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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 cross-linguistic studies (e.g., Soroli, Sahraoui & Sacchetti, 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 thus constraining lexicalization options (Talmy, 2000): some (mostly Romance languages, ie. French) invite speakers to lexicalize Path information leaving Manner optional; whereas others (Germanic, ie. English) systematically privilege Manner verbs together with Path adjuncts.

Aims

The question of whether such cross-linguistic differences have deep effects on cognitive processing (e.g., visual attention, categorization) has recently become of great interest for aphasia. The aim of the present study is to collect real-time indications of how online and offline spatial processing operates (ie. through similarity-judgment tasks and Eye-tracking (ET)), and to investigate the role typological (language-related) vs. language-independent (universal/syndrome-related) factors play in agrammatic aphasia.

Method and Procedure

20 English, 20 French and two PWA (1 of each language) were tested in three ET experiments: (I) a Non-Verbal 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 *Path* (a). The target was 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.

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, gazepaths) to specific areas-of-interest (AOI) (Figures 1-2). 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.).¹



Figure 1. Example of manner-congruent (m) and path-congruent (p) AOIs in the variants presented during the similarity-judgment tasks



Figure 2. Example of a 'INTO' event presented in Experiment III as divided in different AOIs: Source (S), Goal (G), Path (P), and Manner (P+/-M)

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 non-verbal 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 non-verbal measures and a massive role whenever explicit linguistic processing is involved. From these findings it is clear that linguistic constraints cannot be neglected in aphasia research, assessment or treatment procedures. In future research, the use of

¹ In order to analyze statistically the scores of PWA and because of their small number, we used the method proposed by Crawford & Garthwaite (2007) that treats the statistics of the analogous control group as sample statistics.

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3 multiple methodologies and the account for multiple factors will be essential in order to deeper
4 investigate what is the relative weight of language- and syndrome-related factors for cognitive
5 processing in aphasia.

6 7 **References**

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