

Computer and Smartphone-Administered Versions of the Cogstate Brief Battery are Equivalent on Performance Accuracy but not Performance Speed

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Overview

The use of smartphones to assess cognition holds potential in increasing access to assessment and for use in novel experimental designs such as in ecological momentary assessment. The Cogstate Brief Battery (CBB) is a well-validated computerised test battery, whose simple design and response requirements make it suitable for smartphone administration. The aim of this study was to compare performance speed and accuracy between computer and smartphone CBB in healthy adults. We also explored whether different smartphone operating systems impacted performance.

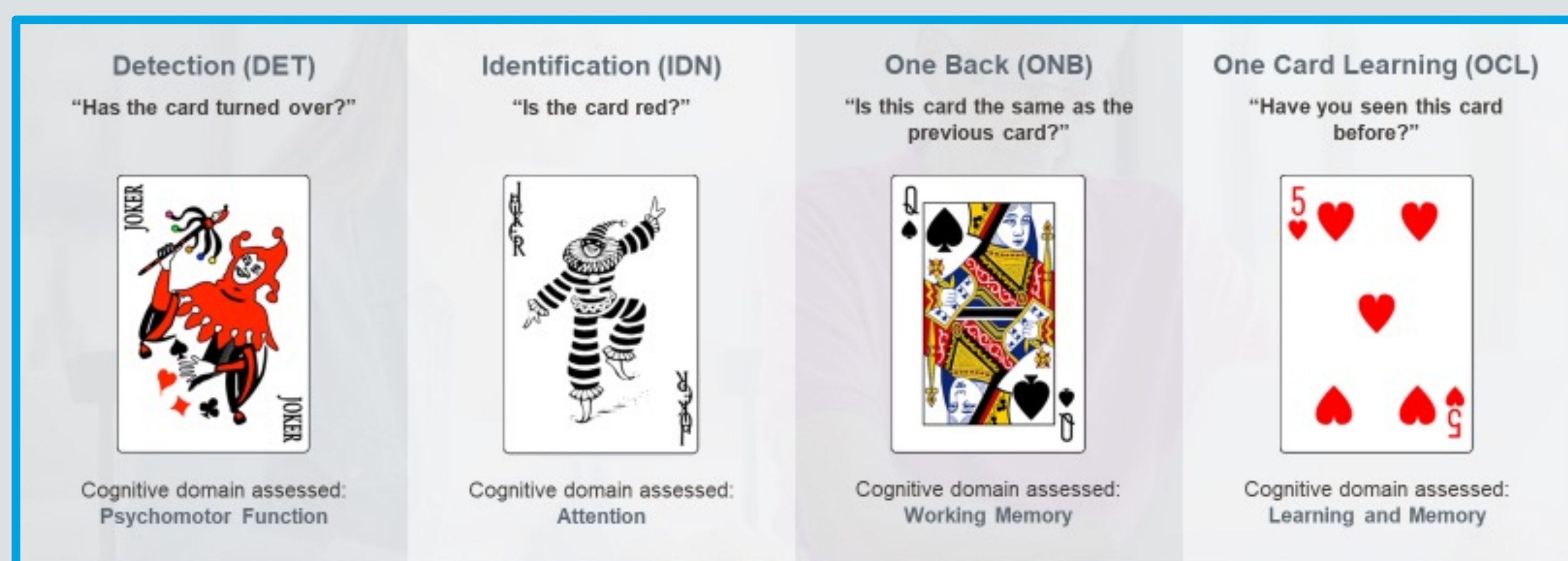
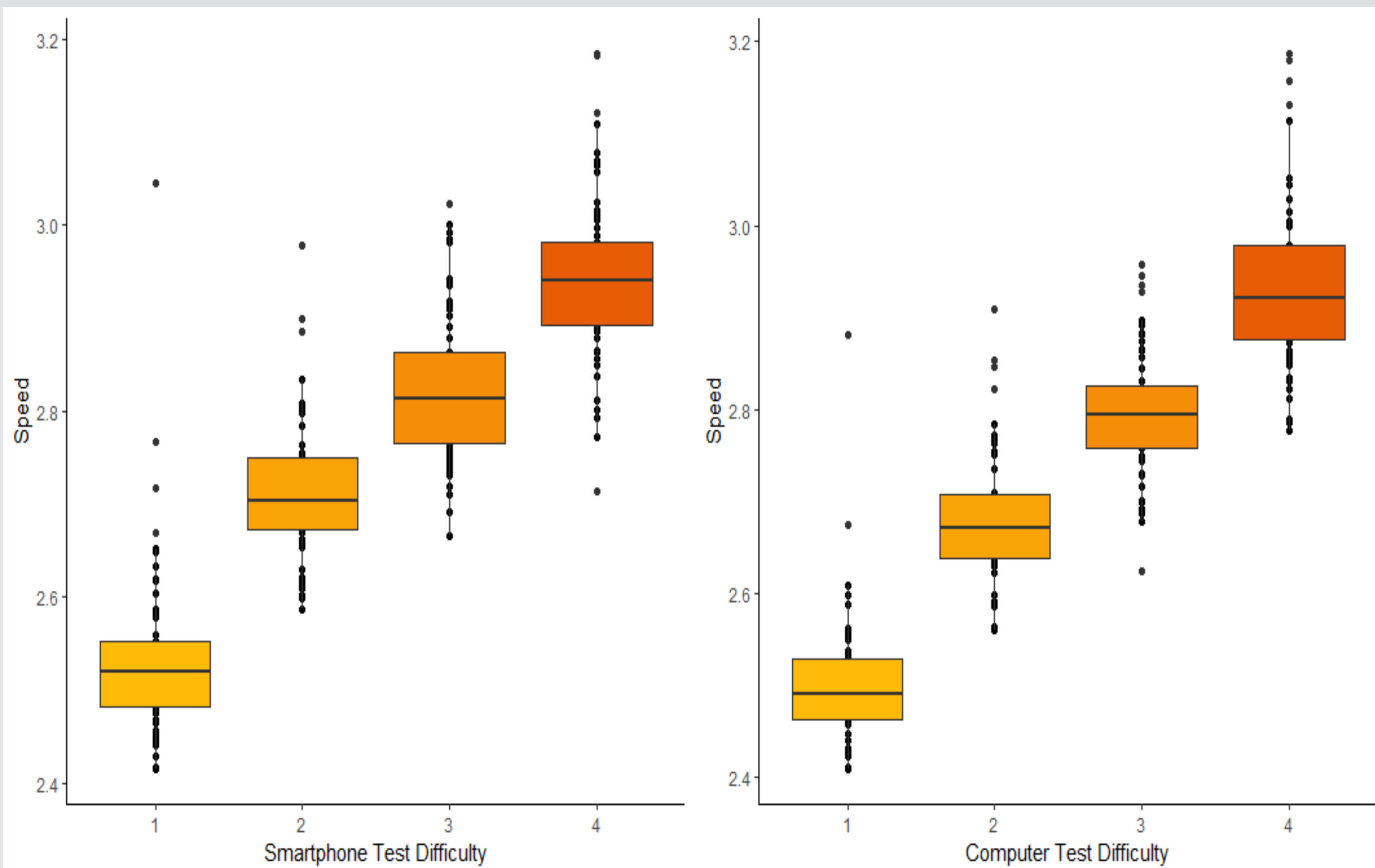


