Cognitive Task Overview: TestMyBrain Matrix Reasoning

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TMB Test Name: TestMyBrain Matrix Reasoning
Test Demo: standard 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 Matrix Reasoning (Chaytor et al., 2020; D'Ardenne et al., 2020; Richler et al., 2017; Singh et al., 2022) was adapted from the matrix reasoning subtest of the Wechsler Abbreviated Scale of Intelligence–Second Edition (Wechsler, 2011) for remote, unsupervised administration.

Task Parameters:
On each trial, a matrix of images is presented, with one image missing. Participants are required to identify patterns that link the images, and use those patterns to select which of five target images best completes each matrix. Participants complete one practice trial and up to 36 test trials; the test concludes after participants either (a) answer three consecutive test trials incorrectly, or (b) complete all 36 test trials.

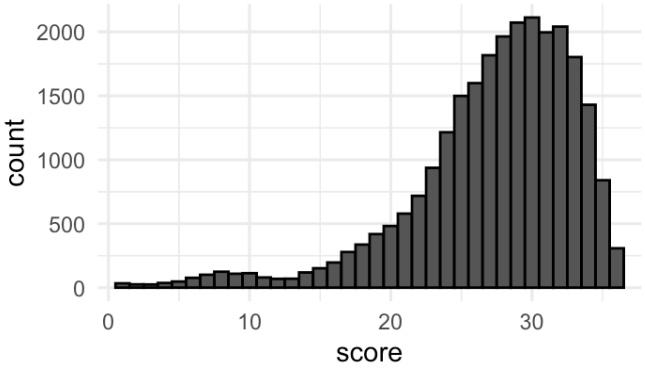
Primary Outcome:
The suggested primary outcome is the number of test trials answered correctly (score).

User Input:
Participants respond either by touching their selections (touch-compatible devices), clicking their selections, or using the 1-5 keyboard keys.

Alternate Task Versions: Three brief forms of the test are available, each containing 11 trials. Additionally, a 10-item "screener" version of the test is available, which contains 5 items intended to capture impaired (bottom 5 percentile) performance, and 5 items intended to differentiate individuals with unimpaired performance.

Psychometrics:

- **Reliability**: In single-session testing, variation in performance (score) between participants has a split-half reliability of .87. Note that this calculation assumes participants would answer all questions incorrectly following implementation of the stopping rule.
- **Score distribution**:



References:

Chaytor, N. S., Barbosa-Leiker, C., Germine, L. T., Fonseca, L. M., McPherson, S. M., & Tuttle, K. R. (2021). Construct validity, ecological validity and acceptance of self-administered online neuropsychological assessment in adults. The Clinical Neuropsychologist, 35(1), 148-164.

D'Ardenne, K., Savage, C. R., Small, D., Vainik, U., & Stoeckel, L. E. (2020). Core neuropsychological measures for obesity and diabetes trials: Initial report. Frontiers in Psychology, 11, 554127.

Richler, J. J., Wilmer, J. B., & Gauthier, I. (2017). General object recognition is specific: Evidence from novel and familiar objects. Cognition, 166, 42-55.

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.

Wechsler, D. (2011). Wechsler Abbreviated Scale of Intelligence–Second Edition (WASI-II). San Antonio, TX: NCS Pearson.