

## Introduction

US Latinos are 1.5x more likely than non-Latino whites to develop Alzheimer's disease and related dementias (ADRD), and prevalence is projected to increase sevenfold by 2060.

Accurate cognitive assessment in Spanish-speaking populations is critical for reducing disparities in ADRD detection and monitoring. The California Cognitive Assessment Battery (CCAB) is an automated, tablet-based battery with a Spanish-language protocol (CCAB-Espanol) designed to remotely assess cognitive decline in Spanish speakers.

However, whether performance differences between Spanish- and English-language administrations reflect genuine cognitive impairment or testing-context effects remains unclear.

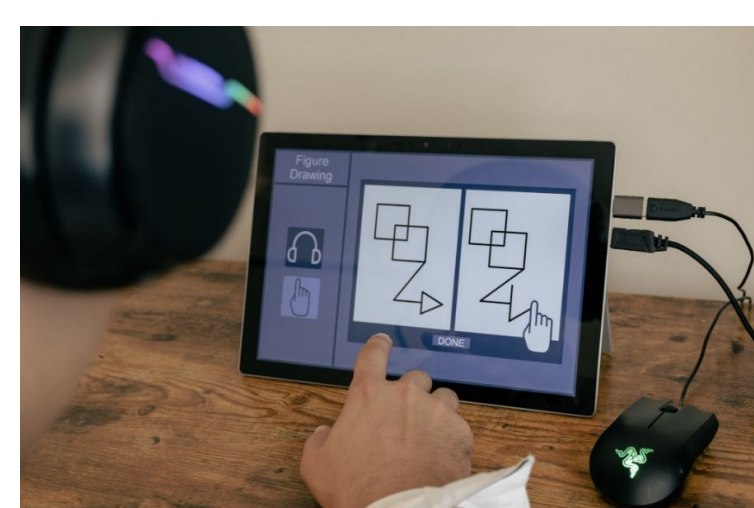
## Methods

**Participants:** The California Cognitive Assessment Battery (CCAB) was administered to 168 healthy adult native Spanish speakers during ongoing normative data collection. Participants completed a range of cognitive tasks, including verbal response tasks. 1:1 nearest-neighbor matching from an English speaking Latino cohort on age, education, gender, and vocabulary yielded 169 matched pairs (Spanish: M age=47.1, SD=13.8, 59.8% female; English: M age=46.8, SD=13.6, 59.8% female; all  $p > .41$ ).

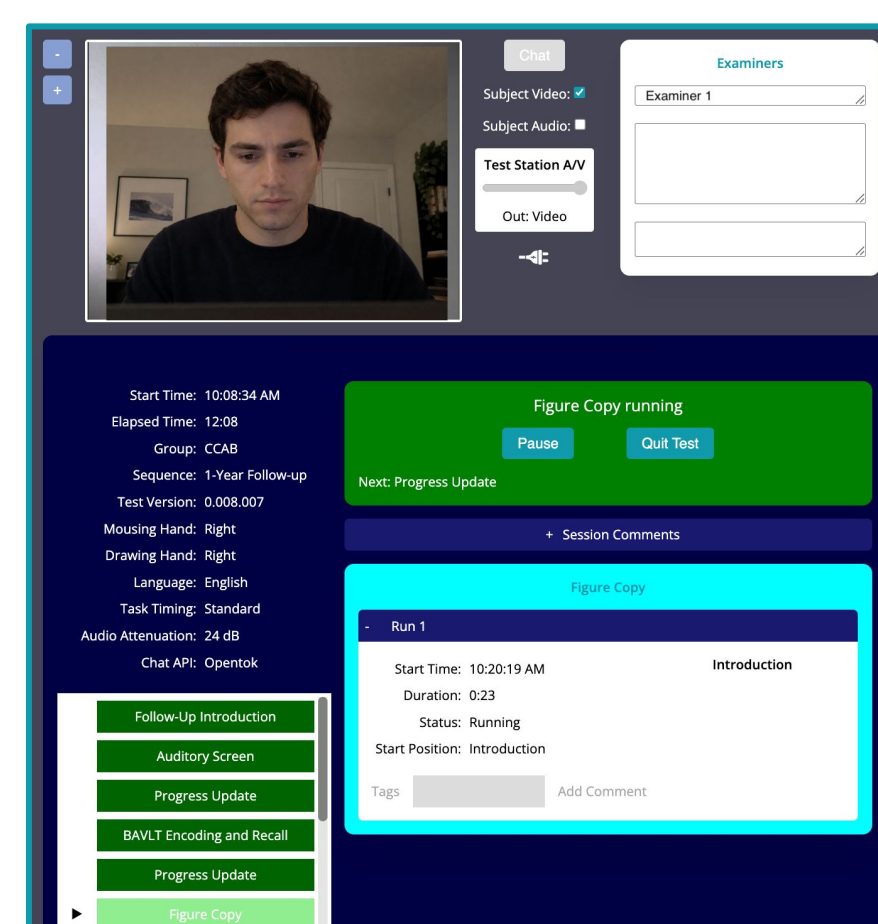
**Technology:** Participants were tested using a tablet computer with circumaural headphones and a head-mounted microphone. Instructions and stimuli were delivered using text-to-speech (TTS) with intensities adjusted to the participant's auditory threshold. Non-verbal responses were recorded via the tablet's touchscreen at a variable sample rate from 30 to 60 hz. Select tests were performed with a calibrated usb mouse. An examiner remotely monitored participant performance over audio and visual feeds.

