Failure to Agree in Agrammatism

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The purpose of this paper is to consider, in one particular respect, the bearing on linguistic theory of the study of aphasia. We will examine the inflectional deficits reported in the literature on aphasia and see how they can be accommodated in contemporary minimalism, holding minimal impairment as a basic assumption. The association between agreement (to which inflection relates) and movement embedded in the minimalist theories will also be considered and shown to be at least potentially problematic. To conclude, a proposal will be made to accommodate for the facts of agrammatism in a natural way.[1]

1. The empirical domain

The empirical domain which we aim to explore is that of inflection. The deficit of inflectional markers (including Case markers) and function words

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associated with aphasia was recorded long ago in the literature. See, e.g., the example (1) due to Deleuze (1819, quoted in Goodglass 1976).

(1)   Souhaiter bonjour, rester, mari venir.
        wish-inf good-morning remain-inf husband come-inf
        'He said good-morning, stayed, the husband came.'

In this example, the adult French finite verbs have been replaced by their non-finite, infinitive, counterparts. Forms departing from the normal adult form are also illustrated for English (2), Catalan (3), Spanish (4), and Hebrew (5). (Mismatches in agreement have been found accepted as well; see e.g. Zurif and Grodzinsky 1983).

(2)   Uh, oh, I guess six month ... my mother pass away.
        (Goodglass 1976: 239)

(3)   No me'n recordo. No sortir.
        not refl of-it remember-1s not come out
        'I don't remember. It doesn't come out.'
        (Gavarró 1993: 3)

(4)   a.   casas
              houses (repetition of "casa" 'house')

        b.   La niño tiene un vestido.
              det-f child-m has a dress
              (repetition of "La niña tiene un vestido", 'The girl has
              a dress')

        c.   Ser correcto.
              be-inf correct
              'That's correct.'

        d.   Mañana iré al cine
              tomorrow go-fut-1s to-the cinema

(repetition of "Mañana iremos al cine" , 'Tomorrow we'll go to the cinema')

(Gavarró 1993: 4)

(5) a. xamesh yamin

    five-f days-m

  b. tiylu anaxnu ba'ali ve'ani

    walked-3pl we my-husband and I

    (Grodzinsky 1990)

   Examples from other languages are found in the literature. The examples above suffice to show that the inflectional deficit associated with agrammatic aphasia involve omissions of inflectional markers (2), as well as substitutions, both in concatenative (1), (3), (4), and non-concatenative morphology (5).

   Grodzinsky (1990) convincingly argues that the deviant forms of the kind exemplified result from syntactic impairment, rather than a morphological or phonological one (as in Lapointe 1983 or Kean 1977 respectively). The categories affected by this syntactic impairment are (i) tense, aspect and person on the verbs (as illustrated in (1), (2), (3), (5)), (ii) gender and number on D/N categories (as in (3)-(5)).

   The claim has been made that there is a more selective inflectional impairment which affects only the production of a subset of the inflectional categories above.[2] Thus Hagiwara (1995), Friedmann and Grodzinsky (1997), and Friedmann (1998) describe the following cases of impairment of a subset of categories: CP for Japanese, TP (but not AGRP) for Hebrew.

(6) a. Taro-wa kinoo ryokou-ni dekake-*ru/ta

     Taro-top_yesterday_a_trip-to-go_*prespa_t_

_ _ _ 'Taro_*go/went_on_a_trip yesterday.'__

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[2] That is, the impairment is not a central impairment in terms of Caramazza and Zurif 1976, i.e. an impairment affecting production, comprehension and grammaticality judgment.

_ _ _ _(grammaticality contrast detected)_

_ _ _b_._ _Taro-wa sono hon-o doko-de kaimasita-*∅/ka.

Taro-top that book-acc where buy-past ∅/Q

'Where did Taro buy that book?'

(grammaticality contrast undetected)_

(Hagiwara 1995)

(7)   a.   Etmol ha-yeled katav.

yesterday the boy write-past

b.   *Etmol ha-yeled yiktov.

yesterday the boy write-fut

(ungrammaticality undetected)

c.   *Etmol ha-yeled katvu.

yesterday the boy write-past-pl

(ungrammaticality detected)

(Friedmann and Grodzinsky 1997)

(8)   *Etmol ata telex.

yesterday you go-fut-2-m-sg

(ungrammaticality undetected)

(Friedmann 1998)

Other sources can be adduced for selective impairment: De Bleser and Luzzatti (1994) found verb agreement spared in some Italian patients, etc. (see Friedmann and Grodzinsky 1997 for further references).

