

Note: this document may not describe the most recent version of this cognitive test available from TestMyBrain. TestMyBrain cognitive test documentation will be updated over the next several months to align with current test versions.

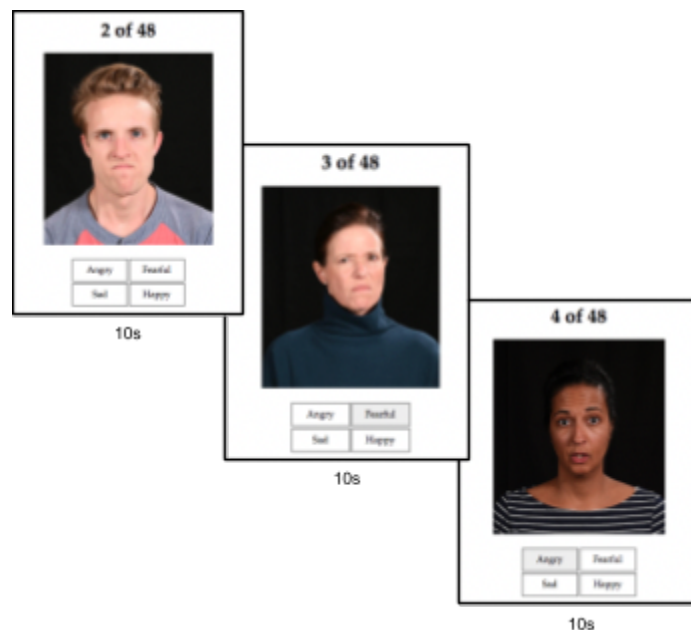
TMB Multiracial Emotion Identification Test

Constructs Measured: Social Communication / Reception of Facial Communication

Duration: 2.6 minutes

Sample size for which normative data are available: 14,332

Description of Procedures: Identify which of four emotions (anger, happiness, fear, and sadness) best describes the emotion in a face.



This test is a standard format basic emotion identification test that was designed using item analysis off a larger item bank to increase difficulty. In this task, the participant is asked to identify which of four basic emotions best describes a series of 47 faces (angry, happy, sad, or fearful). Faces represent a broad range of adult ages and race/ethnicities, with approximately equal proportions of men and women. This is a novel test that is based on a standard format basic emotion identification test, such as the Penn ER40, but without a neutral condition (due to psychometric reasons; see Task Development below). Advantages of the task are that it is short, can be administered quickly and easily on a mobile device, and includes faces across a range of ages and ethnicities as part of the Act Out for Brain Health project at the Company One theater.

Task Development

To develop this task, we recruited actors from across a range of ages and race/ethnicities, from the Boston Company One theater, as part of the Act Out for Brain Health project. Boston

Company One theater has a mission of engaging the city's diverse communities, with an emphasis on diverse actors. Images were taken from video clips of actors portraying different emotions. An initial set of 146 images were selected portraying anger, fear, happiness, sadness, and neutral facial expressions to create an item bank. Images were drawn from this item bank and data was collected from a development sample of $N = 8309$ participants who each saw a subset of 37–53 images. Ultimately the neutral condition was dropped as these faces were judged with significantly ($ps < 0.01$) poorer reliability than anger, fear, sadness, and happiness (average correlation with rest of items for each emotion category: anger: $r = 0.3$; fear: $r = 0.26$; sadness: $r = 0.2$; happiness: $r = 0.25$; neutral: $r = 0.06$). The reliability of judgements of other emotions did not significantly differ from each other ($ps > 0.1$). Overall, performance on valenced items (anger, sadness, fear, happiness) captured substantially more variance in total scores than neutral items ($R^2 49\%$ for anger, fear, happy, neutral and $R^2 0.4\%$ for neutral). The final test includes 48 images that were selected to capture (1) images with consistent judgments of a single emotion, (2) varying levels of difficulty for each emotion, and (3) items with high correlations with overall emotion recognition accuracy to maximize reliability, while preserving the diversity of actors and faces.

Psychometric Characteristics

Here we focus on accuracy (number correct or proportion correct) as the primary outcome measure or score. There are other reaction time-based measures that could be derived from this test (e.g. mean response time), as well as performance on individual emotion categories. These can be examined more specifically if desired.

The TMB Multiracial Face Emotion Identification test has a Cronbach's alpha of 0.75, which compares favorably with other tests of the same form. Sociodemographic effects were estimated based on a sample of 13,174 participants. The distribution of scores is relatively normal, with minor ceiling effects (see Figure 1). Performance is variable across the lifespan, with increases in performance until about age 30 and minimal decreases into older age, consistent with other tests of similar constructs (Hartshorne & Germine, 2015) (see Figure 2). Controlling for age, there is a sex difference in performance, with female participants performing better than male participants (see Figure 3). Participants with higher levels of education had better performance, but the difference was not consistent across education levels (see Figure 4).

Practice effects are likely over a time interval where faces might be remembered from previous testing. Therefore, alternate forms would be recommended in situations where retest is considered.

Validation

Emotion identification tasks are widely used in the neuropsychiatric literature as a way of estimating social cognitive ability or identifying social cognitive or social perceptual impairments. Such impairments are consistently identified, particularly in individuals with severe neuropsychiatric disorders such as schizophrenia, bipolar disorder, and autism spectrum disorders (Philips et al., 2000; Kohler et al., 2004; Harms et al., 2010; Gur & Gur, 2016), as well as in individuals at high risk of such disorders.

