

Introduction

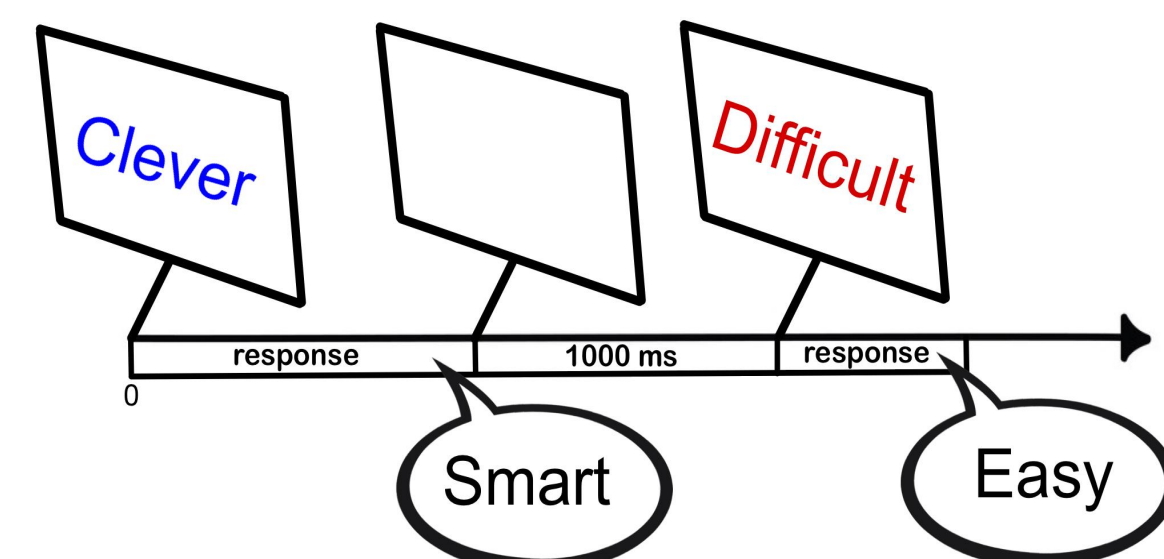
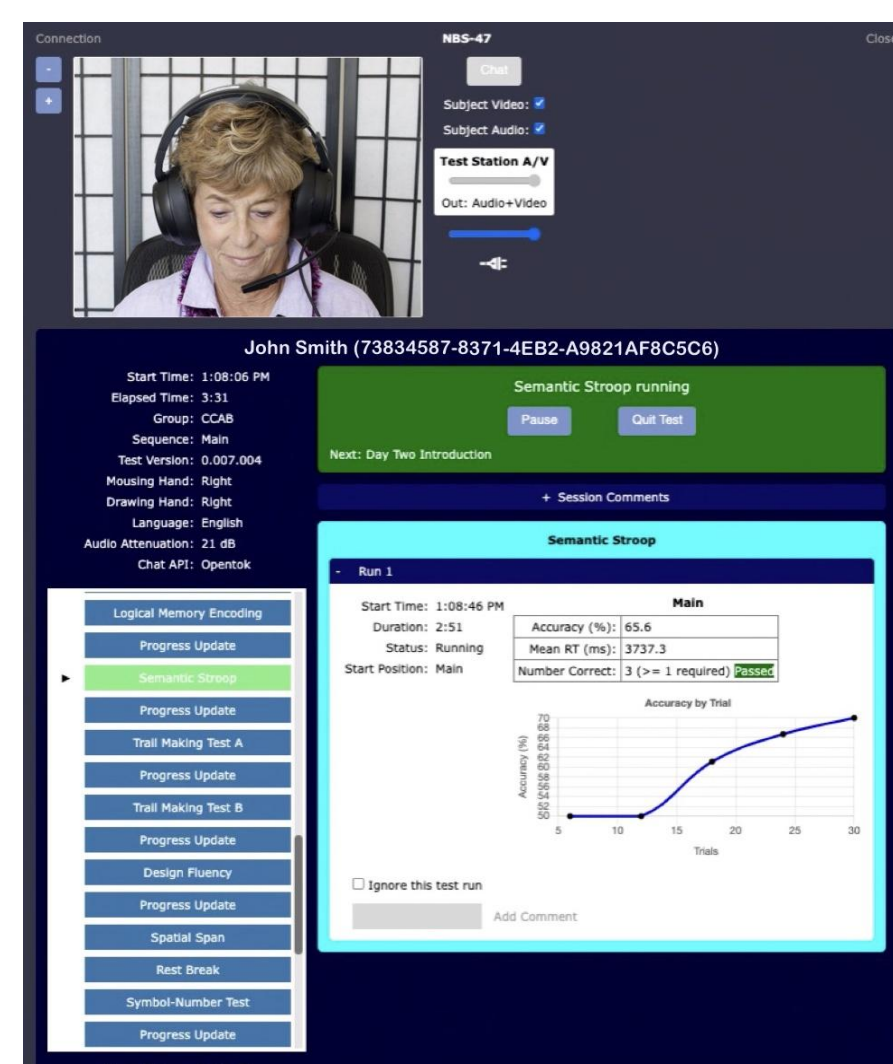
Semantic memory assessments are sensitive indicators of cognitive decline in preclinical Alzheimer's Disease (AD), correlating response latencies with amyloid and tau accumulation [1]. We introduce the Semantic Stroop Test — a brief (4.3 minute), automated semantic retrieval and executive function task included in the California Cognitive Assessment Battery (CCAB). We present data from the performance of healthy adults, with a concentration on gender, age, education, vocabulary and the excellent psychometric properties of the Semantic Stroop Test.

