CONCEPT BUILDING PROCESS 
IN 3D GEOMETRY

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Abstract: Tasks aimed at the classification of a group of tactiley perceived geometrical solids make pupils think about the solids and learn them in different way than is usual when visual perception is involved. Pieces of information about attributes of solids which are gathered by tactile perception come to the mind gradually and are hierarchical. The first substantial phenomenon which a pupil notices is called the dominant one. Which phenomenon a pupil perceives as dominant or whether a pupil perceives only a global attribute of a solid is projected into his/her way of manipulation with the solids. On the basis of the analysis of video-records of some 10-11 years old pupils’ solution of the tasks we describe some mental processes, mechanisms, related to the structure building process of geometrical knowledge. In the paper we present some findings of our on-going research into the learning and structuring of knowledge about 3D solids by pupils.

Keywords: 3D geometry, cognitive mechanisms, tactile perception, structuring of knowledge, concept building process

Genesis of the research

The research aimed at concept building process in 3D geometry started in 1994 under the guidance of M. Hejny. We focused our attention on pupils of age 6-10 years, on the investigation of their understanding of geometrical concepts and the possibility of developing this understanding. We posed the following questions to ourselves: In what way do the early phenomena of the geometrical world emerge from the real world? Through which perception channels does the 3D world come to the pupil’s mind? How is the information, which is carried by touch and sight, coded in a pupil’s mind? How are the given mental representations handled? What are the qualitative types of pupil’s geometrical images and how are these verbalised? Special attention was paid to the construction of mechanisms, for instance the mechanism of classification of 3D objects. We constructed the mechanisms of tactile selection and classification of geometrical solids and the mechanisms of control of tactile selection and classification (Jirotková, 2001).

Since 2001 the author has been collaborating with G. Littler and some of

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