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Adult age differences in task switching: components, generalizability, and modifiability

Cognitive control, defined as the ability of the cognitive system to effectively organize its own processing, is often seen as a fundamental dimension of intellectual behavior (Duncan, 1995), and is also assumed to determine age-based changes in fluid intelligence in old age (e.g., Moscovitch & Winocur, 1992). In the context of a larger research project on age differences in cognitive control ability across the life span, the present study investigated adult age differences in the ability to organize cognitive processing during switching between two cognitive task sets such as a lexical-categorization and a syllable-counting task. During task switching, two interrelated components were distinguished: (a) the ability to organize (i.e., to maintain and coordinate) task-relevant information under switch conditions, and (b) the ability to regulate (i.e., to initiate and execute) cognitive processing in task-switch conditions.

In line with the theoretical consideration that both cognitive control measures represent mechanic components, both general and specific switch costs were more negatively related to reasoning and perceptual speed from the fluid-mechanic domain of intelligence than to knowledge from the crystallized-pragmatic domain.

A major, but unexpected, finding of the present study concerns the difference of age-based increments in general and specific switch costs. More precisely, taking into account that older adults show generally slower performance compared to younger adults, negative age effects were significantly more pronounced in general switching ability than in specific switching ability. The extent to which both cost measures represent valid indicators of cognitive control, this finding indicates that the ability to maintain and coordinate task-relevant information during task switching was more affected with advancing age than the ability to initiate and execute a task switch. Alternative interpretations of the present results, such as the influence of age differences in speed of responding, limitations of the present paradigm, and a possible explanation of findings, are discussed.

Reference:

Kray, J., & Lindenberger, U. (2000). Adult age differences in task switching. *Psychology and Aging, 15*, 126-147.