However, Hagiwara expressly acknowledges the existence of patients whose impairment is general. As for Friedmann and Grodzinsky (1997) and Friedmann, it is unclear whether the existence of general (i.e. non-selective) impairment is precluded or not. In any case, their theory does not exclude such a possibility. For these reasons, and while we retain the case of selective impairment in mind, general impairment remains part of the empirical domain

to be characterised. This general impairment has been noted for production and grammaticality judgement (see Zurif and Grodzinsky 1983).

More recently in the history of aphasiology, another area in which agrammatics display deficits has been pointed out: that relating to displacement of constituents within a structure (e.g. Thompson, Shapiro, Jacobs and Schneider 1994 for disruption of wh-questions). Grodzinsky (1990) first asserts that the operation Move is altered in agrammatism in view of the disruption in the interpretation of sentences involving movement, notably passives as opposed to actives. The principle he formulates is known as the Trace Deletion Hypothesis (TDH, Grodzinsky 1986, 1990, 1995) -- what should be the exact formulation of the TDH is not relevant here; see, for discussion, Hickok & Avrutin 1995.

(9)   The Trace Deletion Hypothesis claims that traces of syntactic movement of phrasal constituents are deleted from grammatical representations of patients [of agrammatic aphasia], resulting in a selective syntactic impairment. (Grodzinsky and Finkel 1998: 282)

Trace deletion affects comprehension as well as grammaticality judgements (for which see Grodzinsky and Finkel 1998), and, if it affects grammatical representation as claimed, should have repercussions in sentence production too.

Notice that trace deletion does not disrupt X^0 movement, according to the empirical evidence. Thus Lonzi and Luzzatti (1993) demonstrate that X^0 movement remains intact; they examine word order alternations in Italian, in particular the relative position of adverbs and verbs. Non-finite verbs may follow or precede adverbs, while finite verbs must always precede adverbs, as a result of verb raising to I (see (10)). Three agrammatic patients were shown to have knowledge of these alternations by means of a constituent ordering task.

(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

    e.   ... sempre mangiare pesce

always eat-inf fish

    f.   ... mangiare sempre pesce

eat-inf always fish

Nonetheless, evidence of impaired head-raising is attested: Zonneweld and Bastiaanse (1999) show cases of V2 being impaired in Dutch agrammatism. Then, X^0 movement cannot be assumed to be impaired, but impairment can result from independent sources. We will come back to the theoretical implications of X^0 movement being preserved.

Before we turn to the theoretical analysis of the phenomena summarised so far, it should be pointed out that the asymmetries that may arise between production and comprehension, and also grammaticality judgement, in agrammatic subjects are not central to this paper. We attempt to characterise the disruption that affects grammatical derivations, and the reasons why the disruption is not apparent in all cases remains a topic for future research (but see section 2.2).

2. Agrammatism and minimalism

2.1.   Background

The account of agreement and movement proposed in the minimalist program constitutes a departure from previous models of generative grammar and, even within minimalism (Chomsky 1992 [1995], 1998, 1999) the formalisation of the phenomena has undergone a considerable shift. All minimalist theories establish some connection or another between agreement and movement, which is relevant to our concerns.

When compared to the previous principles-and-parameters models, Chomsky (1992 [1995]) introduces the modifications of: (i) limiting levels of representation to the interface levels (PF and LF), and (ii) determining that structural Case and agreement only occur in Spec-head configurations. The sentential structure (11) is the one in which these relations hold.

(11)

```
     CP
     2
SPEC    C'
       2
      C      AGRs''
             2
   SPEC   AGRs'
            2
          AGRs  TP
             2
           T    AGRo''
                2
             SPEC   AGRo'
                   2
                 AGRo    VP
                      2
                    SU      V'
                         2
                        V      OB
```

In this structure, the subject SU is assumed to raise to the specifier of AGRs, and the object OB to the specifier of AGRo; in the two resulting Spec-head configurations, both subject and object can acquire morphological case

and/or come to agree with the inflected verb -- since V raises successively to AGRo, T and AGRs. Thus subject and object enter into two kinds of relations with a verbal predicate: agreement, which consists of feature sharing, and Case, which manifests itself in the NP alone. The AGR projection is the only one involved in agreement, while Case involves the raised T and V projections, depending on their lexical properties.

It was suggested in Gavarró (1993) that this new theoretical approach granted us some generalisations based on the work of Grodzinsky (1990) but not forseen in his original work, which had been carried out in former versions of principles-and-parameters. Grodzinsky (1990) dealt separately with the inflection deviant forms and the impairment related to movement, the second by a version of the TDH introduced above. It was pointed out in Gavarró (1993) that the TDH suffices to predict disruption of inflection if agreement and case assignment are a product of movement, as is the case already in the first version of minimalism. Moreover, this stance allows us to generalise over other facts, such as the distribution of DPs/NPs with respect to finite and non-finite verbs. For example, the presence of a full NP as in (1) is expected if feature checking, being mediated by traces, is disrupted and thus the +/- finite feature cannot be properly controlled by the speaker.

