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Processing of Covert Scope Inversion in Broca's Aphasia

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Introduction

Comprehension deficits in Broca's aphasia have been related to syntactic movement. If syntactic movement yields comprehension impairments, the question arises whether this also holds for covert movement. The aim of this study is to investigate whether Greek-speaking agrammatic patients are impaired in processing ambiguous doubly quantified sentences, which -according to the standard theory (May, 1977)-involve covert A'-movement on their inverse scope interpretation.

Participants

Five chronic Greek-speaking patients with Broca's aphasia (four agrammatic and one non-agrammatic), aged from 37 to 68 years old. Their language impairment was due to a left hemisphere stroke. Aphasia classification was based on BDAE profiles. 19 non-brain injured Greek speakers also participated in the study.

Materials & Procedure

Participants carried out a truth-value judgment task. There were two types of experimental sentences: 1) ambiguous, doubly quantified sentences (e.g. *A man waters every flower*) combined with four different pictures (one, depicting surface-scope interpretation, one, depicting inverse-scope interpretation and two, violating both surface and inverse scope interpretation), and 2) sentences that involve overt movement operations (passives, object relatives and subject relatives), combined with two pictures (one depicting the action described by the sentence and one violating truth conditions due to reversed thematic roles). In total, there were 10 experimental conditions.

Results

Accuracy data have been analysed with Generalized Estimated Equations (GEE) method, (SPSS). Patients' performance was impaired in processing sentences that contain overt movement operations, whereas their performance in processing ambiguous doubly quantified sentences was close to normal (Fig. 1). Thus, patients with aphasia were able to recognize both scope interpretations, including the inverse one, which involves covert movement.

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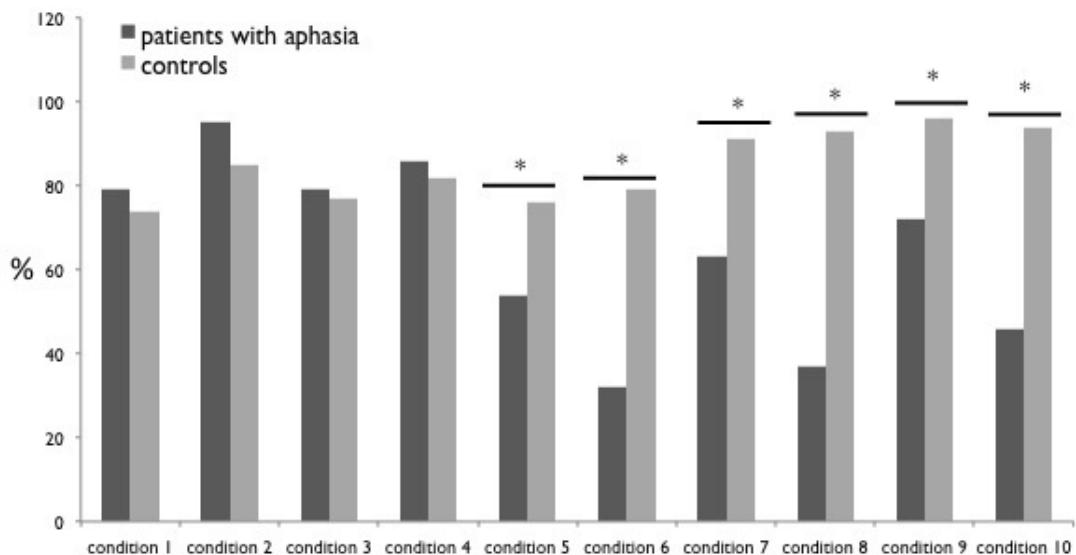


Fig.1 Means (%) of correct responses by patients with Broca's aphasia and controls per experimental condition. Condition 1: accept pictures depicting the surface-scope interpretation. **Condition 2:** accept pictures depicting the inverse-scope interpretation. **Condition 3:** reject pictures due to violations of truth conditions (pictures with one agent). **Condition 4:** reject pictures due to violations of truth conditions (pictures with three agents). **Condition 5:** accept pictures depicting passive sentences. **Condition 6:** reject pictures depicting passive sentences due to reversed thematic roles. **Condition 7:** accept pictures depicting object relatives. **Condition 8:** reject pictures depicting object relatives due to reversed thematic roles. **Condition 9:** accept pictures depicting subject relatives. **Condition 10:** reject pictures depicting subject relatives due to reversed thematic roles. * $p < 0.05$

Discussion

Patients with aphasia were not impaired in comprehending ambiguous doubly quantified sentences (see also Saddy, 1995), in contrast to syntactic movement operations. This might indicate that covert movement does not affect patients' comprehension. Since there is no theoretical motivation to the claim that covert movement is distinct from overt movement, we, therefore, concluded that the results provide an argument against a movement-based account of covert scope extension, such as that proposed by May (1977) and subsequent work. The reason is that if May were correct, the prediction for patients with agrammatic aphasia would be that they only accept the surface-scope interpretation, which involves no movement. However, this was not the case. Our results may be interpreted as supporting non-movement accounts of covert scope inversion (e.g. Neeleman & van de Koot, 2011).

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