Move and Agree in Agrammatic Comprehension

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ABSTRACT

This paper argues that agrammatisc disruption results from deficits in the application of Agree (as defined in Chomsky 1999) in comprehension. We argue that this account supplants previous analyses in which it was claimed that it was the operation of Move whose application was impaired.

In previous work the idea was put forward that the deviations in the overall syntax of agrammatics follow in part from impairment in the operations of Move (Thompson, Shapiro, Jacobs & Schneider 1994) or Agree (Gavarró 2002). This view seems too general given that impairment now appears to be more selective than previously thought: Friedmann and Grodzinsky (2000) show how agrammatic speakers may apply Move correctly provided the full functional structure of the clause is available to them; on the other hand, there are patients who fail to raise phrases to e.g. CP or even produce elements in CP and, consequently, embedding and V2 phenomena fail (see e.g. the results of Friedmann and Gil 2001). Other patterns of language impairment also indicate that Move or Agree cannot generally break down in the productions of agrammatics: embeddings are problematic whether they involve movement (as in relative clauses) or not (as in the case of sentential complementation); the generalisation that both phenomena fail at once is missed under an account in terms of a general Move/Agree failure.

Grodzinsky (1990) already considered the possibility that the disruption of movement affects only comprehension: in his Trace Deletion Hypothesis he claimed that XP-trace deletion accounted for the poor comprehension of passives in contrast to the spared comprehension of the corresponding actives. Recent experiments on languages such as Hebrew and German indicate that agrammatic speakers cannot use agreement as a cue in the interpretation of alternating word order patterns; if this is so, this constitutes evidence in favour of an analysis of agrammatism as partly resulting from a failure to apply Agree in comprehension. Failure in this operation grants also failure in the application of Move, as Move is a composite of Merge and Agree, under the assumptions of Chomsky (1998) and later versions of minimalism. Following Chomsky's theoretical stances, Move only affects XP structures, not X-zero structures, and therefore if Agree fails in agrammatic comprehension our prediction is that the comprehension of XP movement, but not necessarily X-zero movement, will fail; this seems consistent with the empirical evidence available.[1]

In this paper I address the relation between the impairment of inflection and the disruption of movement-related constructions; it is argued that all of these linguistic

phenomena follow from a deficit in the application of Agree (as defined in recent minimalist work) in comprehension. This account is argued to supplant previous analyses in which it was claimed that the operation that yields *movement* is impaired, or that Agree is impaired across modalities (as in Gavarró 2002).

The argument proceeds as follows. In section 1 a summary of the literature is given showing that the impairment in the production of inflection in agrammatism is not general, but rather selective; while movement-related constructions are shown to be disrupted, it will also be demonstrated that the source of impairment is structural. While the facts in section 1 are consistent with the Tree Pruning Hypothesis (Friedmann & Grodzinsky 1997, Friedmann 1994), some other facts within the domain of inflection are still awaiting a proper account. In section 2 it is argued that the application of some movement operations, namely head movement, is not impaired, in consonance with Grodzinsky (1995, 2000a). In section 3 we turn to agrammatic comprehension: head raising is also spared in agrammatism, while XP movement is impaired, again in consonance with Grodzinsky (1990, 2000a). In section 4 the evidence available on the comprehension of inflection is considered and a unified account of the disruption of inflection and displacement is proposed, in the light of current linguistic theory.

1.   Selectiveness of inflectional impairment in production

Contrary to given views on impairment according to which agrammatic production is lacking inflectional elements altogether, inflection cannot be said to fail in general. Friedmann and Grodzinsky (1997) showed, on the basis of a verb completion and repetition task in Hebrew how tense and person/number agreement are not impaired in parallel: rather tense errors in the production of sentences such as (1a) are more common that person/number agreement errors as in (1b).

(1)   a.   Berega ze ha-yeled holex. Gam etmol ha-yeled (halax).
                right now the boy walks. yesterday too the boy (walked)
        b.   Berega ze ha-yeled holex. Berega ze gam ha-yeladim (holxim).
                right now the boy walks. right now the boys (walk-pl)

The contrast is quantified for Hebrew and Arabic by Friedmann (2001):

(2)   Verb completion and repetition task (Friedmann 2001)
        a.   Hebrew   tense errors   agreement errors
                completion   41%   4%

	repetition	16%	0%
b. Arabic		tense errors	agreement errors
	completion	69%	9%

Similar results have been gathered for unrelated languages such as English and Spanish (Benedet et al. 1998) and Japanese (Hagiwara 1995).

