

# MULTIDOMAIN COGNITIVE PHENOTYPES DIFFER IN LEVEL, NOT DECLINE

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**KEY FINDING:** Multidomain cognitive phenotypes were clearly separated by cognitive level, but showed largely parallel trajectories over time.

## BACKGROUND

Cognitive aging is highly heterogeneous, even among cognitively healthy adults<sup>1</sup>. Data-driven approaches can identify cognitive phenotypes, but it is unclear whether these groups reflect stable differences in cognitive level or truly different rates of decline<sup>2</sup>. Distinguishing these possibilities is important for interpreting cognitive reserve and longitudinal cognitive risk.

## OBJECTIVE

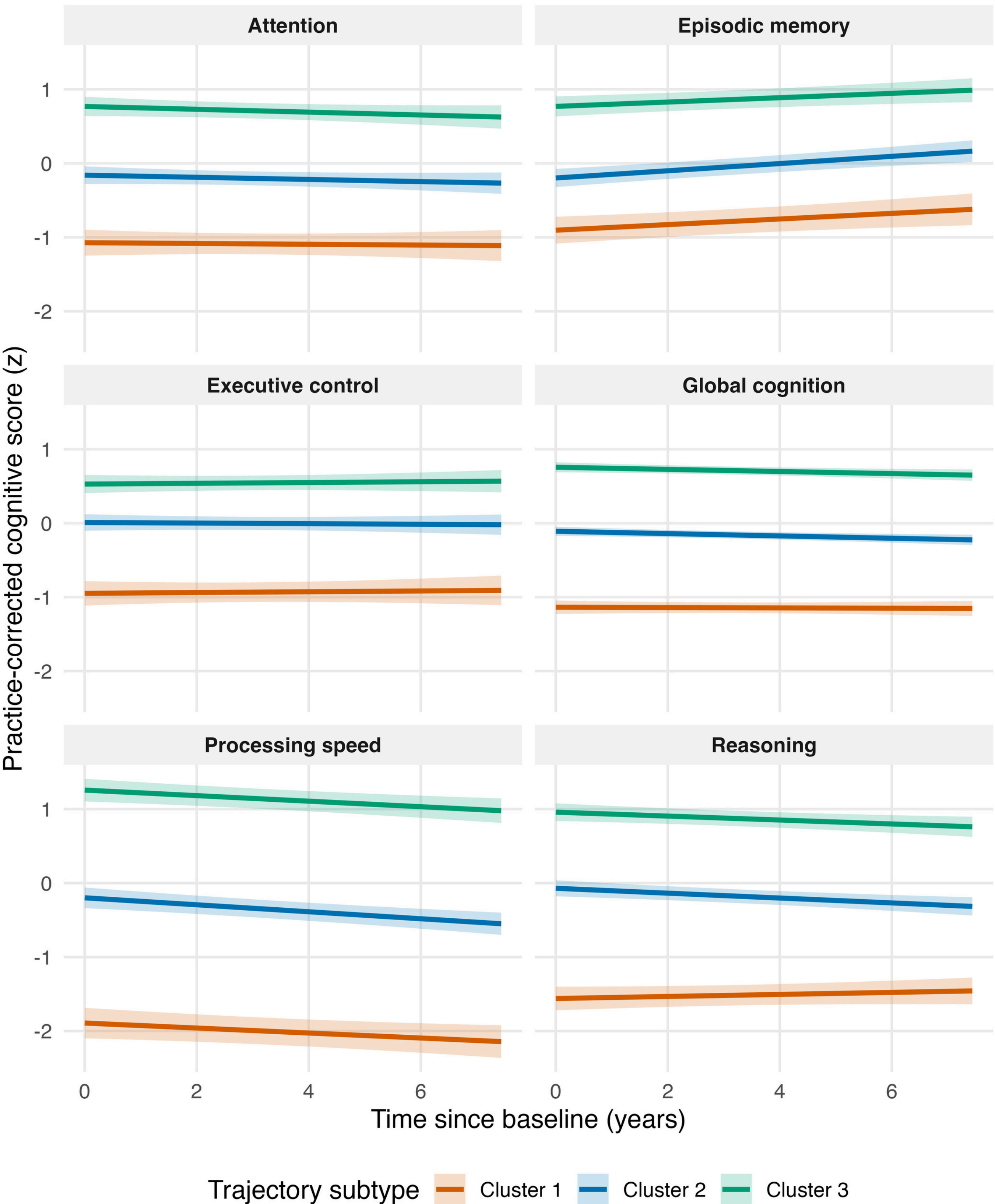
Identify multidomain cognitive trajectory phenotypes in cognitively healthy adults and determine whether they primarily reflect differences in cognitive level or rates of cognitive change.

## METHODOLOGY

- **Sample:** 395 cognitively healthy BBHI adults
- **Assessments:** In-person neuropsychological testing in 2018, 2020, and 2025
- **Cognition:** CFA-derived domain composites scores and global cognition score
- **Phenotypes:** Longitudinal clustering of repeated multidomain cognitive profiles
- **Models:** Linear mixed-effects models adjusted for age, education, and sex

## MULTIDOMAIN TRAJECTORIES BY PHENOTYPE

FIG. 1. GLOBAL AND DOMAIN SPECIFIC COGNITIVE TRAJECTORIES BY PHENOTYPE



## RESULTS

- Three cognitive phenotypes showed low, intermediate, and high cognitive performance.
- Phenotype membership was strongly associated with global cognition and all cognitive domains.
- Global trajectories were largely parallel, indicating level rather than decline differences.
- Domain-specific slope differences were limited; reasoning showed the only significant evidence of non-parallel change.

## CONCLUSION

- Cognitive phenotypes in healthy adults primarily reflect stable level differences.
- Evidence for robust decline-based subtypes was limited over the observed follow-up.
- Findings suggest that reserve-related factors help explain differences in cognitive level more than differences in short-term cognitive decline.

## REFERENCES

<sup>1</sup> Salthouse TA, Tucker-Drob EM. Implications of short-term retest effects for the interpretation of longitudinal change. *Neuropsychology*. 2008 Nov;22(6):800-11. doi: 10.1037/a0013091. PMID: 18999354; PMCID: PMC2593909.

<sup>2</sup> Rodrigues, E. A., Christie, G. J., Cosco, T., Farzan, F., Sixsmith, A., & Moreno, S. (2024). A Subtype Perspective on Cognitive Trajectories in Healthy Aging. *Brain Sciences*, 14(4), 351. <https://doi.org/10.3390/brainsci14040351>

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