Methods

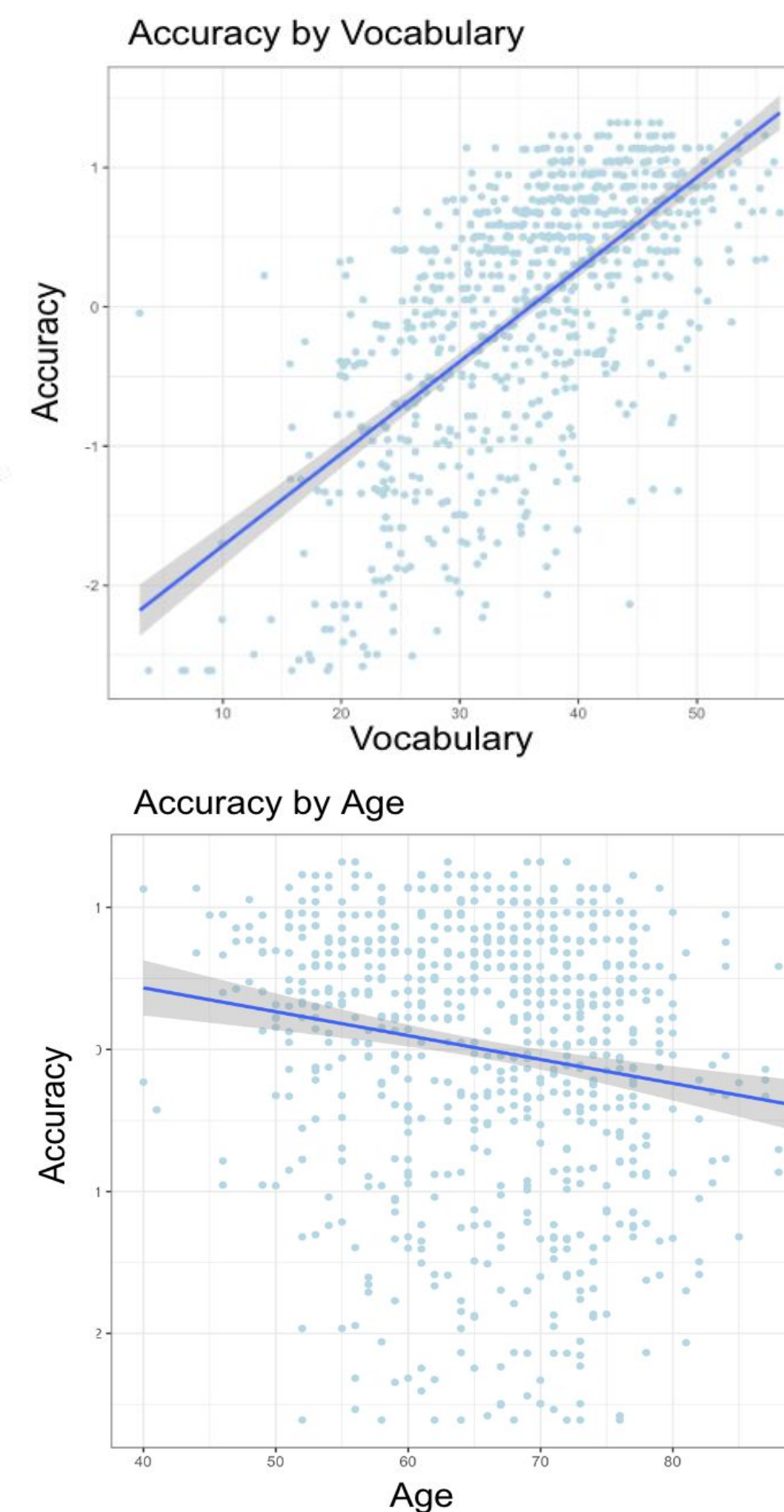
Participants: The Semantic Stroop Test was administered to 572 healthy adults. ~ 50% of participants were female, with a mean age of 65.6 years, ±10.6

