

INTERACTIONS BETWEEN SHORT AND LONG TERM ASSOCIATIONS IN ADULTS.

TAGLIABUE Mariaelena  
University of Padua, Italy

Cognitive plasticity is a topic of interest since it allows us to analyze the potential cognitive modifiability of a person. Plasticity refers to the fact that individuals perform at different functional levels under varying experiential conditions. In our perspective, plasticity is referred to changes in performance based on innate or over-learned associations allowable with a short practice. In the series of experiments that will be described, we tried to pinpoint which conditions may modify long term association so as to influence a robust effect such as the Simon effect that is based on the automatic elaboration of the spatial dimension of the stimulus.

In particular, the Simon effect is the delay in response time (RT) that occurs when stimulus position and response position do not correspond compared with that which occurs when they do, in tasks in which stimulus position is not relevant for the selection of the correct response whereas the spatial compatibility effect is the delay in RT that occurs when stimulus position and response position do not correspond compared with that which occurs when they do, in tasks in which the spatial dimension is relevant.

The Simon effect is explained on the basis of the fact that, in a typical Simon task, when a lateralized stimulus is presented, long-term memory (LTM) links pre-activate the corresponding response, which is faster than the non-corresponding response.

Our starting point was a research in which we found that when children performed a Simon task after a spatially incompatible task, the Simon effect was reversed. Afterwards, an identical procedure was adopted with adult participants, who performed the Simon task immediately after, a day after, or a week after the spatial compatibility task. The result of a reversed Simon effect one week after the spatial incompatible task indicated that learning can affect a putatively automatic effect. Based on a dual route explanation of the Simon effect, learning effects are explained assuming that the spatially incompatible task determines the instantiation of short-

term memory (STM) links, which do not decay after task completion but rather modulate the effects of LTM links. Thus, when a spatially incompatible task is performed before the Simon task, STM links activating the response opposite to stimulus position are instantiated. If a Simon task is then performed, these STM links continue to activate the non-corresponding response, so as to contrast the effect of LTM links, which would activate the corresponding response. As a consequence, the Simon effect disappears or reverses.

Even more interestingly, this learning effect has been demonstrated also when the learning (spatially incompatible) task was performed in the auditory modality and the Simon task in the visual modality (Tagliabue, Zorzi, Umiltà, and Bassignani, 2000), thus demonstrating that the learning effect is not an episodic/contextual effects and supporting the hypothesis of a long-lasting spatial remapping that is not modality specific.

Finally, we investigated whether learning effects influencing the Simon effect, such as those found when learning involves the spatial stimulus dimension, might be also found when learning tasks involve other non-spatial stimulus features, such as color, shape, and orientation (Tagliabue, Umiltà and Spera, 2009). In conclusion, our results demonstrate that cognitive plasticity is so effective as to allow the system to modify the effect of automatic route on the basis of prior practice, not only when practice involves spatial STM association but also when it involves non-spatial STM links.

Tagliabue, M., Umiltà, C, & Spera, P.(2009). Interference between nonspatial stimulus features in the Simon effect. *American Journal of Psychology*, 122, 431–453.

Tagliabue, M., Zorzi, M., & Umiltà, C. (2002). Cross-modal re-mapping influences the Simon effect. *Memory & Cognition*, 30, 18–23.

Tagliabue, M., Zorzi, M., Umiltà, C., & Bassignani, F. (2000). The role of LTM links and STM links in the Simon effect. *Journal of Experimental Psychology: Human Perception and Performance*, 26, 648–670.