Adaptation and Modification of Digital Cognitive Assessments for Smartphone-based and Unsupervised Conduct

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Background

Remote and decentralized methods for clinical trials can reduce patient and trial burden, improve recruitment and retention, and lower barriers to trial participation. Remote assessment may be facilitated through smartphone-based cognitive assessment, especially in Bring-Your-Own-Device (BYOD) trials, and can enable novel designs, for example, high frequency 'burst' assessment. Application of digital assessments in remote or unsupervised settings requires understanding of potential error from delivery platforms (e.g., smartphones vs. computer).

Results

In a sample of young adults in a controlled setting, performance accuracy was similar between smartphone and computer (Cohen's d effects sizes <0.3). Performance was systematically slower (d >0.4) on smartphone than computer.
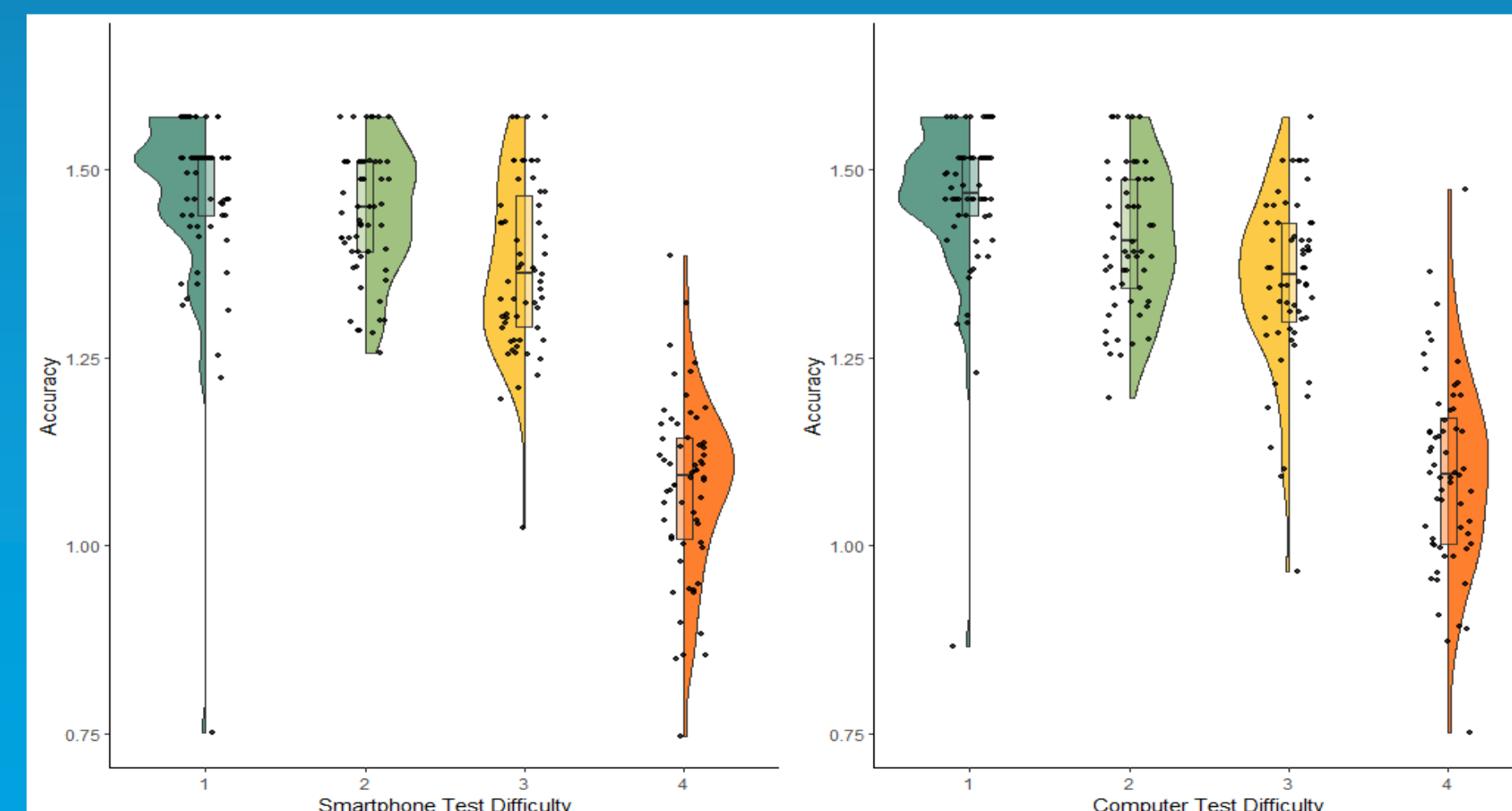
Similar findings were observed in the large BYOD sample (N>35,000) where comparisons between non-touch PC, touch smartphone and touch tablet showed equivalent accuracy (d<0.3) and no clear influences of device brand or browser.

