

**UNIVERSITY OF SZEGED**  
**DOCTORAL SCHOOL OF EDUCATION**  
**PROGRAMME OF PSYCHOLOGY**

**DÓRA JUHÁSZ**

**AGE RELATED CHANGES OF LEARNING AND MEMORY  
PROCESSES**

**Summary of the Ph.D. Dissertation**

**SUPERVISOR: Dr. Dezső Németh**

**Habil. Associate Professor**



**Szeged, 2022**

Exploring human learning processes as well as the quantity and quality of learned information plays an important role in many areas of life. It is observed in everyday practice that the quality of memory and learning processes varies at different ages due to biological development processes. A more exact definition of these qualitative differences is crucial to be able to give a comprehensive picture of, first, which learning processes one can rely on the most at different ages, and second, what can be considered an optimal level in terms of specific skills. Based on this, the typical development of certain cognitive skills can be specified, which may facilitate the early diagnosis of atypical development and the creation of intervention programs. As for changes with aging, such findings could also contribute to the support of efficient life-long learning, as well as to the creation of prevention programs aiming to slow down age-related decline.

The aim of the dissertation is to introduce four empirical studies that investigate working memory, executive functions, as well as the development and age-related changes of implicit learning consolidation across a wide range of age groups, applying several different psychodiagnostic tools. In Study 1 and Study 2, our objective was to examine, in the framework of explicit learning, the development of verbal working memory, complex working memory, and executive functions among individuals with healthy development, with thorough focus on differences over the age of 60. In Study 3, in connection with automatic and controlled processing, we observed performances on verbal fluency tests, introducing a time component. In Study 4, we investigated the consolidation of knowledge acquired by implicit learning from childhood to adulthood, in terms of gender.

The results of Study 1 show that on the tests measuring the phonological loop and executive functions, the performance of children and older people is lower than that of young and middle-aged adults. The more complex the task, the greater the decline in performance. The presentation of the results of the Activity Fluency Task is of special importance, as it is the first developmental research in Hungarian using the Activity Fluency Task along with the Letter Fluency and Semantic Fluency Task in order to examine verbal and executive functions.

The findings of Study 2 indicate that age-related short-term memory loss is moderate, while there is a significant decrease in the performance of older people on tasks of verbal and executive functioning, and on more complex tasks requiring sustained attention.

The results of Study 3 reveal that the developmental trajectories for both time intervals of each fluency task are similar to the development pattern of classical cognitive skills: the performance of children and older adults is lower than that of young adults. Comparing the two time intervals, participants listed approximately twice as many words in the first 15 seconds as

in the following 45 seconds regardless of age and task, which may suggest the existence of automatic and controlled processing.

Based on the results of Study 4, it can be concluded that children's memory consolidation performance is similar to that of adults. We found gender differences in sequence-specific learning consolidation, with males performing better after a 24-hour delay than females, which may indicate their better perceptual-motor consolidation processes.

Our results could have important implications for pedagogy, special education, psychology, neurology, as well as psychiatry. The exploration and a more thorough understanding of learning and memory processes could contribute to the higher efficiency of learning and teaching strategies, the potential benefits of which are widely recognized not only in education, but also in prevention, intervention, and medical rehabilitation programs.