

Improving the detection of visual symptoms in Alzheimer's Disease using the Graded Incomplete Letters Test

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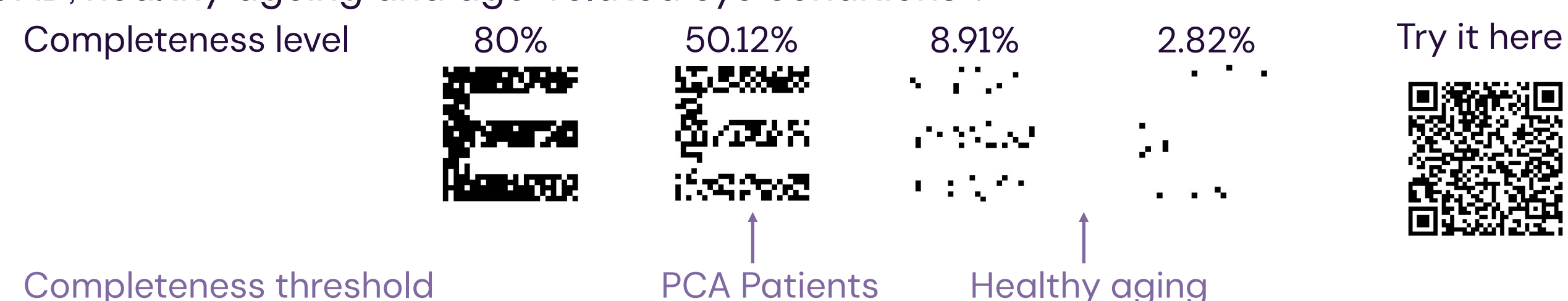
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INTRODUCTION

- Cortical visual deficits in object recognition and space perception affect $\geq 50\%$ of people with Alzheimer's disease (AD) or Dementia with Lewy bodies (DLB) and are the defining feature of Posterior Cortical Atrophy (PCA)^{1,2,3}
- Improved detection is needed: visual symptoms frequently mistaken for eye disease (e.g. cataract, glaucoma), delaying diagnosis by 3–4 years⁴
- The Graded Incomplete Letters Test (GILT) detects these symptoms & distinguishes PCA from typical AD, healthy ageing and age-related eye conditions⁵:



- Aim:** To understand deficits in incomplete letter recognition in PCA with comparison to typical amnesic AD
- Three candidate stages for disruption:



METHODS

- Participants: Control, PCA and typical AD (n=20 each), matched for age (control=68.7±6.9, PCA=69.0±6.4, tAD=69.5±6.4) and MMSE (PCA=22.5±3.1, tAD=23.0±4.1). All PCA participants met criteria for PCA-pure⁹ and 13/13 got biomarker met criteria of AD
- Identified degraded letters from 12 options (C, D, E, F, H, K, N, P, R, U, V, Z)
- Letters presented with decreasing completeness (18 levels, each with 5 trials)
- Threshold taken as the completeness level giving 80% accuracy
- Three key stimulus manipulations:

Feature integration (Check Size)

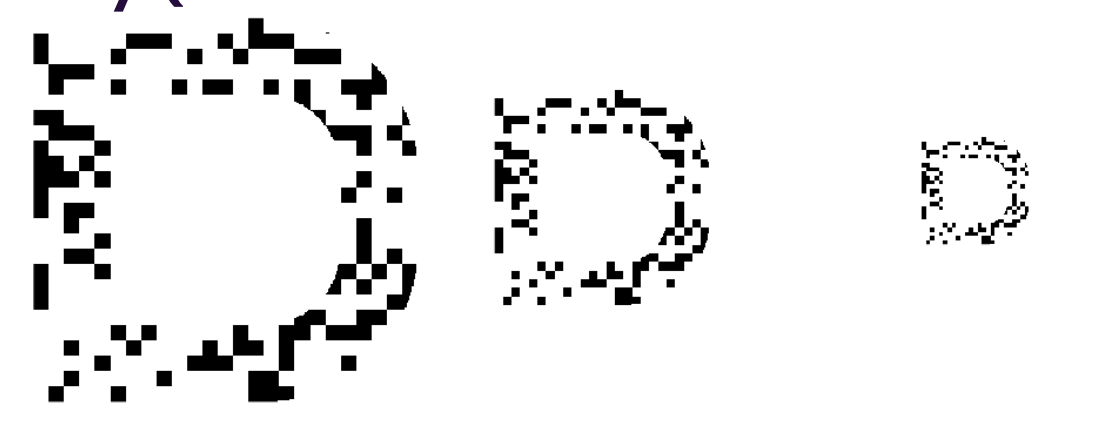


Visibility: worse with smaller checks
Integration: worse with larger checks

Feature clutter (Background Noise)