**Tasks:** Participants performed seven nonverbal tasks spanning executive function, processing speed, visuospatial ability, and working memory, in addition to other verbal tasks and non-verbal tasks. Digitized CCAB versions of the following tasks were administered: Trails A/B, Design Fluency, Spatial Span, Hidden Patterns, Identical Pictures, and Figure Drawing.

Participants complete CCAB tests on a tablet computer. An examiner remotely monitors the test via a web-based platform with A/V and video chat functionality. Tests are administered, run, and scored automatically.

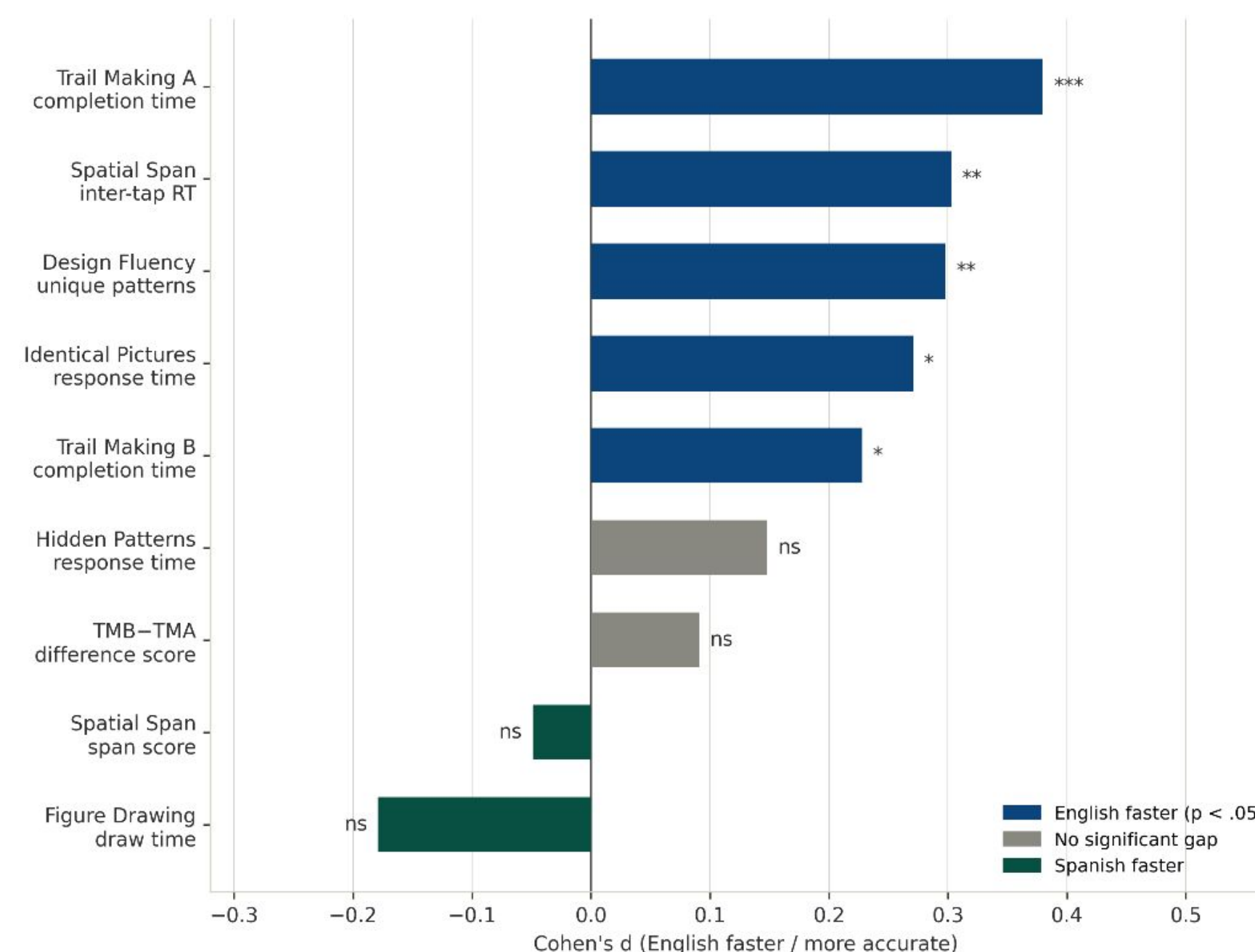


participant view



examiner view

## Results



Task	Measure	Spanish M	English M	Cohen's d	p
<i>Speed-dominant</i>					
Trail Making A	Completion time	33,993	28,955	0.38	**
Spatial Span	Inter-tap RT	1,053	944.0	0.30	**
Design Fluency	Unique patterns	9.40	10.2	0.30	**
Identical Pictures	Response time	2,830	2,610	0.27	*
<i>Accuracy / demand-constrained</i>					
Trail Making B	Completion time	73,503	66,003	0.23	*
TMB-TMA	Difference score	40,050	37,453	0.09	ns
Hidden Patterns	Response time	2,582	2,461	0.15	ns
Spatial Span	Span score	6.20	6.10	-0.05	ns
Figure Drawing	Draw time	16,347	15,163	-0.18	ns

N = 169 matched pairs (age, education, gender, vocabulary; all  $p > .41$ ). \*\*  $p < .01$ , \*  $p < .05$ , ns = not significant.

## Summary

Language-of-administration effects on CCAB performance concentrate on speeded measures, not cognitive accuracy or control tasks. Spanish speakers showed increased response and completion times.

Response time gaps were consistent across executive function, processing speed, working memory, and visuospatial domains, whereas accuracy remained equivalent.

