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Event processing in agrammatic aphasia: does language guide visual processing and similarity judgments?

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Background: The widespread idea that people with agrammatic aphasia (PWA) have a selective vulnerability in morphosyntactic processing (Bradley, Garrett, & Zurif, 1980), irrespective of language, has been questioned by many crosslinguistic studies (e.g., Soroli, Sahraoui, & Sacchett, 2012). Researchers show that “same”-syndrome people with aphasia perform very differently from one language to another (Bates, Wulfeck, & MacWhinney, 1991). In the domain of motion events, languages vary morphosyntactically (Talmy, 2000): some (mostly Romance, i.e., French) invite speakers to lexicalize Path information leaving Manner optional, whereas others (Germanic, i.e., English) systematically privilege Manner verbs together with Path adjuncts.

Aims: The question of whether such crosslinguistic differences have deep effects on cognitive processing (e.g., visual attention/categorization) has recently become of great interest for aphasia (Soroli, 2011). The aim of this study is to collect online and offline indications of how spatial processing operates and to investigate the role typological (language-related) vs. language-independent (universal/syndrome-related) factors play in agrammatic aphasia.

Method and procedure: Twenty English, twenty French and two PWA (1 of each language) were tested in three eye tracking experiments: (I) a nonverbal similarity judgment; (II) a verbal similarity judgment; and (III) a production experiment.

In Experiment I, participants saw a target video showing a motion event performed in a certain *Manner* and along a certain *Path* (a). The target was then followed by two variants: one *Manner-congruent* (b) and one *Path-congruent* (c). Participants had to choose the variant that looked most like the target. Experiment II was exactly the same, except that the target video was replaced by a sentence. In Experiment III, participants were asked to describe the video clips.

- a. Target video/sentence: a woman riding a scooter out of a building
- b. Manner-congruent video: a woman riding a scooter into a building
- c. Path-congruent video: a woman roller-skating out of a building

The experiments were presented in a fixed order: first Experiment I (that involved no linguistic input), then Experiment III (in order for subjects' descriptions not to be influenced by the sentences presented during Experiment II), and at the end Experiment II.



Figure 1. Example of Manner-congruent (m) and Path-congruent (p) AOIs in similarity-judgment tasks.

The analysis was focused on what participants expressed, with which linguistic means, within which event-types, how they performed similarity judgments, how fast, as well as their gaze patterns (fixation counts, visit durations) to specific areas-of-interest (AOI) (Figure 1). A mixed ANOVA to examine the effect of Language as between-subject factor (English, French) with event-type and AOI-type as within-subject factors was conducted on several dependent variables (raw PM-scores, M-choices, M-fixations, etc.).

Results: The results confirm the impact of typological differences. PWA did not differ in performance from their respective language control group. Participants not only privileged the lexicalization patterns of their language (Experiment III), they also categorized and shifted attention based on language-specific features (e.g., more Path-choices/more and longer Path fixations by French participants as opposed to English) in both verbal (Experiment II) and nonverbal similarity judgments (Experiment I). However, in this last case, when verbal input was not explicit, overt attention to specific components differed in fixation counts but not in visit durations.

Conclusion: The findings suggest that there is a close relation between language and cognitive processing. Language plays an important role in most nonverbal measures and a massive role whenever explicit linguistic processing is involved. It is suggested that linguistic constraints cannot be neglected in aphasia research, assessment, or treatment procedures. For future research, the use of multiple methodologies and the account for multiple factors will be essential in order to deeply investigate what is the relative weight of language- and syndrome-related factors for cognitive processing in aphasia.

Disclosure statement

No potential conflict of interest was reported by the author.

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