Relativized Minimality and object A' dependencies in aphasia: new evidence from a case study

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INTRODUCTION

Object A' dependencies (1b) are more difficult than subject A' dependencies (1a) for children to acquire and for adult to process. Evidence for this asymmetry also comes from populations with language pathologies. (see Friedmann et al., 2009, Belletti, Guasti, 2015 for relevant references).

1) a. Subject Relative: The elephant that is washing the lion
b. Object Relative: The lion that the elephant is washing

The featural Relativized Minimality approach (Starke, 2001, Rizzi, 1990, 2004) allows for a natural characterization of the difficulty that speakers experience with object A' constructions.

2) *fRM: given three elements X, Z and Y, Y is in a minimal configuration with X if there is no Z such that (i) Z hierarchically intervenes between X and Y and (ii) Z is of the same structural type/shares relevant features as X.*

In object A' dependencies the embedded subject always intervenes between the moved element and the gap in the original merge position. In contrast, no such intervener is present in subject A' dependencies. The presence of an intervention configuration is what makes object relatives harder to compute. We assume a nominal feature (+NP) expressing the lexical restriction to be among the features relevant in the computation.

3) a. SR: the elephant that __ is washing the lion.
[+R +NP] [+NP]
b. OR: the lion that the elephant is washing __.
[+R +NP] [+NP] [+R +NP]

In particular, not all the object A' dependencies are equally difficult for the computational system. Friedmann et al. (2009) suggest that the inclusion relation of relevant features is the most difficult one to compute among the possible intervention configurations:

4)

		X	Z	Y	
a.	Identity:	+A ...	+A …	<+A>	*
b.	Inclusion:	+A,+B ...	+A ...	<+A,+B>	?
c.	Intersection:	+A,+B…	+A,+C…	<+A,+B>	√
d.	Disjunction:	+A …	+B ...	<+A>	√

CASE STUDY

Participants:

F.G.: a 66 y.o. right-handed Italian speaker affected by anomic aphasia. First haemorrhagic stroke (64 y.o.) in the left temporo-parietal area, due to an arteriovenous malformation in the left temporal lobe; second haemorrhagic stroke (65 y.o.) in the left temporo-pariet-occipital area, due to the bleeding of the embolizated arteriovenous malformation.

Control Group: six right-handed, totally healthy, Italian men with the same years of schooling and about the same age as F.G.

Procedure and material:

We investigated F.G.'s morphosyntactic competence through a series of experimental tasks in both comprehension and production. We first analyzed the domains that are traditionally impaired in patients with grammatical deficits - determiner system, verb tense and agreement, clitics – and then the complex sentences mentioned above, i.e. subject and object relative clauses.

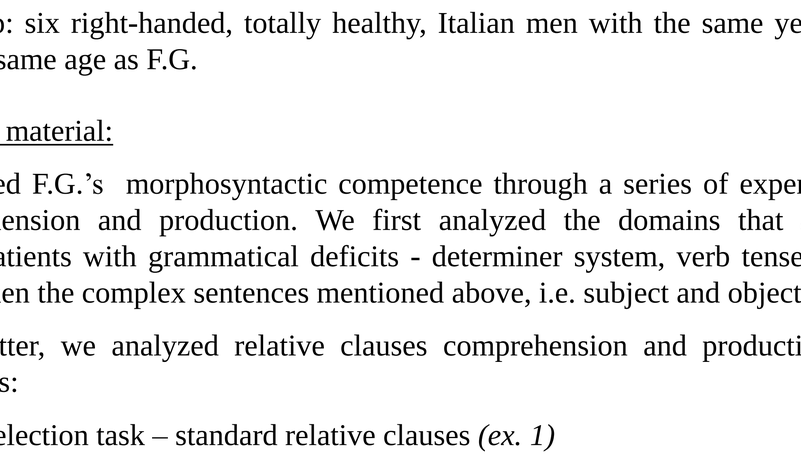
As for the latter, we analyzed relative clauses comprehension and production, through the following tasks:

- character selection task – standard relative clauses *(ex. 1)*
- character selection task – passive object relatives *(the lion that is washed by the elephant)*
- character selection task – relative clauses with number feature mismatch *(the lions that the elephant is washing)*
- character description task – standard relative clauses *(ex. 1)*

