



Time perception - a chance for neurorehabilitation: evidence from cross-linguistic comparisons

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The three studies presented here focus on auditory perception of temporal order and address the following question: (1) do subjects' age, gender and cognitive functioning influence temporal ordering abilities? (2) do Polish and German subjects react in a similar way, i.e. are cross-language differences on a phonological level possibly associated with temporal ordering abilities? (3) can the specific temporal training reduce specific cognitive deficits i.e. auditory comprehension deficits in aphasic patients or cognitive declines in elderly people?

In study 1: eighty six Polish and eighty two German subjects aged from 20 to 69 years identified the order of two clicks presented monaurally in a rapid succession. The results showed no differences between Polish and German subjects on temporal ordering abilities. In both samples a significant prolongation of temporal order threshold was observed in subjects older than sixty years of age; men show shorter temporal order thresholds than woman; most importantly, temporal information processing is strongly linked to cognitive competence. Thus, it is presumably not chronological age but cognitive competence that explains temporal acuity. Furthermore, potential effects of age or gender are robust against the language background as no differences were observed between Polish and German subjects.

In study 2: twenty five aphasic patients with deficits in both auditory speech comprehension and perception of temporal order participated in eight 45-minutes sessions of the specific temporal training (n=18) aimed to improve the perception of sequencing abilities, or in a non-temporal control training (n=7) on volume discrimination. The temporal training yielded an improvement in temporal order perception, moreover, a transfer of improvement was observed from the time domain to the language domain, which was untrained during the training. The control training did not improve either the time perception or auditory speech comprehension. These results are in agreement with previous studies from the literature which proved ameliorated language competencies following the temporal training in LLI children.

In study 3: six elderly healthy subjects aged above 65 years of age participated in 32 sessions of the Fast for Word Training (Scientific Learning, Oakland). The training was administered in 8 consecutive weeks, 4 times a week. Following the training we observed the improvements both in time perception and cognitive function, specifically in associative learning (CantabEclipse Battery) and in some aspects of attention (Test for Attentional Performance). Recently, we verify neuronal (electrophysiological) and neuroanatomical (fMRI) correlates underlying such improvements.

The results of these 3 studies support the thesis that many aspects of cognitive functioning may derive, at least in part, from timing. Such influences proved beneficial for individual patients, independently of their mother tongue. These research trends will probably be of major clinical importance in the near future and provide new directions for therapeutic programs in neuropsychological rehabilitation.

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