The atomic analysis of the conceptual field: *similarity*

Ewa Swoboda, Pedagogical University, Rzeszow, Poland

My work was related to the very large research problem: structuralisation.

Filip, a junior-secondary student, was subjected to a series of tests and observations. As the 10 years old boy, at the end of 1996 he took part in the experiment in which he was taught how to understand the statement: "figures have the same shape". Three years later I met him again. During the investigation I tried to describe the actual level of his competence by using an informal idea of similarity.

The first part of the investigation was related to the former experiences of Filip. His reaction to the task which he solved in 1996, and tools used, gave me a possibility to describe the actual structure of his field concerned transformations. It contained three almost separate conceptual fields: deformation, isometries, and similar figures. The differences between concept derived mainly from their epistemological nature.

During the second part of the investigation Filip solved a new series of tasks related to similar figures. After that he was asked to describe that concept. The atomic analysis showed how the solving process changed the scheme of similarity. I isolated 14 phenomena which described the mathematical activities connected to his work on the task. The analysis showed also the new linkage created between the concept "similar figure" and the concept "isometry".

New capacity of the concept treated gave Filip a chance to build the new meaning for the statement: "figures have the same shape".

LITERATURE:

1. Chinnappan M., 1998: *Schemas and Mental Models in Geometry Problem Solving,* w: Educational Studies in Mathematics, 36,201-217.
2. Dreyfus T.: 1991, *Advanced Mathematical Thinking Processes,* w: Advanced Mathematical Thinking, edit. David Tall, Kluver Academic Publishers (Dordecht), Boston (London)
3. Hershkovitz R., 1990: *Psychological Aspects of Learning Geometry,* w: Nesher P., Kilpatrick J. (ed): Mathematics and cognition (p.70 – 95), Cambridge University Press.
4. Nunokawa K., 1994: *Solver,s Structures of a Problem Situation and Their Global Restructuring,* Journal of Mathematical Behavior, 13, 275-297
5. Tall D., 1995: Cognitive growth in elementary and advanced mathematical thinking, in: Proceedings of 19th International Conference PME, Recife, Brasil
6. Vergnaud G.: 1998, *A Comprehensive Theory of Representation for Mathematics Education,* Journal of Mathematical Behavior, 17 (2) 167 – 181.