CBB Accuracy Data

BYOD Brand (n≥1045 per brand)
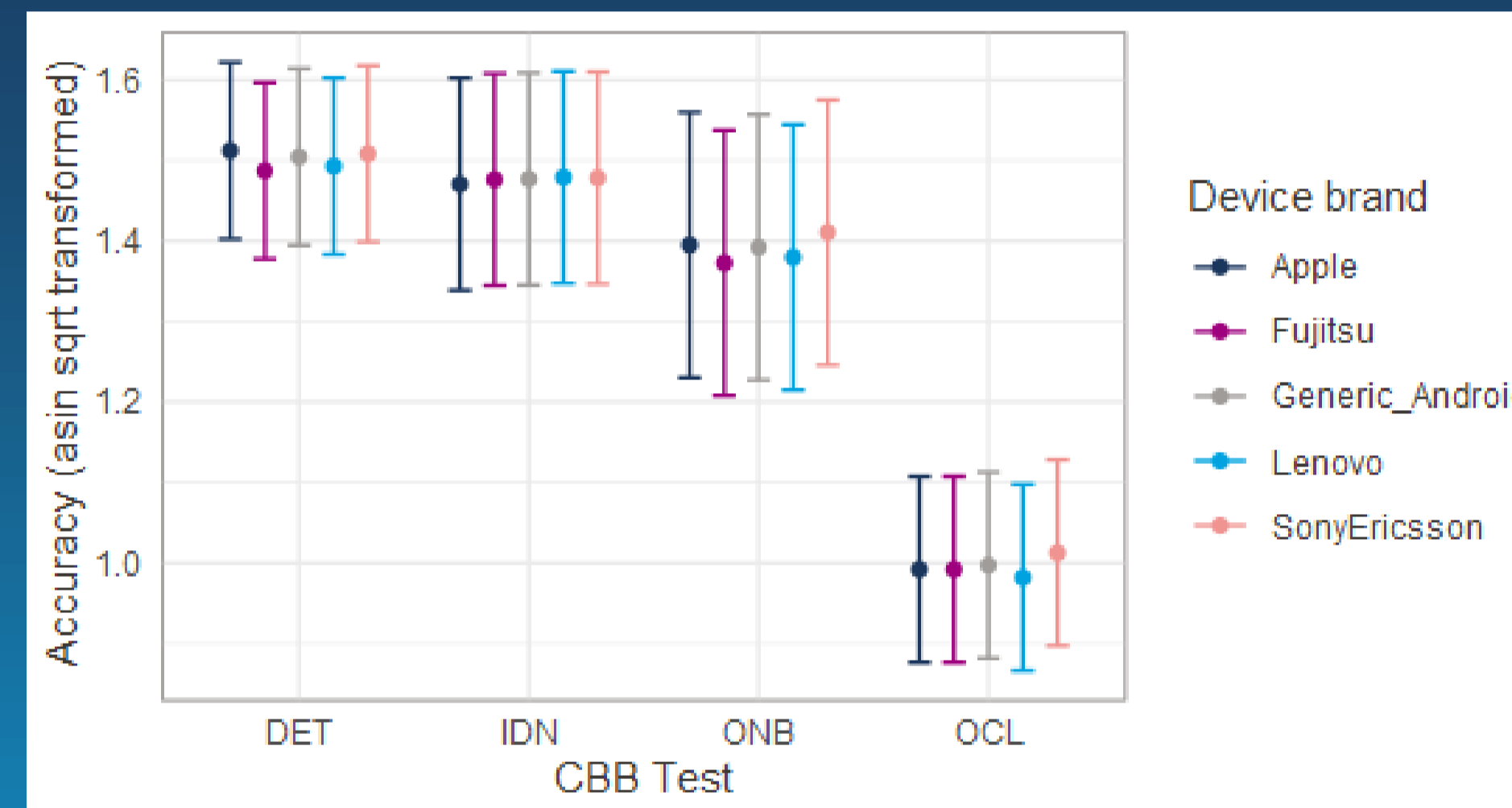
Smartphone Vs Tablet (n=60, cross-over design)

Method

Cogstate Brief Battery (CBB) data were drawn from healthy populations in (1) a crossover study in young adults (n=60) who completed both smartphone and computer administration, and (2) a large (n=35,000) study of adults who completed unsupervised smartphone-based cognitive assessments in a BYOD context.

Detection (DET)	Identification (IDN)	One Back (ONB)	One Card Learning (OCL)
"Has the card turned over?"	"Is the card red?"	"Is this card the same as the previous card?"	"Have you seen this card before?"
Cognitive domain assessed: Psychomotor Function	Cognitive domain assessed: Attention	Cognitive domain assessed: Working Memory	Cognitive domain assessed: Learning and Memory

Conclusions

Smartphone assessment has high acceptability, good reliability, and factors such as device type, input, and brand appear to have a minimal influence on accuracy of performance.

Bring-Your-Own-Device (BYOD) trials are feasible when considering accuracy outcomes from the Cogstate Brief Battery