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Verb and context processing in Parkinson's disease

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Abstract

The aim of the present study was to investigate verb and context processing in 10 individuals with Parkinson's disease (PD) and matched controls. A self-paced stop making sense judgment task was employed where participants read a sentence preceded by a context which made the thematic role of the verb plausible or implausible. Participants were required to indicate whether the sentence ceased to make sense at any point by responding yes/no at each word. PD participants were less accurate than the control participants at detecting sentence anomalies based on verb selection restrictions and previously encountered contextual elements. However, further research is required to determine the precise nature of the grammatical processing disturbance associated with PD.

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1. Introduction

A growing body of research has indicated that sentence comprehension may be impaired in individuals with Parkinson's Disease (PD) (Grossman, 1999; Grossman, Carvell, Stern, Gollomp, & Hurtig, 1992; Lieberman et al., 1992; Ullman et al., 1997). One of the earliest studies to investigate sentence processing in PD was conducted by Natsopoulos et al. (1991) who utilised a sentence-picture matching paradigm to investigate thematic role assignment within relative clause constructions. The PD participants performed significantly poorer than normal control participants, suggesting

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that the PD participants were interpreting the sentences based on a restricted variety of superficial structural rules (Natsopoulos et al., 1991).

Lieberman et al. (1992) employed a sentence-picture matching paradigm to investigate the comprehension of simple and complex sentences in participants with mild and moderate PD. Participants with moderate PD displayed higher error rates and longer response times than the mild PD participants, suggesting that syntactic comprehension in the PD participants was influenced by PD severity and sentence complexity. It was proposed that the comprehension difficulties reflected an impairment of syntactic rule application, rather than impaired attentional processes (Lieberman et al., 1992). Reduced attention span was discounted as a possible cause of the comprehension difficulties because short, syntactically complex sentences were associated with more errors and longer response times than longer, syntactically simple sentences. Furthermore, when sentence length was constant, error rates were higher for complex sentences than simple sentences (Lieberman et al., 1992). However, the sentences containing the complex syntactic structures may have required greater attentional resources than the simple sentences (Kemmerer, 1999). Thus, the discrepancy between the sentences may have reflected impaired language processing and/or impaired attentional processes rather than impaired language processing alone.

Congruent with Lieberman et al. (1992), Grossman et al. (1992) found a discrepancy between PD participants' comprehension of simple and complex sentences during an off-line sentence comprehension task. The researchers found that the PD participants displayed increasing sentence comprehension difficulties with increasing sentence complexity (Grossman et al., 1992). However, unlike Lieberman et al. (1992), Grossman et al. (1992) concluded that the effects of syntactic complexity were related to limited attentional resources, rather than impaired understanding of grammatical rules.

To further investigate the nature of the sentence processing impairment associated with PD, Grossman et al. (1992) examined the ability of PD participants to detect grammatical errors. Participants were required to answer questions about sentence stimuli, with 70% of the sentences containing errors. The errors included omissions of grammatical morphemes, alterations in the shape of grammatical morphemes, and modified word orders. The ability of the PD participants to detect the errors varied as a function of error type, showing that the PD group was less sensitive than the control group at detecting omitted grammatical morphemes. However, the groups did not differ in the ability to detect word order errors. It was suggested that the selective nature of the PD group's ability to detect the errors reflected impaired attentional processes (Grossman et al., 1992). However, it was acknowledged that impaired attention may not have been the sole factor influencing sentence comprehension in the PD participants, suggesting that the impaired sentence comprehension reflected an interaction between grammatical complexity and limited attentional resources (Grossman et al., 1992). However, as the experiment involved a two-stage evaluation of each sentence, unnatural demands may have been placed on the participants' attentional resources. Subsequent research has found that the comprehension accuracy of individuals with PD is sensitive to the introduction of a secondary task (Grossman et al., 2000).

The role of executive functions in impaired sentence comprehension in PD was further elucidated by Lee, Grossman, Morris, Stern, and Hurtig (2003) by means of a word

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