p-103

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Longitudinal analysis of grammatical changes across the three variants of Primary Progressive Aphasia

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State of the Art
Grammatical language errors characterise the nonfluent variant of Primary Progressive Aphasia (nfvPPA); however, there is limited consensus on clinical metrics that reliably differentiate the three PPA variants. Longitudinal analysis is a powerful approach to investigate changing relationships between neuroimaging and behavioural data. This study examines whether specific metrics (i) reliably differentiate nfvPPA from other variants and (ii) correlate with regional changes in cortical thickness.

Methodology
Participants were 23 individuals with nfvPPA, 28 logopenic (lvPPA), 24 semantic (svPPA), and 36 healthy controls matched on demographics. All participants verbally described the 'Cookie Theft' picture (111 baseline samples, 29 at 1 year). Samples were analysed using CLAN software implementing the Northwestern Narrative Language Analysis, which generates 11 summary metrics of grammatical integrity.

Results
Linear Mixed Effects modelling examined diagnosis by time for grammatical measures. The nfvPPA group produced fewer words/min than other groups ($p<.001$) but all declined similarly over time ($p=.005$). nfvPPA showed higher ratio of nouns:verbs ($p=.007$) and open:closed class words ($p<.001$), but time was nonsignificant. nfvPPA had shortest utterance length ($p<.001$) with nfvPPA and lvPPA declining over time and svPPA increasing ($p=.019$). Percentage of complex sentences and of grammatically correct sentences were lowest for nfvPPA ($p<.001$, $p=.002$; interaction: $p=.08$, $p=.087$), with nfvPPA tending to show greatest decline over time.

Conclusion
Sentence complexity and grammaticality are promising metrics of grammatical deterioration in nfvPPA. Analyses of additional cases, timepoints, and correlation with regional changes in cortical thickness are ongoing. Findings can inform differential diagnosis, prognosis and tailored intervention.

Conflicts of interest

We have no financial disclosures to declare.