For this particular test, overall performance is modestly correlated with performance on the Reading the Mind in the Eyes test ($r = 0.35$, $N = 160$, 95% CIs [0.21, 0.48]) as well as the TMB Vocabulary test ($r = 0.29$, $N = 1141$, 95% CIs [0.24, 0.34]). Performance is also associated with levels of social anhedonia in the population, a risk factor for psychosis ($r = 0.11$, $N = 6717$, 95% CIs [0.09, 0.13]) as well as individual differences in prodromal symptoms ($r = 0.12$, $N = 8213$,

95% CIs [0.1, 0.14]). These effect sizes are comparable to those reported in the literature between psychosis risk and traditional, well-validated emotion identification tests (Germine & Hooker, 2011; Germine et al., 2011).

Appropriateness for Field Test Use

This test is very brief and is considered engaging by participants (based on attrition and ratings combined), with minimal technical or user interface barriers to completion. We would consider it ready for field test use.

Device Effects: The TMB Multiracial Face Emotion Identification test is easy to administer across a range of devices. The data show little to no effect of device type on accuracy (e.g. iPad mean = 40.5, SD = 4.5, N = 807; iPhone mean = 40.6, SD = 4.2, N = 1069; Macintosh desktop / laptop mean = 40.8, SD = 5.1, N = 1990).

Participant Burden: The TMB Multiracial Face Emotion Identification test is given an average rating by participants (3.7 / 5 stars, comparable to ratings sitewide), but is completed at a very high rate relative to other tests (97% vs. 81%). Overall, it is low burden relative to other measures.

Figure 1. Distribution of scores

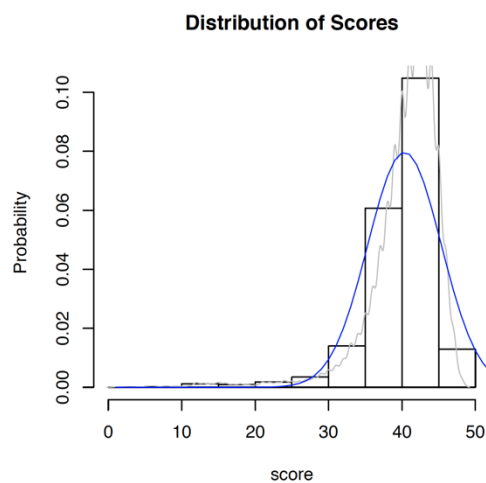


Figure 2. Age-related differences in performance

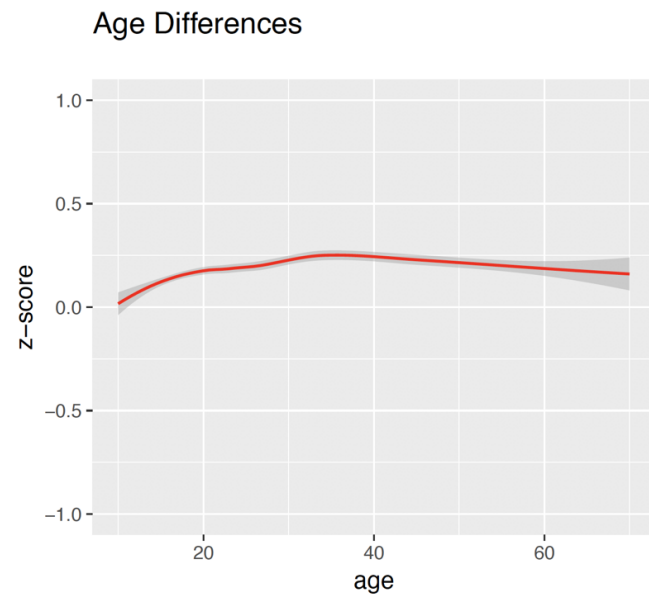


Figure 3. Sex differences in performance

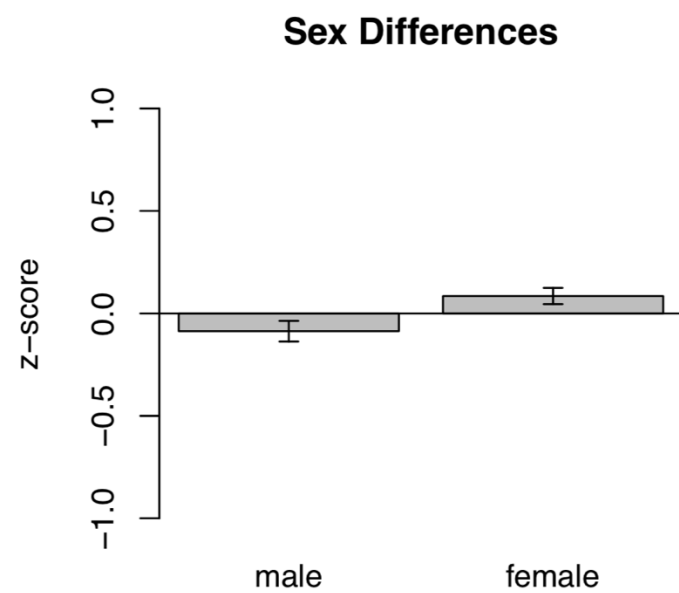


Figure 4. Education-related differences in performance