These findings are given a structural account in Friedmann and Grodzinsky's (1997) Tree Pruning Hypothesis, according to which the higher part of the syntactic tree may be unavailable to the agrammatic speaker in production. Thus, the Tense node may not be projected and the asymmetry in (2) is predicted. When an XP is not projected, all nodes above it are assumed not to be projected either, so e.g. CP, the highest node in the clause, is also unavailable.

As a consequence, constructions involving CP are expected to be impaired: a prediction fulfilled by the results of the experiments in Friedmann (2001). In this work, sentences with embedded CPs, relatives clauses (3a) and sentential complements (3b) were tested through an elicitation task, both in Hebrew and in Arabic.

(3) a. Ze ha-'ish she-xoter besira.
      this the man that rows in boat
      'This is the man who rows a boat.'
    b. Yoxanan xashav she-ha-'isha rakda.
      John thought that the woman danced

The relative clause elicitation task gave the results in (4), and the embedded sentence repetition task in Hebrew those in (5); in both cases, while the patients' CP constructions were poor (22% and 31% correct), sentences claimed in the literature not to involve CP (adjectival predicates and untensed embeddings) were spared. Sentencial embedding was also taken into account by Thompson et al. 1994 and found to be impaired, even though it involved no movement operation.

(4) Relative clause elicitation task (Friedmann 2001)

relative clauses	adjectival predicates
22%	98%

(5) Embedded sentence repetition task in Hebrew (Friedmann 2001)

| tensed embedding (CP) | untensed embedding |
| 31% | 92% |

Friedmann (2001) considers repetition of relative clauses and sentential complements side by side and in both cases the errors rate is 33%; while relative clauses are standardly assumed to be derived by movement, sentential complements are not. The parallel behaviour of agrammatics for the two sentence types advocates for a structural account (along the lines of the TPH), rather than an account that rests on the application of an operation such as movement, that only applies to a subset of the impaired structures.

(6)   Embedded sentence repetition (Friedmann 2001)

| relative clauses | sentential complements |
| 33% | 33% |

The adopted structural account does not suffice to explain all the attested cases of agreement impairment, initially given as evidence in favour of a disruption of Agree in agrammatism (Gavarró 2002). To give an example drawing from Romance, consider the following sentences from French (7) and Italian (8)-(9) in Menn & Obler (1990). What we find in (7)-(8) are inflectional errors within DP involving gender (7a, c, e, f, i, k) and number (7b, 7d, ...) similar data are attested for other languages: Catalan (Gavarró 1993), Hebrew (Grodzinsky 1990), etc.

(7)   Case 1: Mr. Clermont
　　　　a.　　L'image représente un cuisine
　　　　　　the image represents a-masc kitchen-fem
　　　　b.　　le placards muraux garnissent un côté.
　　　　　　the-sg boards mural-pl decorate a side

　　　　c.　　La scène montre le /l/ maman en train d'essuyer le vaisselle.
　　　　　　the scene shows the-masc mum drying the crockery
　　　　d.　　Les tabouret bascule
　　　　　　the-pl stool-sg moves
　　　　e.　　Le paysan sème des grains, j'suppose, la pain
　　　　　　the peasant plants the grains I suppose the-fem bread
　　　　f.　　… décroche le fenêtre
　　　　　　detach the-masc window-fem

g.   la femme réveiller l'homme

the woman wake-inf the man

h.   Ils étaient normal.

they were normal-masc

i.   J'ai subi les examens diverses.

I have undergone the examinations-masc various-fem

k.   Grand-mère comme vous les avez les grands dents!

