Eye Movement Indices of Word and Object Recognition in Primary Progressive Aphasia

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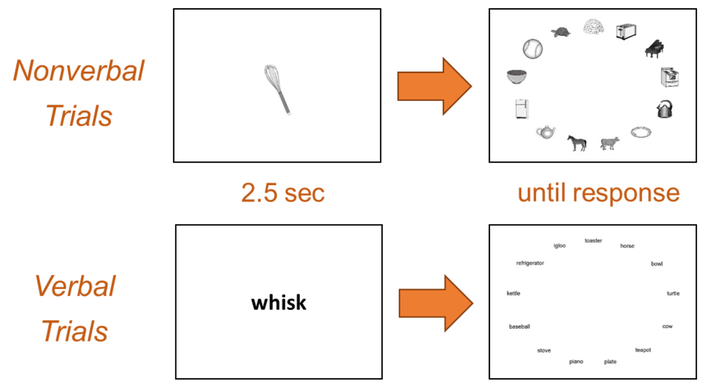
Introduction

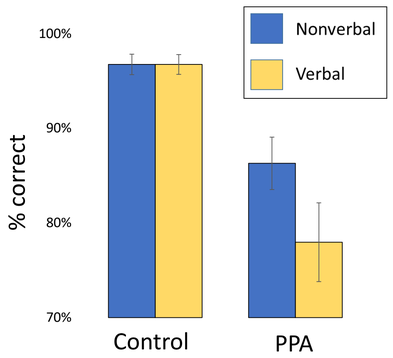
- Language syndromes caused by neurodegenerative disease are known at Primary Progressive Aphasias (PPA)
- Caused by Alzheimer disease pathology and/or frontotemporal lobar degeneration
- A heterogeneous syndrome: language profile reflects regional distribution of atrophy in left perisylvian cortex
- Some patients have loss of single-word comprehension, but loss of nonverbal knowledge is also possible, particularly when atrophy spreads to the right-hemispheric temporal lobe
- Standard tests of single-word comprehension involve word-to-picture matching, which conflates verbal and nonverbal processing
- A novel task was administered which disentangles word from object processing, while eye movements were examined as subtle indicators of impairment

Methods

- *N*=39 PPA patients (19 agrammatic, 13 logopenic, 7 semantic subtype), *N*=23 age, gender, education-matched control participants
- Cue given (whisk), tasked with finding a thematic associate (bowl)
- Target associate was embedded in an array of 12 distractors
- Some distractors were same shape as target (e.g. both round), others were from the same category as target (e.g. both tools)
- Stimuli were pictures on nonverbal trials, & words on verbal trials



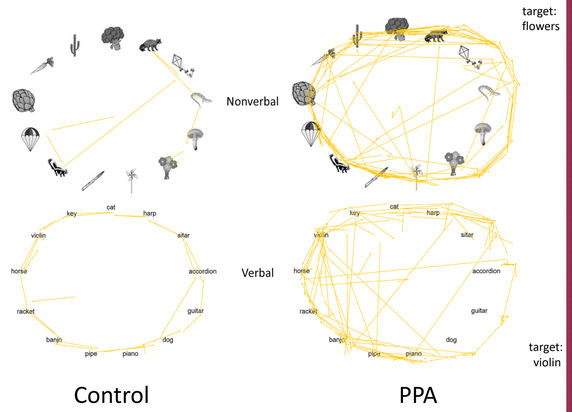
Behavior



- PPA patients were less accurate than controls (*p*=.002)
- Decline in accuracy was more severe for words than for objects (*p*=.003)

Scan Paths

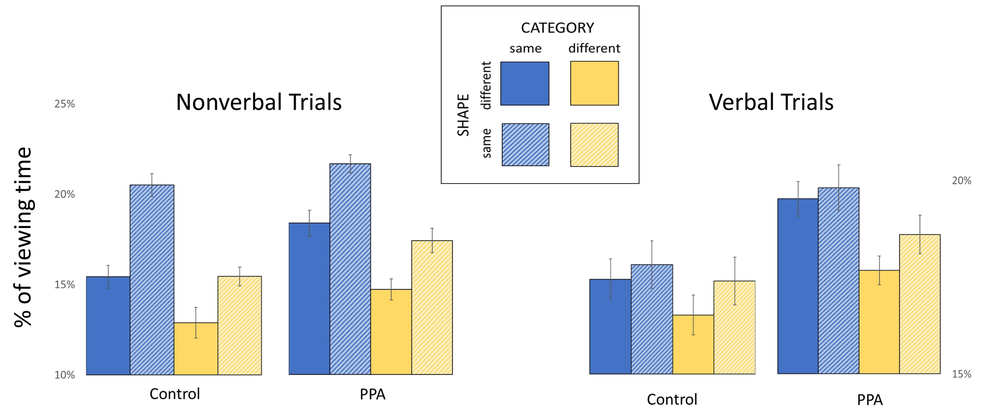
- Controls adopt a parallel search strategy for objects, and a serial strategy for words
- No clear use of strategy in PPA: similar saccades for words and objects



Viewing Time on Distractors

<u>Nonverbal Results</u>

- Gaze lingered on picture distractors from the same category (*p* <.001) and the same shape (*p* <.001) as the target
- No differences between groups (*p* >.05)



<u>Verbal Results</u>

- PPA patients spent more time viewing same-category words (p<.001), while controls did not (*p*=.13)
- Neither group was distracted by shape (*p* >.05)

Conclusions

- In keeping with selective language impairment, PPA patients have greater difficulty searching for verbal material, while search for object pictures is relatively spared
- Results from previous studies employing word-to-picture matching suggested taxonomic blurring of word meaning, such that PPA patients cannot distinguish between words from the same category such as “cat” and “dog” (Hurley et al. 2012)
- Current results suggest that taxonomic blurring is selective for verbal material in PPA
- This finding is striking, considering that controls show no influence of category when viewing words
- Future studies may reveal selective loss of nonverbal knowledge in syndromes with right-hemispheric atrophy

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