Figure 1: Log10 Mean Reaction Time



Conclusions

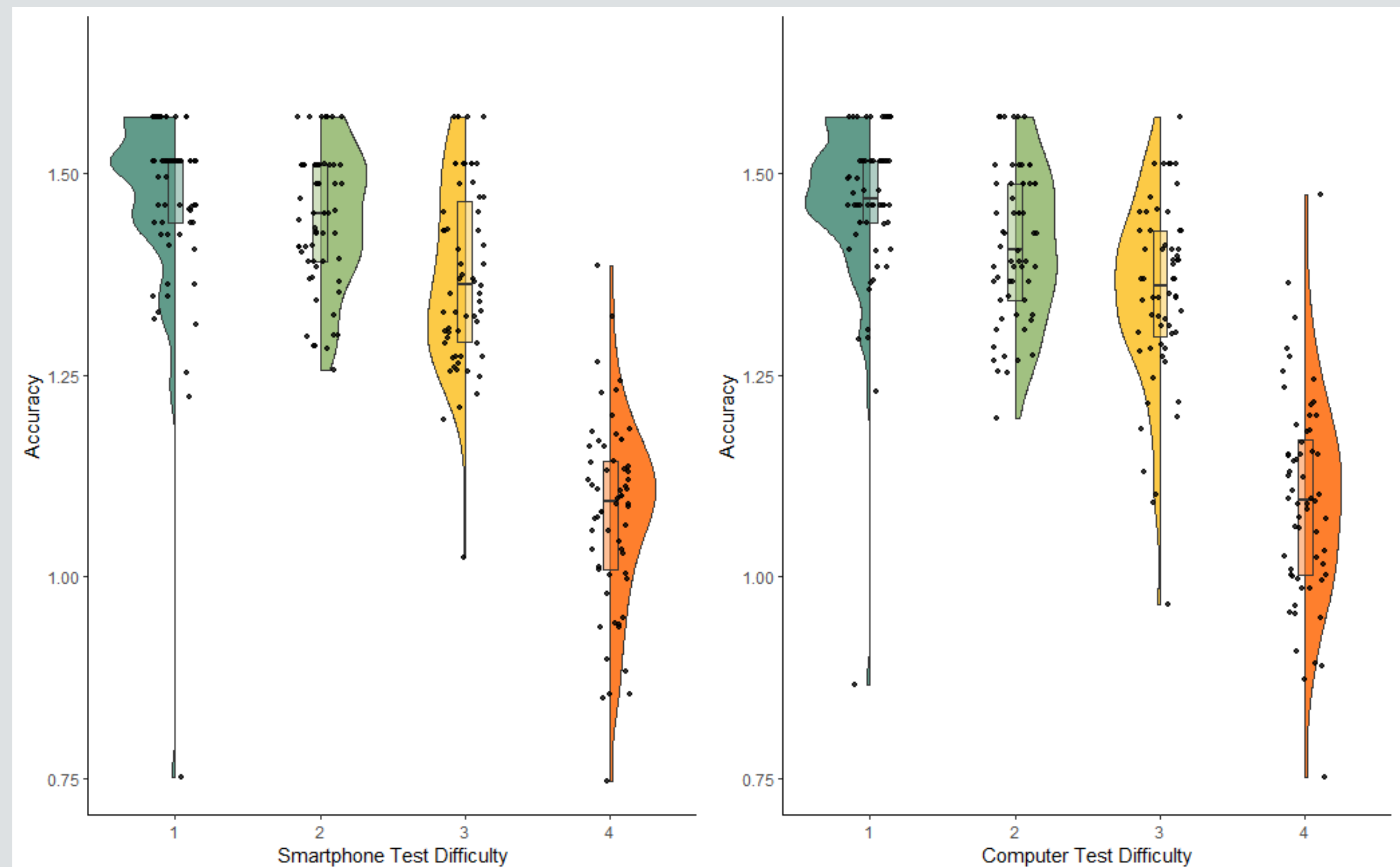
The results indicate that smartphone CBB has high acceptability, good reliability, and that accuracy of performance was equivalent between smartphone and computer versions [Fig 2]. However, the smartphone CBB generally, and the smartphone operating system do influence performance speed [Fig 1]. This study highlights important considerations for the use of smartphone-administered cognitive tests.

Additionally, the smartphone tests showed sensitivity to cognitive worsening with assessment during nighttime waking for DET ($d=1.01$) and IDN ($d=0.84$) [Fig 3].

Methods

A convenience sample of healthy young adults ($n=60$), $M(SD)age = 24.5(6.0)$, completed three assessments of the computer and smartphone CBB in a randomized crossover study. The CBB comprises of tests of psychomotor function (Detection; DET), attention (Identification; IDN), visual learning (One Card Learning; OCL), and working memory (One Back; ONB).

Figure 2: Arcsine Accuracy



Results

No CBB data was lost or incomplete. All tests showed comparable test-retest reliability across smartphone (ICC 0.61-0.88) and computer (ICC 0.62-0.85) administrations. Performance speed on DET, IDN and ONB tests was slower on smartphone than computer (d 's ranging between 0.40-0.53). Performance accuracy was equivalent across smartphone and computer (d 's ranging between 0.08-0.18). Accuracy of CBB performance did not differ between smartphone operating systems, whereas performance speed was generally faster on iPhone compared to Android for OCL ($d=0.67$) and ONB ($d=0.50$).

Figure 3: Log10 Mean Reaction Time: Smartphone Day Vs Night

