Time perception in aging: Age-related cognitive and temporal decline is reduced by intensive temporal training

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Abstract

Time perception is a important subject in cognitive psychology, which is essential for our understanding of brain mechanisms underlying human cognition. Many cognitive functions, like learning, memory, language, decision making, or concept formation may be characterized by regular changes in time-varying processes. The patterning in time, therefore, seems an essential feature of our ‘working brains’. Many previous literature reports and studies conducted indicate age-related decline in our mental activity (e.g., Szymaszek, Sereda, Pöppel, & Szelag, 2009; Szelag et al., 2009). Such cognitive deterioration is often observed beyond 65 years of life and accompanied by less efficient timing processes. In the present study, we focused on rapid auditory processing in some tens of milliseconds. The study was aimed at improving cognitive function in elderly following the specific training in temporal information processing using the Fast ForWord (FFW) program. This program is composed of several games designed to improve memory, attention, and sequencing abilities and it was developed to help children with difficulties in reading, writing, and learning.

Thirty healthy subjects between 65 and 75 years of age were randomly assigned to three groups. One group received temporal training using the FFW. The second group participated in non-temporal training by playing common computer games. The third group underwent no training. Before and after the training, all of the subjects went through a number of tests to measure the level of their cognitive functioning. We assessed: (1) temporal processing by measuring sequencing abilities; (2) three aspects of attention, i.e., vigilance (the ability to sustain attention over a longer period of time), divided attention (the ability to pay attention to multiple processes), and alertness (the ability to maintain a high level of attention in anticipation of a test stimulus); (3) short-term memory with tests evaluating working memory span, as well as the ability to match complex patterns and the ability to recognize a pattern seen earlier.

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Prior to training no significant differences were found among the three groups. After the training, Group A showed improved temporal information processing accompanied by amelioration of some attentional and memory resources. Our study showed, for the first time, significant benefits of temporal training on broad aspects of cognitive function in elderly. We found that elderly who underwent temporal training improved not only the rate at which they processed auditory temporal information, but also in other cognitive processes. These results support the thesis on the ‘timing-cognition’ interrelationship and offer new horizons for neurorehabilitation of declined mental activity in elderly population (Szelag et al., 2011; Szelag & Skolimowska, 2012).

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**Keywords:** Time perception; Temporal training; Cognitive aging

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**References**