Figure Drawing, a task with no speeded response requirement, showed no English advantage, arguing against a generalized motor or tablet-familiarity disadvantage.

Results support the development of speed-adjusted CCAB-Español norms and caution against interpreting slower Spanish-language response times as evidence of elevated cognitive risk.

## Discussion

Speed gaps were largest on the simplest tasks and diminished as cognitive demand increased, suggesting a testing-context effect rather than domain-specific impairment

When cognitive demand is high enough to be the binding constraint, the speed difference becomes irrelevant because everyone is slowed by the task itself.

While unclear from this particular data, stereotype threat, acculturation, or limited prior exposure to computerized testing may prompt Spanish speakers to approach tests with caution, slowing response times under the pressure of speeded tasks but not affecting accuracy.

These findings have imperative implications for equitable dementia screening in Latino populations, and support the implementation of language-and-population specific normative standards.

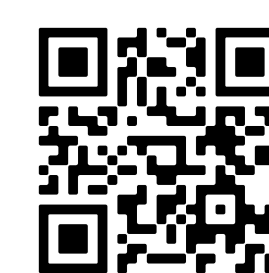
The cause(s) of the observed performance differences cannot be fully disentangled with current data; future studies should more directly measure acculturation and testing familiarity.

## References

- [1] Woods et al. (2024). The California cognitive assessment battery (CCAB). *Frontiers in Human Neuroscience*
- [2] Alzheimer's Association (2023). *Alzheimer's Disease Facts and Figures*.
- [3] Manly & Espino (2004). Cultural influences on dementia recognition and management. *Clinics in geriatric medicine* 20.1 (2004): 93-119

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Supported by NIA R44AG062076  
NIA R44AG080951

