (or even one hour) for the child is in fact much longer period of time than for an adult. This shows that the child and the adult exist in different physical spaces and times. *How interaction is possible then?*

One could say that there is only *one* physical space, and what makes it different is different *perception* of the child and adult. The problem is therefore is not of different physical spaces, but of different mental (psychological) worlds. Such kind of objection does not change the problem, but rather put it in more exact way, since the question remains: how interpersonal (inter-mental) interaction is possible within (or rather between) different personal, mental spaces? It is possible only in a case when these spaces are built by such interactions.

This assumption was the starting point in our considerations. The research task required careful analysis of existing approaches to the problem. Hypotheses do not arise on empty space. So, the theoretical points of departure should be mentioned as having the primarily importance.

1. Systemic psychology and the concept of result developed by T. Jarvilehto (Jarvilehto, 1998a, 1998b, 1999, 2000).
2. Conception of "live movement" and the levels of organization of movements of N. Bernstein (Bernstein, 1976)
3. The concept of "perception as action" by A. Zaporozets and V. Zinchenko (Zaporozets, 1967)
4. Concept of inter/intra-subjective space – F. Mikhailov (Mikhailov, 2001)
5. "Chronotopic Universe" – M. Bakhtin (Bakhtin, 1981)
6. Projective differential geometry – N. Lobachevsky, B. Riemann

Unfortunately, the required format of this paper does not allow showing our discovery of these approaches in details, yet we might give the imaginary graphical picture. Imagine these approaches as interlaced spheres: what then could identify the intersection area of these spheres? The answer is *movement*. Organism-environment system (Jarvilehto) consists from movements to the result, and could be recognized as a set of movements for the result. Live movements construct activity of the organism (Bernstein), perception is a result of organized actions/movements (Zaporozets), chronotop is space and time unit constructed by sense-creating actions/movements of the individual (Bakhtin), space geometry depends on the motions of the bodies (Riemann), intersubjective/intrasubjective space is that created and maintained by joint movements if the individuals (Mihailov). And finally, skills (motor skills) are unfolded actions that maintain interactions of the higher voluntary types of movements and interactions.

Suggestions

As a result of theoretical survey and experimental results we propose the dimensional model of development, presented on Figure 1. It is a *dimensional* model since it proceeds not from linear approach to development; it is based on multidimensionality of space-time continuum that neither can be reduced to the number of dimensions (projections), nor disaggregated to them. This allows to approach to *development as to a process of qualitative changes* of reorganizing system.

