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Introduction. Damage to the left inferior frontal gyrus in individuals with non-fluent variant primary progressive aphasia (nfvPPA) has been associated with syntactic comprehension impairment (Mesulam, 2016), as well as verbal working memory (WM) deficits (Eikelboom et al., 2018). Though verbal WM deficits have been shown to be responsible for nfvPPA patients' poor performance in syntactic comprehension (Sebastian et al., 2014; Thompson & Mack, 2014), no study to date has investigated the role of WM in implicit and explicit inferencing in language. Explicit inferencing mainly relies on language-based cues (lexicon, syntax), while implicit inferencing relies on the integration of syntactic information with contextual and background world knowledge to enable the comprehender to inferentially derive a coherent interpretation of the input and is, therefore, considered a pragmatic function (Rohde & Kurumada, 2018). The current study aims (a) to determine the explicit and implicit inferencing abilities of nfvPPA patients compared to controls, and (b) to investigate whether performance on syntactic comprehension predicts explicit and implicit inferencing to the same extent, and whether executive top-down functions such as verbal WM (as measured by digit-span backwards) mediates these relations.

Method. Fourteen Greek-speaking participants with nfvPPA (age range 53-73; mean age: 64 yrs., *SD*: 5.1) along with eighteen age- and education-matched language-unimpaired adults performed a listening comprehension task (Cain & Oakhill, 1999) that measured explicit and implicit inferencing (among others). Participants were also assessed on syntactic comprehension (Peristeri & Tsimpli, 2010), and digit-span backwards. Simple linear regression was used to show predictive values for behavioral measures (digit span, and explicit and implicit inferencing scores), and multiple linear regression was used to reveal verbal WM mediation effects.

Results. The nfvPPA patients performed significantly lower than controls in both explicit (mean nfvPPA=69.1% vs. mean controls=86.6%; $p = .011$), and implicit language inferencing (mean nfvPPA=43.5% vs. mean controls=96.4%; $p < .001$). Also, the nfvPPA patients scored lower than controls in syntactic comprehension (max. accuracy score: 16) (mean nfvPPA=9.6 vs. mean controls=15.7; $p < .001$) and in digit-span backwards (mean nfvPPA=3.9 vs. mean controls=7.1; $p < .001$). Performance on syntactic comprehension significantly predicted performance on implicit inferencing only (Table 1). Importantly, syntactic comprehension was not associated with explicit inferencing. To test the mediating role of verbal WM for implicit inferencing, we compared the predictive power of syntactic comprehension with and without digit-span backwards for implicit inferencing performance in a multiple linear regression. Syntactic comprehension alone had less predictive power of implicit inferencing scores than syntactic comprehension combined with digit-span backwards, thus, suggesting a partial mediation effect of digit-span backwards for implicit inferencing.

Conclusions. The findings indicate that syntactic comprehension deficits are associated with implicit but not explicit inferencing in nfvPPA, showing that the patients' syntactic comprehension deficit does not impair their understanding of explicit information but contributes to their pragmatic impairments. Importantly, verbal WM mediates the relation between syntactic comprehension and implicit language inferencing in nfvPPA. This pattern indicates that a top-down deficit of nfvPPA in executive functions, such as verbal WM, may partially explain the patients' pragmatic impairments.

(499 words)

Table 1: Simple and Multiple Linear Regression Results of Behavioral Scores in Syntactic comprehension, Explicit and Implicit Language Inferencing and Digit-Span Backwards.

Regression Description (df = 12)	Syntactic Comprehension Coefficient	Syntactic Comprehension R^2	Syntactic Comprehension t-statistic	p-value
Syntactic Comprehension on Digit-Span Backwards	8.85	60.6%	3.93	<.001
Syntactic Comprehension on Explicit Inferencing	0.21	25.0%	0.11	0.918
Syntactic Comprehension on Implicit Inferencing	5.59	37.0%	2.98	0.016
Syntactic Comprehension + Digit-Span Backwards on Implicit Inferencing	3.46	43.7%	1.63	0.020

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