Grandmother how you them have the big-masc teeth-fem

(8)   Case 1: Mr. Verdi

a.   I genitori stava in pensiero.

the-pl parents was thinking

b.   Era svegli.

was awake-pl

(9)   Case 2: Mr. Rossi

c.   [I] due sposini prepara da mangiare in terra, trova che …

two newlyweds prepare-sg the food on the ground, find-3sg that...

d.   Dire un'altra volta "…

say-inf another time

e.   Io [ho] mal di testa e allora sviene

I have headache and then faint-3sg

f.   C'erano dottori. Dice … (target: Dicono)

there were doctors say-3sg

g.   Il contadino mangia i granone

the peasant eats the-pl grain-sg

h.   Subito vai, vai, vai a scuola. (target: andate)

quick go-2sg to school

i.   Il la bambina sono andata a …

the-masc the-fem girl be-1sg gone-fem to

j.   Il lupo scruto la bambina.

the wolf look-1sg at the girl

k.   Il lupo uccido la nonna.

the wolf kill-1sg the grandmother

For such cases, the TPH is not sufficient: as errors occur in the lowest part of the syntactic tree, and yet word order is preserved, it is not feasible to argue that the whole tree has been pruned. Briefly, it must be acknowledged that the TPH does not cover all cases of inflectional disruption, perhaps related to concord – a topic for future research. What can still be maintained is that minimally the disruption in production will be traced back to a structural problem; in the absence of evidence for a breakdown in the application of any syntactic operation (e.g. in movement), we will assume no such breakdown in agrammatic production.

2. *Head movement and production*

Lonzi and Luzzatti (1993) investigated head movement in the production of Italian agrammatic speakers, in particular their task involved the relative ordering of adverbs (such as *sempre* 'always') and verbs (such as finite *mangia* 'eats' and non-finite *mangiare* 'eat-infinitive'). It is commonly assumed that in Italian the word order patterns result from raising of a head V to a higher position, past the adverb, in sentences such as (10a, c)

(10)   a.   Giovanni mangia *sempre* pesce.
                Giovanni eats always fish
                'Giovanni always eats fish.'
        b.   *Giovanni *sempre* mangia pesce.
                Giovanni always eats fish
        c.   Giovanni aveva *sempre* mangiato pesce.
                Giovanni had always eaten fish

        d.   *Giovanni *sempre* aveva mangiato pesce.
                Giovanni always had eaten fish

Patients were generally able to perform the ordering task, as shown by the results in (11).

(11)   Constituent ordering task for Italian (Lonzi & Luzzatti 1993)

patient	% correct ordering
AD	89%
EB	84%
CM	84%

From this one can conclude that X-zero movement is spared. Apparent counterexamples to such a view can be found in Zonneveld and Bastiaanse (1999) and Friedmann (2001). Zonneveld and Bastiaanse (1999) looked at verb raising in Dutch instances of the so called V2 phenomenon, whereby finite verbs in main clauses raise to the second position in the clause; V2 was impaired in agrammatic patients, as was "residual V2" in Hebrew (Friedmann 2001).

(12) Repetition with and without triggered inversion in Hebrew (% correct)

patient	XSVO	XVSO
RN	90%	25%
GR	75%	9%
RA	95%	25%
AL	90%	45%
HY	68%	15%
mean	84%	24%

(from Friedmann 2001)

The results in (12) indicate that basic word order XSVO is not problematic for patients, while the optional raising of the V to the second position yielding XVSO is impaired. Notice however that V2 is raising of the verb to a high position in the clause, in the CP layer. Hence the errors in (12), and likewise those found in Dutch, are attributable to the lack of a CP position as landing site for the head V – i.e. again a structural account of these errors along the lines of the TDH is possible. There is no need to challenge the idea that X-zero movement is intact. Let us now turn to comprehension.

3.   Agrammatic comprensión

The comprehension of the structures considered in (12) above is in all cases preserved. Friedmann and Gil (2001) tested the comprehension of the Hebrew pair XSVO and XVSO ('Here the doctor draws the soldier' and 'Here draws the doctor the soldier' respectively) with the following results:

(13) patient %correct XSVO   XVSO

RN	90	85
GR	93	97
RA	90	86

AL	100	100
HY	93	80
Mean	93	90

Briefly, the raising of V does not affect comprehension. Head raising structures are argued to be spared in the Germanic languages as well: see Friederici and Frazier (1992).

On the other hand, extensive work by Grodzinsky and others has shown that the comprehension of XP movement is severely impaired in agrammatism. By way of example, in their understanding of passives (14a) and object relative clauses (14b, c), and object *it*-clefts, agrammatic subjects perform at chanve level, while in actives, subject relative clauses and subject *it*-clefts their performance is well above chance.

