

The utility of speech and language features for the separation of MCI from healthy controls: Varied performance of picture description task as a screening tool across MCI subtypes

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Abstract

A picture description task is a component of Miro Health's platform for self-administration of neurobehavioral assessments. Picture description has been used as a screening tool for identification of individuals with Alzheimer's disease and mild cognitive impairment (MCI), but currently requires in-person administration and scoring by a speech and language pathologist. The Miro implementation allows broader use of this assessment through self-administration and automated processing, analysis, and scoring to deliver clinically useful quantifications of the users' speech production, vocal characteristics, and language.

Picture description responses were collected from 62 healthy controls (HC), and 33 participants with mild cognitive impairment (MCI): 18 with amnesic MCI (aMCI) and 15 with non-amnesic MCI (naMCI). Speech and language features and contrasts between pairs of features were evaluated for differences in their distributions in the participant subgroups.

Picture description features were combined to form a classifier that distinguishes MCI and HC with an area under the receiver operator curve of 0.76. When contrasting specific subtypes of MCI and HC, the classifier has an AUROC of 0.91 for aMCI versus HC and 0.61 for naMCI versus HC.

Tests of association of individual features or contrasts of pairs of features with HC versus aMC identified 18 features with p-values below $5e-3$ and False Discovery Rates (FDRs) at or below 0.114 and 46 contrasts with p-values below $5e-4$ and FDRs at or below 0.132.

Findings suggest that performance of picture description as a screening tool for MCI detection will vary greatly by MCI subtype.