Technology: Participants were tested using a tablet computer with circumaural headphones and head-mounted microphone. Instructions and stimuli were delivered using text-to-speech (TTS) with intensities adjusted to the participant's auditory threshold. Responses were automatically scored using consensus automatic speech recognition (CASR) with performance scores displayed in real time. An examiner remotely monitored participant performance over audio and visual feeds.

Task: Participants were instructed to produce an antonym in response to words in red font and a synonym in response to words in blue font. Sixteen words were presented in random order. Then the same 16 words were presented again in opposite colors. Verbal reaction time (RT) and response accuracy were quantified for each word.

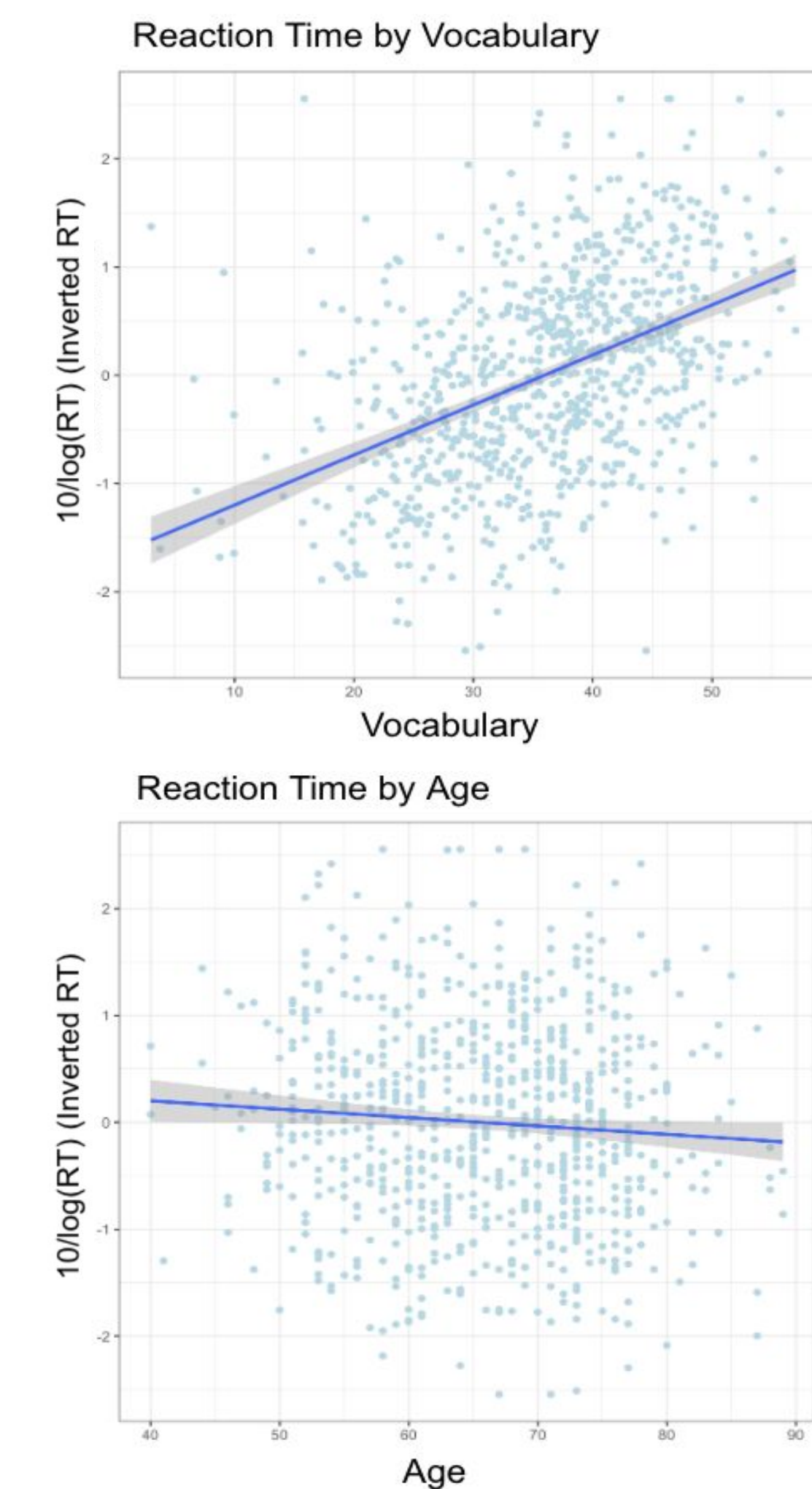


ACCURACY



Results

REACTION TIME



Summary

Excellent test-retest reliability:

- **Accuracy:** $r = 0.79$
- **Reaction Time (RT):** $r = 0.80$
- **Switch Failure Detection:** $r = 0.55$

Multiple regression analysis:

- **Accuracy:** significant effects of Age and Vocabulary ($p < 0.0001$), 41% variance explained
- **RT:** significant effects of Age and Vocabulary ($p < 0.0001$), Education ($p < 0.05$), 30.1% variance explained

Vocabulary, as a proxy for verbal pre-morbid IQ, is significantly correlated with performance

Similar accuracy and RT across genders

Synonyms exhibit greater age-related difficulty and correlation than antonyms, with 88% accuracy for antonym cues versus 79% for synonym cues

Discussion

The Semantic Stroop Test reliably captures age-related cognitive effects through accuracy and speed measures of semantic retrieval while remaining sensitive to executive function processes such as cue-based switching.

Vocabulary level and age are strong predictors of Semantic Stroop accuracy and RT performance among healthy adults. Robust activation effects surfaced during the 2nd half, and both cue switching and synonym production negatively impacted accuracy and response times, suggesting cognitive load effects on performance.

The high test-retest reliability of the Semantic Stroop Test demonstrates that automated semantic memory tests can be reliable and accurate, even when remarkably brief. Monitoring via an integrated telemedical interface assures the quality of remote assessments and enables large-scale testing.

References

[1] Kim et al. (2019 DOI: <https://doi.org/10.3988/jcn.2019.15.1.27>)

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