(14) a. The boy was pushed by the girl. (at chance level)
 b. The boy who the girl pushed was tall.
 c. Show me the boy who the girl pushed.
 d. It is the boy who the girl pushed.
 e. The woman was unmasked by the man.
 (from Grodzinsky 1990)

The cross-linguistic validity of this generalisation has also been established. Hagiwara (1993) found that in Japanese passives derived by movement (15a) and scrambled sentences (15b) also granted chance-level performance in aphasic speakers.

(15) a. Hanako$_i$-o Taro-ga t$_i$ nagutta. (at chance level)
 Hanako Taro-nom hit
 'Taro hit Hanako.'
 b. Taro$_i$-ga Hanako-ni t$_i$ nagu-rare-ta.
 Taro-nom Hanako-acc hit-pass-past
 'Taro was hit by Hanako.'
 (from Hagiwara 1993)

The source of the comprehension deficit for constructions derived by movement is construed by Grodzinsky as a consequence of NP-trace deletion:

(16) Trace Deletion Hypothesis (as revised in Grodzinsky 1995)

Traces in   positions are deleted from agrammatic representation.

This is a revised version of the TDH in Grodzinsky (1990) which established that all traces of movement are deleted (thus incorrectly predicting impairment in X-zero movement). On the other hand, the correct understanding, by agrammatic patients, of subject relatives, subject *it*-clefts, and active sentences with subjects raising from VP internal position is taken by Grodzinsky to follow not from spared instances of XP movement, but rather as a result of a non-purely syntactic strategy (Grodzinsky's 1990 Default Principle or Grodzinsky's 2002b A Adjacency Assignment). Under this view, agrammatic speakers assign theta roles to the subject and object positions by following a referential strategy based on the surface word order of the constituents; this strategy grants apparently undisrupted responses with subject relatives, subject *it*-clefts and so on, but not with the corresponding object constructions. Further, there are contrasts between some constructions differing on the theta role assigned to the subject position (experiencers versus agentives in subject position, see (17)) which strongly argue for an account which rests on more than just a syntactic disruption.

(17)   a.   The boy was pushed by the girl.   (chance level)
        b.   The girl was admired by the boy.   (below chance level)
        (from Grodzinsky 2000a)

Hence, assuming that there is indeed a breakdown that results in the deletion of traces in theta positions, we may ask if such deletion follows from a more general deficit or constitutes the deficit itself.

In Gavarró (2002) it was proposed that agrammatism results in part from the unability to apply the operation Agree[2]. This was argued to result in impairment of (i) overt inflectional patterns related to agreement (and structural Case), and (ii)

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[2] Agree operates between a probe α and a goal β iff
    a. α has uninterpretable $\tilde{\phi}$ features
    b. β has identical, interpretable ϕ-features
    c. β has an unchecked feature of structural Case
    d. α c-commands β
    e.   there is no potential alternative goal γ such that α c-commands γ and γ c-commands β
    f.   the structural relation between (α,β) was not created by Merge (α,β)
(as summarised by Carstens (2000))

grammatical phenomena resulting from the application of Move, since Move is a composite operation of Agree; these include XP-movement.

This argument was possible insofar as Move and Agree are related operations under the assumptions of Chomsky (1999)[3]. Move is in fact built on Agree, and disruption in the second implies disruption in the first.

Notice that the derived constraint of disruption to XP projections was achieved through the basic minimalist assumption in Chomsky (1999) that Move is equated with XP movement, and head movement is relegated to the phonological component. So the distinction X-zero/XP movement is built into the theory and accommodates perfectly for the contrast found in agrammatism – thus in this respect minimalism is shown to be empirically adequate.

Nevertheless, as indicated by the analysis above (in section 1), the production of XP movement is not problematic in itself. Necessarily, then, the impairment in the application of Agree should affect only comprehension[4]. By this step (18) subsumes the TDH – with any remedial referential strategies unaffected.

(18)   Impairment in the application of Agree only affects comprehension.

Critical evidence for (18) comes from disrupted comprehension of inflectional agreement patterns; without this kind of evidence (18) is not empirically backed up, and we have to revert to the TDH. There is indeed some research indicative of an agreement comprehension deficit in agrammatism.[5] Acceptance of agreement mismatches, as found by Zurif and Grodzinsky (1983), can also be adduced to argue for disruption in the application of Agree.

