

Background: Language is assessed in few computerized batteries for the evaluation of early dementia. Batteries that include a language test fail to assess spontaneous speech production and comprehension. Yet, deficits in these functions can be the earliest presenting symptoms in Frontotemporal dementia (FTD) and Alzheimer Disease (AD). We designed Sentence Production (SP) as a subtest for our new computerized battery, Cognitive Testing on Computer (C-TOC), with the aim of simulating as closely as possible on computer the production of speech. In this study we tested SP's sensitivity to speech and language difficulties characteristic of aphasia syndromes.

Methods: C-TOC was designed to combine a highly usable test platform with valid test paradigms in the detection of dementia prodromes. C-TOC records clicking-and-moving mouse responses, and therefore allows for the assessment of productive behaviours. The SP subtest requires the description of pictures by selecting words from an array that includes phonemic and semantic lures, and by ordering the selected words into sentences on the screen. For two items, the production of non-canonical sentence structures is forced. SP is scored for semantic units, phrases, word count, time per word, and syntax. The entire C-TOC battery including SP, and neuropsychological tests (NPT) of language were given to subjects with aphasia and cognitively normal controls. **Results:** Participants included 9 subjects with aphasia, M age=66, SD=11.1; 4 females/5 males, and a mix of etiologies: 5 FTD (1 behavioural-variant, 4 semantic dementia), 1 AD and 3 stroke, and 12 cognitively normal controls, M age=67.5, SD=6.6, 6 females/6 males. As a group, subjects with aphasia performed poorly on all SP measures, on the NPT language tests and on other verbal C-TOC subtests. Their performance was near normal on non-verbal C-TOC subtests. Performance differences were larger and overlap with controls smaller, on SP and NPT than on all other measures. SP performance patterns were qualitatively different for aphasia related to semantic dementia and stroke. **Conclusions:** The computerized sentence production paradigm that is part of the C-TOC battery is sensitive to a number of aphasia deficits. The paradigm may have utility in screening for different dementia prodromes.

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COGNITIVE TESTING ON COMPUTER (C-TOC): DESIGN, USABILITY EVALUATION AND VALIDATION OF A NOVEL COMPUTERIZED TESTING TOOL

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Background: Computer-based cognitive testing offers an important alternative to current approaches in facing the growing demand for evaluation of cognitive concerns. We report on the design and initial validation studies of C-TOC, a test battery created at the interface of cognitive and computer science, neuropsychology, and neurology. C-TOC was developed to satisfy three a priori criteria: high validity for the detection of cognitive impairment, a usable human-computer interface and culturally fair test contents. **Methods:** We designed the C-TOC prototype to have comprehensive domain coverage. Test paradigms were developed to engage both receptive and productive skills. The latter include sentence production, free recall, and visuo-construction and are often not assessed on computer. C-TOC was designed iteratively in 3 cycles of consultation with representatives of end users and of a cultural advisory panel. Convergent validity was investigated by computing correlation coefficients between C-TOC subtests and comparable neuropsychological tests (NPT). Concurrent validity was examined by using ANOVA and Student Newman Keuls (SNK) post hoc to compare test scores of clinic patients with No Cognitive Impairment (NCI), Mild Cognitive Impairment (MCI) and Alzheimer Disease (AD). **Results:** Usability evaluations with 27 participants aged 55 to 87, with a mix of diagnoses (7 normal controls, 6 NCI, 8 MCI, 6 mild dementia) and computer knowledge (1 none, 8 low, 14 moderate, 4 high) revealed problems with instructions, practice trials, screen layout, consistency and intuitiveness of navigation buttons. Cultural advisors identified test format, use of language, and lack of computer skills as chal-

lenges. Based on this input, we refined test content and interface from C-TOC.v1 to C-TOC.v4. Validation was undertaken with 26 participants (5 NCI, 15 MCI, 6 AD). Correlations with NPT ranged from $r=0.4$ to 0.8 . C-TOC test scores discriminated the diagnostic groups on visual memory, language, visuo-spatial and executive function tests (NCI>MCI>AD, ANOVA $p<.05$, SNK 2 subsets). **Conclusions:** C-TOC has been carefully designed to have a highly usable interface for seniors and those with cognitive impairment. The battery's test paradigms are sensitive to mild levels of cognitive impairment. Future research will determine the battery's utility in a variety of settings including clinic offices and the home environment.

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A REVIEW OF TRANSLATED COGNITIVE ASSESSMENT TOOLS TO ASSESS CULTURALLY AND LINGUISTICALLY DIVERSE (CALD) OLDER PEOPLE

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Background: Many cognitive assessment scales were developed in Western countries and are influenced by the language and culture in which they were designed. When used to assess those of Culturally and Linguistically Diverse groups (CALD) this can lead to a misdiagnosis. It is not sufficient to simply translate a tool; tools must be culturally relevant and equivalent. Our study aimed to identify translated cognitive assessment scales suitable for use with older people from CALD backgrounds. **Methods:** A literature review was conducted to identify translated and cross cultural scale that were reviewed against a criteria that included transcultural and psychometric properties, such as validity and reliability, accessibility of the translated version and others. The review was limited to twenty scales and the top 10 languages relevant to major CALD communities in Australia, Canada, the UK and US. Studies conducted in Western countries using multi-cultural samples were also included. **Results:** Of the 167 articles identified, 142 were relevant to the review. Most articles related to the Chinese and Spanish languages; the mini-mental state examination was the scale most often investigated and 38 articles were of studies conducted in (or included) a Western Country. There were no articles related to two scales or the Polish or Ukraine language and few language/tool combinations had information in all six criteria domains (e.g., reliability, validity). **Conclusions:** There is a clear gap in research evidence on this topic. Research is needed, particularly in Western countries, to guide the assessment of CALD older people. This may include the description of normative data (based on age, education and ethnicity) and validation of translated scales in different CALD populations in order to help clinicians more accurately interpret test performance results. This information is required to ensure the inclusion of non-English speaking older people in clinical research trials.

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LATENT VARIABLES OFFER AN UNBIASED APPROACH TO DEMENTIA CASE-FINDING

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Background: Structural equation models (SEM) can explicitly distinguish dementia-relevant variance in cognitive task performance (i.e., "d" for dementia). The resulting latent variable represents an "error-free" continuously varying enophenotype. Here, we constructed entirely from verbal measures and validated it in Mexican-American participants of the Texas Alzheimer's Research and Care Consortium (TARCC). **Methods:** A convenience sample of 142 Hispanic cases with Alzheimer's disease ($n = 7$), Mild Cognitive Impairment (MCI) ($n = 55$) and controls ($n = 80$) was recruited from TARCC's San Antonio site. We obtained comprehensive psychometric assessments and informant-rated measures of Instrumental Activities of Daily Living (IADL). Our analysis was limited to verbal measures with