

Background. The California Cognitive Assessment Battery (CCAB) is a remotely-monitored automated assessment that captures speech measures from verbal tasks that may inform models of cognitive health. However, speech-based timing metrics are subject to language-specific influences that can distort results and mischaracterize impairment. Recent data from Spanish-speaking participants indicate that longer words inflate completion times independent of cognitive ability. Phonological length effects are well-documented in the working memory literature yet rarely accounted for in cross-language assessment. Per-utterance timing in CCAB enables testing of whether phonological word length drives observed language-group performance gaps.

Methods. Spanish-language CCAB data ($n = 168$) were compared to English-language data across four verbal tasks: Digit Span Forward/Reverse (DSF, DSR), Symbol-Number (SN), and Continuous Picture Naming (CPN). Syllable counts were derived from digit names (Spanish $M = 1.80$, English $M = 1.20$) and a matched CPN stimulus set (Spanish $M = 2.55$, English $M = 1.47$ syllables per item). Matched samples ($N = 164$ per group, balanced on age, education, gender, and vocabulary) isolated phonological effects from demographic confounds. Raw time-per-utterance (TPU) was compared to syllable-normalized TPU to quantify the phonological contribution to observed gaps.

Results. All four tasks showed raw TPU gaps favoring English participants (DSF: $d = 0.73$; DSR: $d = 0.37$; CPN: $d = 0.47$; SN: $d = 0.18$). However, observed Spanish/English TPU ratios were consistently well below those predicted by syllable counts alone. After normalization, Spanish participants demonstrated faster or equivalent processing speed per syllable. Digit span scores showed residual speed gaps after normalization (DSF: $d = 0.74$; DSR: $d = 0.31$), consistent with a phonological rehearsal-speed effect on working memory capacity rather than a measurement artifact.

Conclusions. Raw completion times on cognitive tasks with verbal responses systematically overestimate gaps between Spanish- and English-language administrations due to phonological word-length differences. Syllable normalization eliminates the apparent disadvantage for Spanish speakers on naming and symbol-number tasks, while span timing scores reflect a theoretically expected rehearsal-speed effect. These findings argue for syllable-adjusted norms on verbal timing measures in multilingual assessment and caution against interpreting raw completion time differences as evidence of cognitive impairment in Spanish-speaking patients.

completion time tasks — raw vs. syllable-normalized

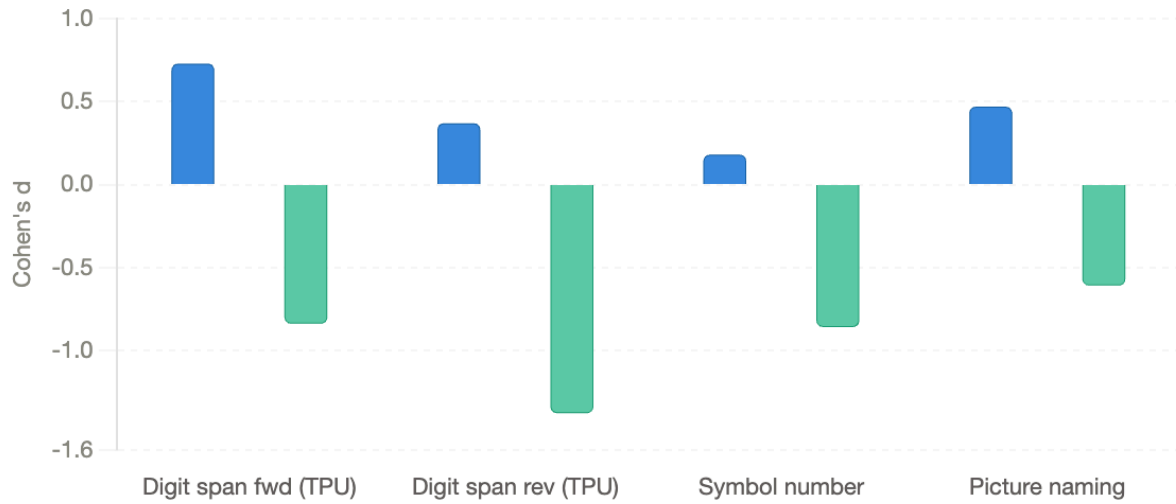


Figure 1. Raw d (blue bars) reflects completion time gaps before accounting for phonological word length (positive = English faster). After syllable normalization (green bars), the effect reverses for all four tasks: normalized d values are negative, indicating Spanish speakers are faster per syllable than English speakers (DSF: $d = -0.84$; DSR: $d = -1.38$; SN: $d = -0.86$; CPN: $d = -0.61$). Groups matched 1:1 on age, education, gender, and vocabulary (all balance checks $p > .44$). Per-utterance timing derived via Consensus Automated Speech Recognition (CASR).