

## Psychological Questions of Development and Education

**Programme director: Tamás Martos, DSc**

### *The overall framework of the training programme*

The training programme aims to provide research-oriented knowledge on the Psychology and Cognitive Neuroscience of child and adolescent development. The history of Educational Science and Psychology share an origin. To this day, there is a strong relationship between the two disciplines, as both focus on examining human behavior. Moreover, the most important area of shared interest involves the research of possibilities and mechanisms of forming behavior. In the past decades, new theoretical frameworks and research paradigms (e.g., the approaches of Cognitive Neuroscience, Evolutionary Psychology, dynamic systems theory, and ecological systems theory) have emerged to explore and understand human behavior. The fundamental training function of the programme is to provide the doctoral students with a broad perspective of psychological and neuroscientific understanding to address pedagogical issues, including the formulation of theoretical, methodological, and research questions. Cognitive neuroscientific approaches are getting more influential within international educational research. With the advancement of neuroscientific examination methods, it is now possible to find new interpretations and explanations to several pedagogical phenomena. Research concerning the educational application of Cognitive Neuroscience (i.e., *Educational Cognitive Neuroscience*) has been initiated worldwide. PhD students of our Doctoral School have the opportunity to take part in establishing this line of research in Hungary.

Apart from the Institute of Education, the training programme is in close collaboration with two other institutes of the University of Szeged, namely, the Institute of Psychology and the Institute of Physiology. The history of our collaboration with the Institute of Psychology dates back to several decades. The two institutes formed a joint unit by the name of Institute of Education and Psychology until September 2007. As a result of the strengthening and organizational development of the fields, Education and Psychology now form two separate institutes with close and fruitful collaboration to this day.

The Institute of Physiology conventionally focuses on the physiology of the central nervous system, and more specifically, sensory functions. Within the neurophysiology of sensory functions, vision from the retinal level to the level of cognitive processing (along with perception and categorization) are being investigated. The collaboration with the researchers of the Institute of Education allows for the combination of various research methods, and hence the exploration of further links. The data collected regarding the central nervous system can supplement the examination of factors determining the development of cognitive skills and academic performance. Cognitive neuroscientific methods offer new perspectives to explain the considerably high interindividual variability in the pace and level of development of skills. This paves the way to identify biological/maturational and social/cultural differences more accurately and to distinguish their role in academic performance. An interesting collaborative approach could be the further development of educational diagnostic methods through methods used in Cognitive Neuroscience, for instance, analyzing the validity of diagnostic tools in such a way.

## *Main areas of research*

### 1. The psychology of adolescence

a) Coping with stress in adolescence. One major challenge of adolescence is to cope with problems and challenging situations. On the one hand, our research aims to explore the coping mechanisms of adolescents in problematic situations with a new questionnaire that has not been used previously. On the other hand, we also wish to explore stress management methods used in social relationships that are relevant to adolescents. This research provides an opportunity to explore the coping mechanisms of young people of different ages and identify the various coping skills in social relationships.

b) Planning and decision making in adolescence. Adolescence is the period of preparing for tasks in adult life and determining the means of formulating and realising plans. In our research, we explore the long-term personal goals, motivation of career choice, and decision-making processes of young people of various socio-cultural backgrounds. This research provides an opportunity to explore the planning processes, identify the difficulties in decision-making, and help specify the future plans of young people who are about to decide on their careers. This study also aims to explore the background factors of family and school socialization.

c) Self-image and self-esteem in adolescence. The examination of shaping and change of self-image in adolescence is a popular field of research within the field of Developmental Psychology. However, only a few representative studies have been conducted in Hungary. The research aims to explore the changes of self-image and self-esteem spanning through the entire length of adolescence. Another important aspect is to examine the relationship of self-esteem and self-image with parental aspirations and self-image.

### 2. Socialisation and learning in the family, and in-school and out-of-school contexts

a) The process of family socialisation has a fundamental role in primary socialisation. Research on this topic is particularly warranted by the diversification of family forms (e.g., single-parent families, children raised by non-biological parents, etc.) which also calls for the reevaluation, reanalysis, and novel research of the family socialisation process.

b) Environmental psychological research of home and school. Home and school can be interpreted and investigated with an environmental psychological approach as environments of socialisation. The interactions between socialisation, learning processes, and environmental characteristics in these settings are yet to be explored.

c) Situated learning and apprentice learning. In the past decades, significant attention has been drawn to learning processes in everyday and natural situations. The most influential theoretical bases of the field include the affordance theory of Gibson and the social learning theory of Vygotsky, and the work of Schoenfeld, Lave, and Rogoff had a great impact on the field of research. The research programme also aims to examine situated and apprentice learning in other settings.

### 3. The development of visual skills in children

a) The development of shape and form perception at the ages of 5 and 14. It was commonly believed that visual functions become fully mature by the age of two. However, a growing body of evidence suggests that visual functions (e.g., the recognition of an image based on its fractions) shows constant improvement until the end of puberty.

b) The development of contrast sensitivity in children.

Visual contrast sensitivity has been investigated for about twenty years. The introduction of automated computerised methods of contrast sensitivity has remarkably changed previous views of contrast sensitivity, particularly with regard to its development. We wish to investigate the contrast sensitivity of school-aged children in order to gather information regarding the development of the parvocellular and magnocellular pathways. Another promising line of investigation is to analyse the connection of contrast sensitivity with pedagogical measures of children.

c) The electrophysiological background (EEG, ERG, visual evoked potentials, and event-related potentials) of skill development in children.

The technical background of our workgroup makes it possible to carry out complex electrophysiological measurements. Several studies have investigated the relationship between EEG and mental skills. From the current viewpoint, there is no link between these two factors in healthy children. By examining further electrophysiological phenomena, we can hopefully give estimates of mental (learning) skills.

d) Analysis of the development of parvocellular and magnocellular visual pathways in children between the ages of 2 and 14. There has been a rather heated debate regarding which of the two pathways develops first. We believe that the main obstacle in resolving this debate is the inadequacy of the currently used examination methods. We wish to address this issue by using both conventional and novel psychophysiological techniques.

#### 4. The psychophysiological and electrophysiological analysis of learning and attention in children

These investigations are conducted in collaboration with schools and educators. Doctoral research may be based on the following research questions:

a) The development of event-related potentials in childhood. Event-related potentials may objectively inform us of the cognitive components of brain function. The parameters of evoked potentials can be compared to each other, and this way, they can inform us on the development of cognitive skills.

b) The development of gamma band activity in childhood. The examination of gamma band activity is a new branch of EEG analysis. These fast components of EEG are currently considered an accompanying electrical activity of conscious functions and attention. The methods we have access to make it possible to measure and follow these components.

c) Psychophysiological research regarding the development of learning and attention in children. We wish to follow up the development of children aged 5 or 14 with the psychophysiological techniques that are available to us.