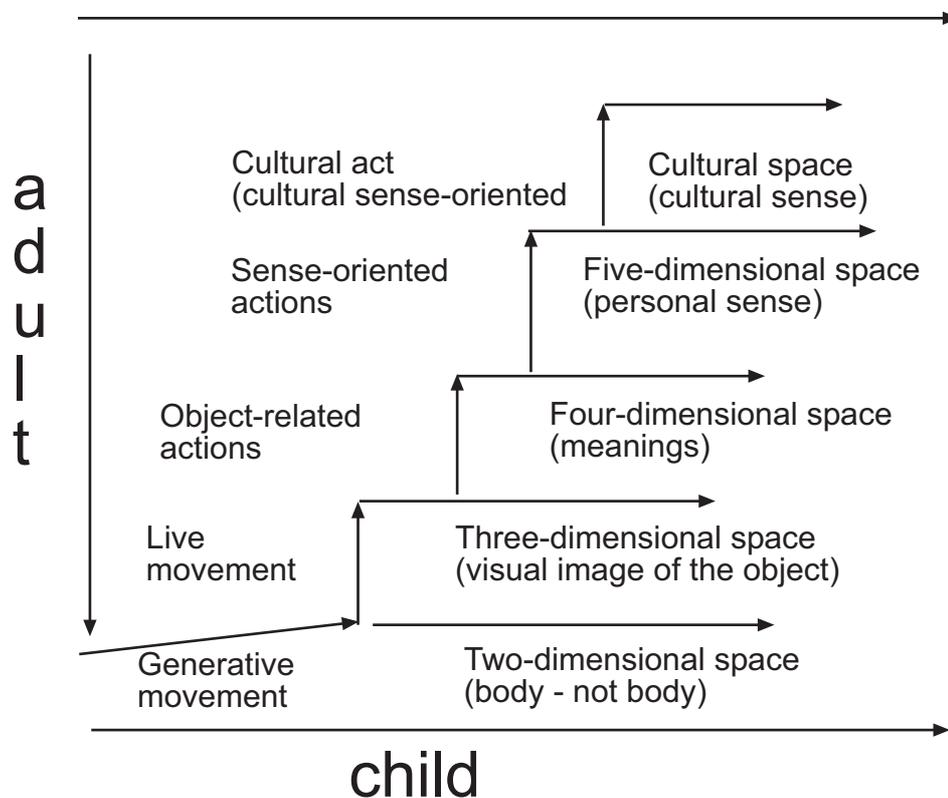


FIGURE 1. Dimensional model of development

Some necessary explanations of the dimensional model of development:

1. The model presupposes 6th-dimensional space of interaction in a course of development. Child and adult interaction takes place in this 6th-dimensional space (including physical and mental dimensions). It preexists for the adult, but not for the child. Interacting with the adult, child builds prospectively three-, four-, - and fifth dimensional spaces. Every new dimensional space is

qualitatively different from the previous ones and cannot be reduced to them and disaggregated into single dimensions.

2. Generating movement and differentiation of movements are important traits of the model. Every dimensional space is not the area or the field where movements take place. Movements (generating movements) generate space as *a result*. Achieved result makes possible the differentiation of movements into productive and reproductive components and therefore the transition to next level of movements and dimensionality of space. Child's development could be seen as transition from one space to the other one with higher rank of dimensionality. Development therefore is the creation of a new type of space *by movements* (actions). Dimensional space cannot be identified as external or internal - it is a dynamic structure and "mental image" is just one of the aspects of this structure. Human mind is not a thing or place - it is a process.

3. Levels (spaces) of development do not replace each other in a course of time. Each new level (space) includes the previous one. Each developmental level is characterized by:

- certain type of movement (actions) and
- certain type of dimensional space created by these movements

Each higher developmental level of movements requires interaction with the adult (or the other), and originates as such an interaction. Each new type of movement generates (creates) the higher, qualitative different type of space and therefore, the possibilities for a new, qualitatively different type of movements (actions) within this space. Each developmental level of space is characterized by certain achievements (results) which are conditions for the creation of higher dimensional space. Each higher developmental level reorganizes the lower movements so that they *maintain* lower dimensional space. Within the action of higher level, each action of lower level changes *and maintains* the space for the action of the higher level.

4. After obtaining the result (mental image of the space), every movement differentiates into productive and reproductive components. Productive components are "responsible" for the construction of a new dimensional space, whereas reproductive components (motor skills) are "responsible" for maintaining of the space, perceiving by an individual as "surrounding world" simultaneously.

Conclusions

The model we introduce covers not the states, but the *whole process* of mental development as obtaining new qualitative characteristics and, at the same time, as the reorganization of the living system. It corresponds with the main principle of the development of the living systems (organisms) - the principle of progressive differentiation. Human mind, therefore, is viewed as living system, a sort of organism, but not as mechanism. Therefore, it has no mechanisms inside, and "mechanical" movements are infolded organic movements. Motor skills as reproductive components of generating movements are extremely important for mental development since they are components that reproduce an adequate image of the surrounding world for the individual.

Our model is based on *non-linear approach to the process of development*. Multidimensional space is not external or external since it is creating and maintaining by generating movements. The model also explains *why an individual* perceives the space he creates as internal and as internal preexisting worlds. The differentiation of the worlds is the result of the differentiation of the movements.

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