Lukatela et al. (1988) argued, on the basis of Serbo-Croatian data, that 'agrammatics are impaired relative to normals when forced to rely on case inflection cues only' (p.4). For Japanese, Hagiwara and Caplan (1990) examined word order variation as in right dislocations, pseudo-clefts, passives and non-canonical actives and

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[3] "The combination of Agree/Pied-Pipe/Merge is the composite operation Move, preempted where possible by the simpler operations Merge and Agree." (p. 7).
"Case-assignment is divorced from movement and reflects standard properties of the probes, indicating that it is a reflex of Agree holding of (probe, goal)." (p.13).
[4] The analysis in terms of Agree bears some resemblance to that in Thompson et al. (1999), where feature checking is argued to be disrupted. But Thompson et al.'s (1999) argument is too general, as it predicts non-selective breakdown in production, the same as Gavarró's (2002) analysis.

the results of their experiment indicate that case marking is not enough for the agrammatic patients to arrive at the target interpretation when the word order is not the canonical one in Japanese.

For French, Jakubowicz and Goldblum (1995) found that patients were impaired when agreement marking surfaced on a verb or an adjective, as in (19), but not when agreement occured within DP/NP (what might be regarded as concord, rather than the result of Agree) or with a copular verb.

(19)   a.   Ils boivent/Il boit le lait.

               They drink-pl/he drinks the milk

       b.   L'acrobate était gentille/gentil.

               The acrobat-fem was nice-fem/nice-masc

(20)   Mean percentage of correct responses of nonfluent aphasics

	marked agreement	unmarked agreement
D, gender	84.2	87.9
D, number	94.7	90.6
N, gender	87.5	86.7
Copula, number	95	85
A, gender	71.7	76.7
V, number	73.3	78.3

For German, Burchert et al. (2001) carried out an experiment on the contrast between object-verb-subject and subject-verb-object; if the object in the first position is derived by movement, the object raising structure is predicted to be impaired by the TDH. What these authors found was that object-verb-subject sequences were indeed impaired (in most patients), and that the agreement markers on subject and object – German being an overtly Case marking language – did not compensate for the deficit putatively due to movement. So, 'the presence of overt unambiguous nominative and accusative markers' did not allow German agrammatic speakers to improve their performance with respect to that encountered in a language with no such morphological cues like English. These results coincide in part with those of Swoboda-Moll et al. (2001?), who carried out an agent identification task and found that 'the

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[5] A problematic case in point is that of reflexives, as indicated by E. Reuland: the interpretation of reflexives seems to be intact in agrammatism (Grodzinsky et al. 1993), even though by hypothesis it is mediated by Agree.

processing of [case and number] morphological cues was not totally impaired', and in fact argued that comprehension improved with the number of converging cues, these including morphological ones.

Finally, for Hebrew subject and object relatives have been the subject of study by Friedmann and Shapiro (xxxx); as verb inflection includes gender markers in Hebrew, the experimental work reported in this paper controlled for gender markings; however, it seems that the gender marking, when available to disambiguate reversible pairs does not facilitate the comprehension of sentences such as *This is the man that the girl kisses*[+fem] (N. Friedmann, p.c.).

Of all these cross-linguistic studies, arguably only those in which no movement operation is involved in the derivations are conclusive: for the other cases, one can claim that inflectional morphology is not impaired, but rather insuficient to surmount the movement impairment. What are the exact predictions of our account, then? If Agree is impaired in comprehension, we expect comprehension to be visibly impaired (i.e. grant chance behaviour) whenever Agree is involved in a derivation and the context does not rule out one of two competing interpretations. Resort to Agree may not be necessary with monoargumental predicates. On the other hand, assuming that a referential strategy is available, interpretation of agent-verb-theme constructions may be above chance (as the empirical works cited report), not due to the operativity of Agree/Move, but thanks to a non-syntactic strategy.

Lacking further empirical evidence, in this paper we have put forward a unified account of the comprehension deficit of agrammatism[6]: an account under which impairment in the resolution of agreement and in the understanding of XP movement related constructions result uniquely from impairment in the application of Agree.

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[6] Needless to say, there is an issue which remains open: how do we account for the contrast between production and comprehension? and how do we encode it in a principles-and-parameters or a minimalist grammar?

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