Cognitive Task Overview: TestMyBrain Digit Span
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TMB Test Name: TestMyBrain Digit Span
Test Demo: forward version | backward version
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The Many Brains Project

The Many Brains Project, is a 501(c)(3) non-profit that supports TestMyBrain (TMB) in collaboration with the Laboratory for Brain and Cognitive Health Technology at McLean Hospital and Harvard Medical School. We currently support many different types of research studies through our infrastructure for cognitive assessment - these range in size from small lab-based pilot studies to large longitudinal, multisite clinical research studies with tens of thousands of participants. As TestMyBrain has been continuously in operation since 2008, we provide a stable and secure platform for hosting and delivering mobile and web-based cognitive assessment protocols. Through TestMyBrain.org, data have been collected from over 3.7 million participants in a *citizen science* framework that includes structured return of research results toward the development, validation, and normative characterization of cognitive measures. We currently support research and education at over 2,000 sites worldwide engaged in digital neuropsychological assessment.

CITATION
Please credit The Many Brains Project and TestMyBrain in any papers, posters, or publications related to the TMB tests or data collected by TMB tests.
- Example:
  - All tasks were selected from and hosted on The Many Brains Project's web-based cognitive testing platform, TestMyBrain (Germine et al., 2012; The Many Brains Project).
    - Germine, L., Nakayama, K., Duchaine, B. C., Chabris, C. F., Chatterjee, G., & Wilmer, J. B. (2012). Is the Web as good as the lab? Comparable performance from Web and lab in cognitive/perceptual experiments. *Psychonomic Bulletin & Review, 19*(5), 847-857.
    - The Many Brains Project. *TestMyBrain Cognitive Tests*. URL: www.manybrains.net

Test Overview

Background:
TestMyBrain Digit Span (Chaytor et al., 2021; Hartshorne & Germine, 2015; Singh et al., 2021; Treviño et al., 2021) is a digital version of in-person digit span tasks (e.g., Richardson, 2007) adapted for remote administration.

Task Parameters:
After being presented visually with a set of numbers (e.g., 153), participants are asked to recall those numbers either in order (forward version, 153) or reverse order (backward version, 351). Individual numbers within each set are presented on the screen sequentially for 1000 ms each. Initially, number sets contain only two numbers, but increase up to a maximum length of 11 numbers. Participants are presented with two trials at each set length; if at least one of those two number sets is recalled successfully, the set length is increased by one number. Participants complete two unscored practice trials before beginning test trials.

Primary Outcome:
The suggested primary outcome of the test is the length of the longest number set for which participants answered at least one trial correctly (span).

User Input:
Participants using a keyboard use the number keys to make their responses, whereas participants without a keyboard press number buttons on the screen. If the participant's device has touch capability, at the beginning of the test the participant will be given the option to respond using touch input or keyboard input. Otherwise, the participant must use keyboard input.

Alternate Task Versions: Alternate forms of the test are available for repeated administration.

Psychometrics:
- **Reliability**: see Chaytor et al. (2021)
- **Score distribution**:
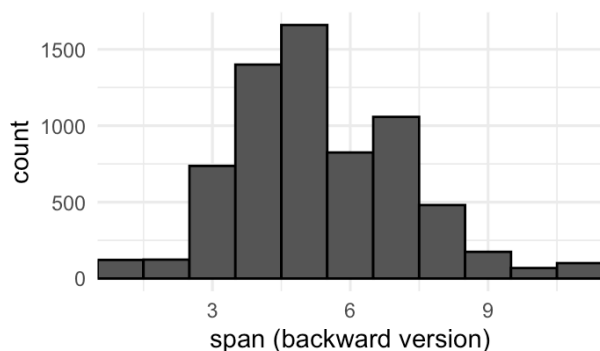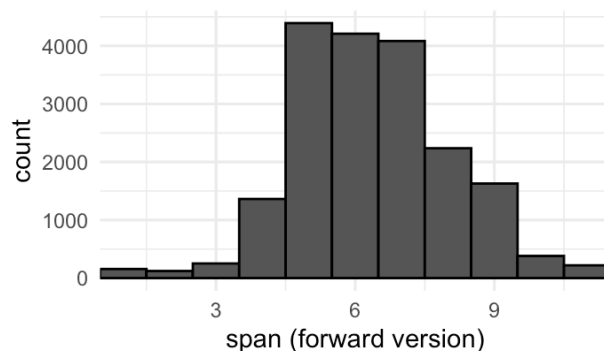
References:

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Hartshorne, J., & Germine, L. (2015) When does cognitive functioning peak? The asynchronous rise and fall of different cognitive abilities across the lifespan. *Psychological Science, 26*(4), 433-443.

Richardson, J. T. (2007). Measures of short-term memory: a historical review. *Cortex 43*(5), 635–650.

Singh, S., Strong, R. W., Jung, L., Li, F. H., Grinspoon, L., Scheuer, L. S., Passell, E. J., Martini, P., Chaytor, N., Soble, J. R., & Germine, L. (2021). The TestMyBrain Digital Neuropsychology Toolkit: Development and Psychometric Characteristics. *Journal of Clinical and Experimental Neuropsychology, 43*(8), 786-795.

Treviño, M., Zhu, X., Lu, Y. Y., Scheuer, L. S., Passell, E., Huang, G. C., ... & Horowitz, T. S. (2021). How do we measure attention? Using factor analysis to establish construct validity of neuropsychological tests. *Cognitive Research: Principles and Implications, 6*(1), 1-26.