The evanescence of the term “general slowing” in normal aging

Matthias Grieder,1 Raffaella M. Crinelli,2 Thomas Koenig,1 Lars-Olof Wahlund,2 Thomas Dierks,1 Miranka Wirth1

1Dept. of Psychiatric Neurophysiology, University Hospital of Psychiatry, University of Bern, Switzerland
2Karolinska Institute, Dept. NVS, Division of Clinical Geriatrics, Stockholm, Sweden

Keywords: Aging, electrical neuroimaging, general slowing, N400, priming, semantic memory

Research on normal aging often shows a general slowing in processing speed that has been interpreted to reflect declining cognitive abilities. Here, we challenge this assumption and disentangle age-related alterations in automatic (less attention-dependent) and controlled (attention-dependent) word retrieval in semantic memory. Therefore, an automatic semantic priming paradigm was conducted. Two participant groups of healthy young and elderly performed lexical decisions upon visually-presented word/nonword pair stimuli with a stimulus onset asynchrony of 150 milliseconds. Behavioral reaction times and event-related potential (ERP) were measured. The N400, an ERP component sensitive to lexical-semantic retrieval, was analyzed by means of electrical neuroimaging. Controlled semantic word retrieval was assessed with verbal fluency tests. The established semantic priming effects in reaction time and N400 during lexical decisions were found in both age groups. Importantly, the elderly did not differ significantly from the young in these critical effects, except for a delayed N400 microstate. Moreover, no age effect was detected in the general processing speed. However, the age-related decrease of word production was replicated in the verbal fluency tests. The findings indicate that the automatic semantic retrieval remains stable in the normal course of aging. Consequently, the existent slowing in the elderly seems to be attributable to controlled processes. Hence, the distinct investigation of automatic and controlled semantic memory processes questions the justification of the term of general slowing. Thus, the age-related slowing is process dependent.