



WHICH COGNITIVE ABILITY IS MORE AFFECTED IN NORMAL AGING?

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BACKGROUND

Cognitive decline is commonly associated with aging (Salthouse, 2009). One cognitive ability that is often subjectively complained about by many older adults is memory (Nyberg et al., 2012). While it is true that memory problems may arise as people age, it remains unclear whether memory decline is more severe than the decline of other cognitive abilities, such as reasoning and problem-solving. The purpose of this study is to compare the impact of aging on a broad range of cognitive abilities, in order to better understand the relative decline of different cognitive domains in normal aging.

METHODS

- 111 healthy and right-handed adults were recruited (Age: 18-81; Education level: 10-25 years).
- 11 cognitive tasks were designed to assess a wide range of cognitive abilities, including short-term memory and executive function, as shown in Table 1.
- Data were analyzed using linear regression models.

RESULTS

- Significant effects of age were observed on the performance of all cognitive tasks except for the Shipley and sentence completion tasks (as shown in Table 1).
- As shown in Figure 1, performance on the synonym task improved with age.
- Comparisons across domains based on z-scores showed that the performance on Raven's SPM, Tower of Hanoi and trail making (mixture) have the steepest rates of decline (as shown in Figure 1).

Cognitive Tasks	Cognitive Measures	Performance
Synonym	Verbal intelligence	Improved ($p = 0.009$)*
Shipley	Verbal intelligence	Stable ($p = 0.736$)
Sentence completion	Verbal intelligence	Stable ($p = 0.504$)
Digit span	Phonological short-term memory	Declined ($p = 0.024$)*
HKLLT 1-3	Verbal short-term memory	Declined ($p < 0.001$)*
HKLLT 4	Delayed verbal memory (10 mins)	Declined ($p = 0.001$)*
HKLLT 5	Delayed verbal memory (30 mins)	Declined ($p < 0.001$)*
Stroop	Cognitive control	Declined ($p < 0.001$)*
One-back	Attention and working memory	Declined ($p = 0.030$)*
Operation span	Working memory	Declined ($p < 0.001$)*
Raven's SPM	Fluid intelligence	Declined ($p < 0.001$)*
Tower of Hanoi	Fluid intelligence and executive function	Declined ($p < 0.001$)*
Trail making-numbers	Visual attention and processing speed	Declined ($p < 0.001$)*
Trail making-mixture	Executive function	Declined ($p < 0.001$)*

Table 1. The impact of aging on the performance on cognitive tasks. An asterisk (*) indicates that there is a significant effect of aging on the performance of the cognitive task (HKLLT: Hong Kong List Learning Test; Raven's SPM: Raven's Standard Progressive Matrices).

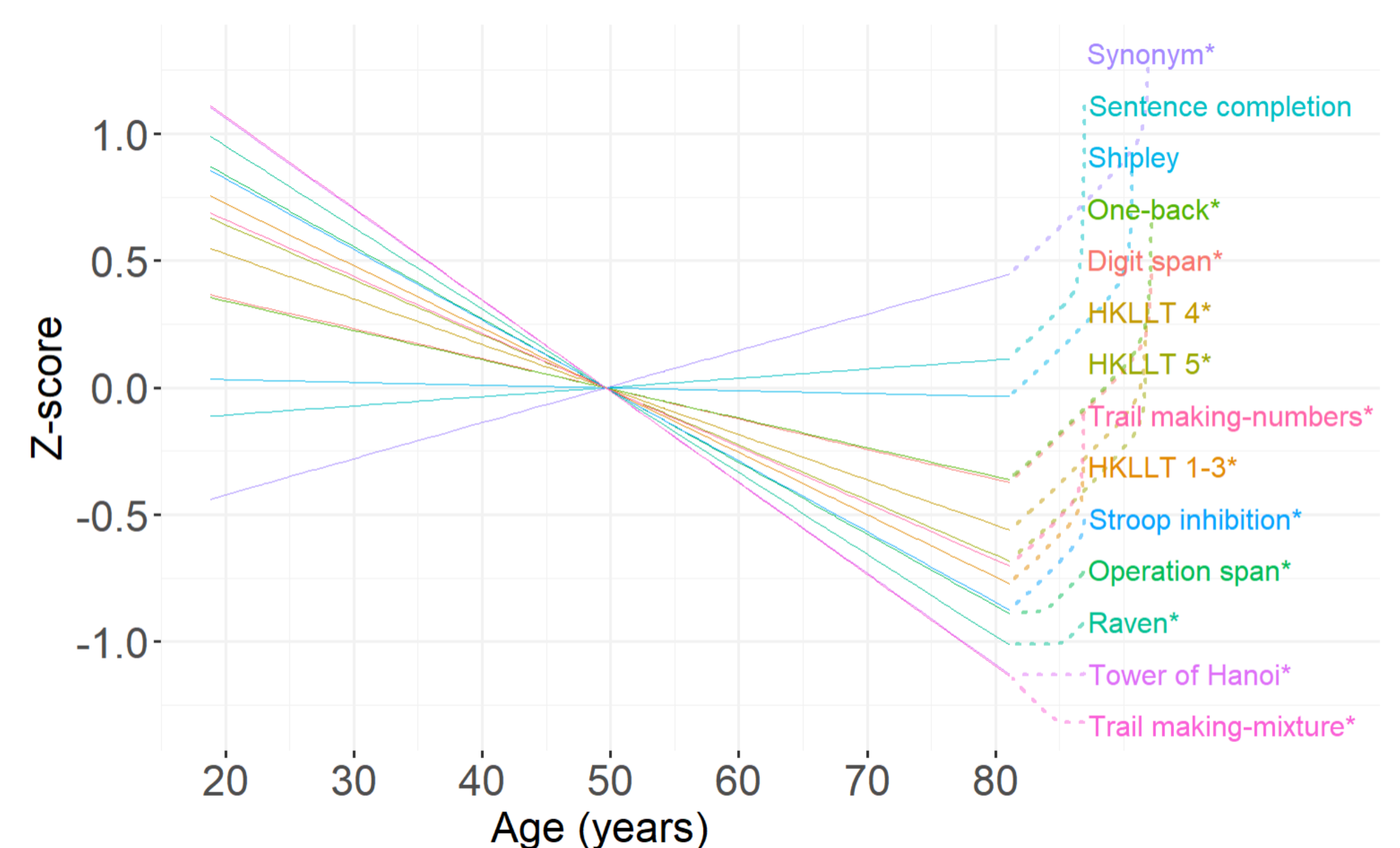


Figure 1. Interaction between age and task on the z-score-transformed cognitive measures. An asterisk (*) indicates that there is a significant effect of aging on the performance of the cognitive task (Raven refers to Raven's SPM).

CONCLUSIONS

The results indicate that cognitive abilities generally decline with age, although verbal intelligence may remain stable or even improve. In addition, executive functions and fluid intelligence tend to decline more severely in normal aging than memory and other cognitive abilities investigated in this study. Future research should explore and compare the effects of aging on additional cognitive abilities, such as long-term memory, to gain a more complete understanding of the nature and extent of age-related cognitive decline.

References

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