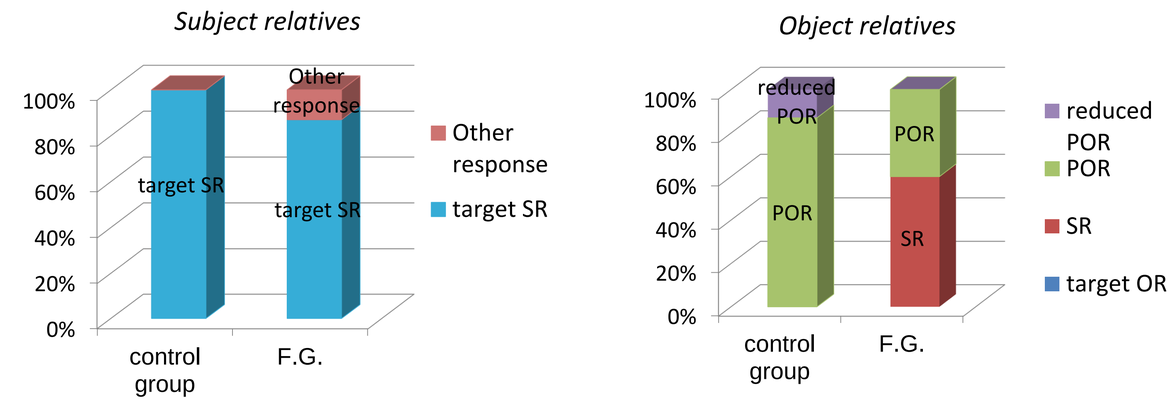
Results:

In line with the clinical diagnosis, F.G.'s syntactic abilities were mostly intact and he did not show the difficulties peculiar to patients affected by grammatical deficits. However, he showed a selective deficit in the processing of certain object relatives.

5) *Table 1. Relative clauses comprehension*



6) *Tables 2 and 3. Relative clauses production.*



PROPOSED ANALYSIS

We attribute the subject/object asymmetry in F.G.'s standard RC' comprehension and production to the locality effects involved in ORs and not in SRs, as predicted by the fRM approach.

In standard ORs (3b) the moved element is in a features inclusion relation with the intervening subject (Friedmann et al., 2009, Munaro, 1999, for evidence on the grammatical impact of the lexical restriction feature). In line with the hypothesis advanced in acquisition by Friedmann et al. (2009), we assume that the inclusion relation is more difficult to process than the other possible intervention configurations. We speculate that the extra-complexity involved in the processing of an inclusion relation may exceed, to some extent, the computational resources of F.G..

Indeed he successfully processed ORs in the number mismatch condition (7b), where target and intervener are in an intersection relation (the number feature is relevant in Italian for the computation of intervention, Belletti et al., 2012, Adani et al. 2010). The same manipulation had no effect on the comprehension of SRs, which were already comprehended at ceiling.

7) a. SR: The elephant that __ is washing the lions.
[+R +NP +sing] [+NP +plur]
b. OR: The lions that the elephant is washing __ .
[+R +NP +plur] [+NP +sing] [+R +NP +plur]

The approach adopted here offers a valid explanation also for the excellent patient's performance in the POR condition. In line with Belletti (2011, 2014), Belletti, Rizzi (2013a), Contemori, Belletti (2013) and the smuggling analysis of passive by Collins (2005), we assume that passive structures do not involve intervention configurations. (Belletti, Contemori, 2013 for relevant data on children and healthy adults).

8) [$_{CP}$ the lion that [$_{TP}$ *pro* is [$_{VP}$ washed <the lion>] by [$_{vP}$ the elephant <VP>]]]

CONCLUSIONS

The patient showed selective difficulties in the processing of certain ORs, as predicted by the fRM approach. He couldn't process standard ORs but he understood and produced ORs as a healthy adult when the obstacle of intervention was eliminated – POR condition – or modulated – number mismatch condition. The presence of an intervention configuration in which the relevant elements are in an inclusion relation (due to the presence of the NP feature) turn out to be the crucial factor. We suggest that the computational cost associated with the processing of the inclusion relation may exceed the computational resources of F.G. It may be possible that the patient's resources are reduced to same extent, given the neurological event undergone.

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