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What do pause patterns in non-fluent aphasia tell us about monitoring speech? A study of morpho-syntactic complexity, accuracy and fluency in agrammatic sentence and connected discourse production

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Abstract:

Compared to normal speech, agrammatic utterances are “telegraphic” with frequent closed-class words omissions, simple clauses, short utterances and reduced morpho-syntactic complexity. Besides, its predominant symptom comprises fluency disturbances and great efforts needed to produce speech. Results from previous corpora analyses confirm that variability in agrammatic performance is a key feature for understanding impaired and strategic language use (Kolk & Heeschen, 1990 ; Kolk, 2006, Sahraoui & Nespoulous, 2012). Beyond the reduced on-line processing resource related to the underlying impairment, patients adjust the surface structure to be encoded according to contextual constraints. Moreover, across-task variability in fluency may also be determined by the use of various adaptation strategies, such as elliptical and corrective encoding strategies, related to the focus on form enabling better grammatical accuracy under certain conditions. In particular, corrective strategies are due to the preserved ability, in these patients, to detect errors and monitor their speech production (Postma, 2000 ; Oomen, Postma & Kolk, 2001). This suggests that agrammatic patients may over-use the monitoring device in producing language, at a pre-articulatory or post-articulatory stage and according to the type of task (Sahraoui, 2014).

In this study, we carefully look at temporal aspects of agrammatic speech production in order to understand how far does speech (non)fluency and dysfluency show a relation to the morpho-syntactic properties of sentence and connected discourse across various tasks. Indeed, describing and interpreting pause patterns may also contribute to account for non-fluent aphasia, as demonstrated in previous work dealing with fluent aphasia (Butterworth, 1979). To study pause patterns in non-fluent aphasia, we performed further speech data analyses involving agrammatic speakers (N=5) and control speakers (N=9) (Sahraoui & Nespoulous, 2012). In particular, silent and filled pauses were coded and automatically computed using speech processing methods (Mac Whinney, 2000 ; Boersma & Weenink, 2015). Analyses include speech and articulatory rate, pause durations and pause distribution in relation to the elliptical style, overt errors, dysfluencies and repair strategies (corrective adaptations). In connected discourse (spontaneous and autobiographical) with more elliptical style due to more frequent omissions of grammatical morphemes, the pattern of pauses is different from narrative and descriptive discourse, as well as in sentence production. The latter type of speech output is characterized by fewer grammatical omissions with longer and more frequent pauses, what is combined with greater morpho-syntactic accuracy and complexity (that is to say less elliptical style) and with more frequent corrective adaptations.

Arising from the way the speaker deals with the underlying impairment *in situ*, trade-offs are thus clearly made between fluency and morpho-syntactic accuracy and complexity. Even though language processing cannot perform in a safe way anymore, the agrammatic speakers rely on still operating executive functions related to pre- or post-articulatory speech monitoring in order to improve morpho-syntactic encoding.

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