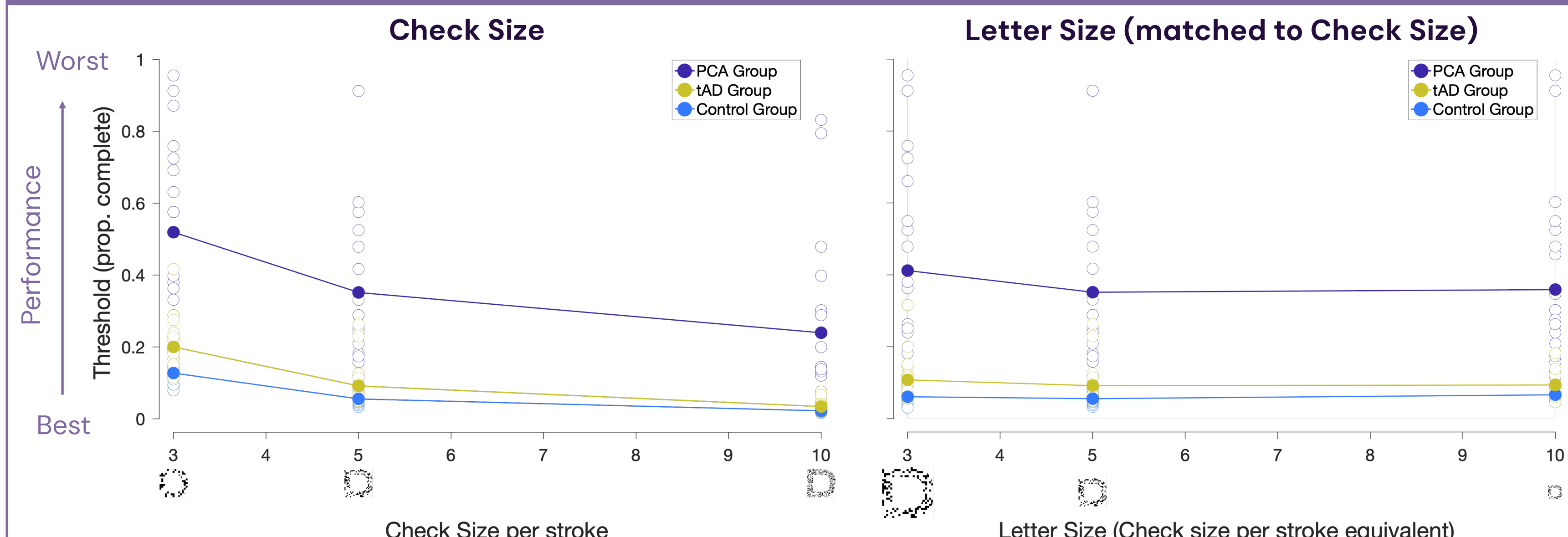
Visibility (Letter Size: matched to Check Size)



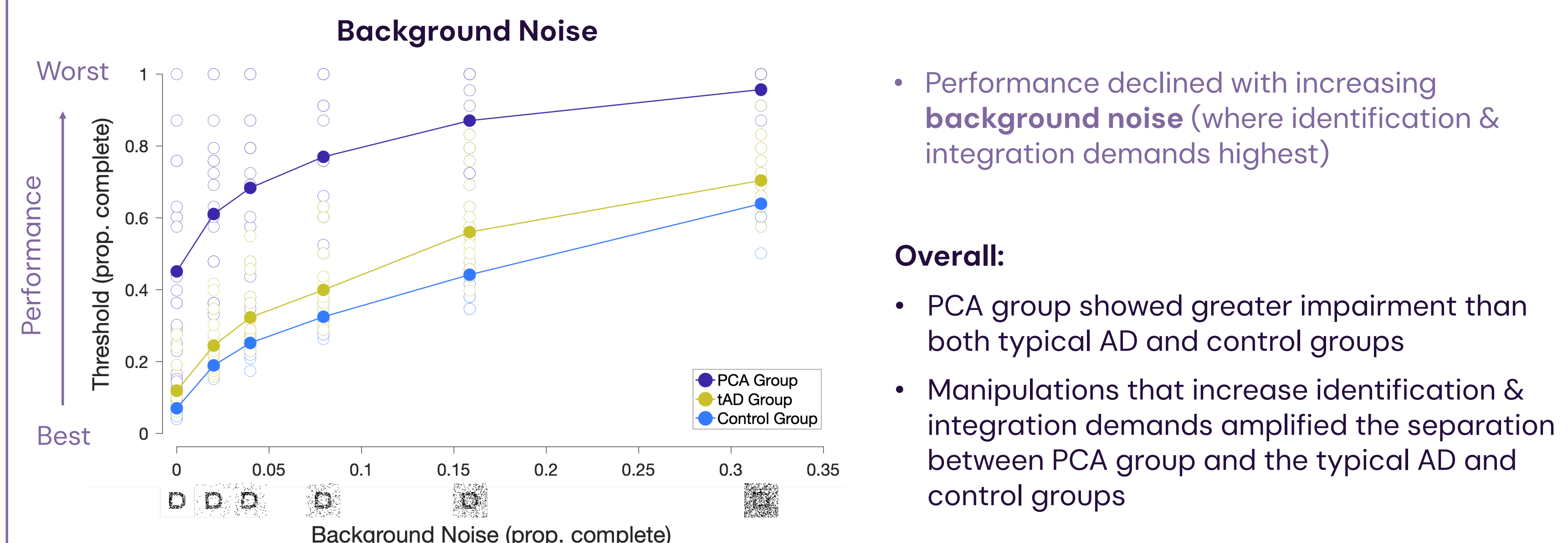
Visibility: worse for smaller Letter
Integration: no effect

Visibility: no effect
Identification & integration: worse with more noise

RESULTS



- Performance worst (i.e. thresholds highest) at **check size 3** (with highest feature integration demands)
- No difference with **letter size** (feature visibility does not limit performance)



- Performance declined with increasing **background noise** (where identification & integration demands highest)

Overall:

- PCA group showed greater impairment than both typical AD and control groups
- Manipulations that increase identification & integration demands amplified the separation between PCA group and the typical AD and control groups

CONCLUSION

- PCA participants were markedly impaired on incomplete letter recognition relative to typical AD and healthy controls, with further impairments when check sizes and background noise were increased
- Impaired recognition of degraded visual stimuli in PCA is likely driven by impaired feature identification and global integration, rather than by reduced feature visibility
- Manipulations that increase global integration demands (e.g., larger check sizes or higher background noise) may enhance the sensitivity of tests for cortical visual loss

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