(1)   ... mari venir
           husband come-inf

However, this proposal suffered from an empirical shortcoming (pointed out to me by Y. Grodzinsky): it predicted that all sorts of movement (or displacement) are impaired, contrary to fact.

Thompson, Fix and Gitelman (1999) and Izvoski and Ullman (1999) argued for minimalist accounts of agrammatism not unlike that in Gavarró (1993): the first considered overproduction and substitution of inflection by an English speaking patient and proposed impairment in feature-checking (as in Chomsky 1995); the second equated inflectional deficits to impairment of the
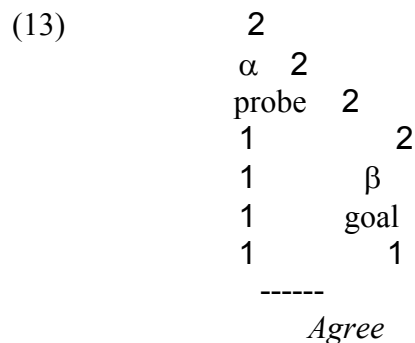
operations of concatenation and/or movement (Chomsky 1995) with a cumulative effect (with higher nodes being more affected).

2.2. Agreement redefined

Later versions of minimalism retain the inherent relation between movement and agreement, albeit in a different way. Chomsky (1998) redefines the basic operations that intervene in the syntax. These are: Merge, Agree and Move. Agree is defined as establishing 'a relation (agreement, Case-checking) between a linguistic expression and a feature F in some restricted search space' (Chomsky 1998: 14).

(12)   Agree operates between a probe α and a goal β iff
   a. α has uninterpretable f-features
   b. β has identical, interpretable f-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))

(13)
```
            2
        α   2
        probe   2
        1          2
        1          β
        1          goal
        1          1
         ------
            Agree
```

Move is an operation composite of Merge and Agree (plus an extra step). That Move should be a composite of simple operations brings in a theoretical

problem with respect to economy: 'good design conditions would lead us to expect that simpler operations are preferred over more complex ones, so that Merge or Agree (or their combination) preempt Move' (Chomsky 1998: 14). To overcome this contradiction, a new metric of economy is introduced by Chomsky. This comes to show that the composite character of Move was not free of shortcomings.

We have seen that, just as agreement is found to be deviant in agrammatism, word order patterns (partially determined by movement) are altered, although in a more selective manner. Now, assuming Chomsky 1998 has the following consequence: if the application of Agree is problematic in agrammatism, we would expect movement to be problematic too, insofar as Move requires the application of Agree. Contrary to this, movement seems to be partially but significantly spared in agrammatism.

With respect to the theory as stated in Chomsky 1998, and given the empirical evidence above, agrammatism could be taken as an argument for reconsideration of the basic operations Move and Agree. This could involve either the restoration of Move as a primitive operation, or granting Move a status whereby it was not a composite of Agree. Notice as well that there are independent reasons to make Agree and Move entirely independent operations: that Move should be preeempted, due to economy, by Merge and Agree was problematic in itself (see Chomsky 1998: 14).

Carstens (2000) points out some shortcomings of Chomsky's (1998) account of agreement, and separates this from concord (this last one understood as agreement within DP, between sister constituents). Chomsky (1999: 34, fn. 5) also signals that 'there is presumably a similar but distinct agreement relation, concord, involving Merge only'; the details of it remain unspecified. Roeper & Eisenbeiss (2000) assume the distinction between concord and agreement to account for the early vs. late development of inflectional patterns in acquisition. In view of the fact that some authors have argued that there is preserved agreement within DPs in some patient's agrammatism (see De Bleser, Bayer & Luzzatti (1995/96) for German, and Friedmann and

Grodzinsky 1997 for Hebrew), the proposal of Carstens may, therefore, be relevant for the study of agrammatism too. This is a matter for future research.

The issue of concord aside, there is a possible alternative to a redefinition of the basic operations that encompasses the facts associated with agrammatism; it consists in analysing the inflectional deficits at the level of lexical insertion. It can be argued that the features characterising a lexical item have been empoverished or misassigned in the lexicon in such a way that approapriate lexical insertion is impossible. So, for example, in (2):

(2)   Uh, oh, I guess six month ... my mother pass away.

month can have been wrongly specified as [+ plural], or *pass* been specified as [+ past], or simply unspecified for tense, so that matching of features proceeds as normal. The locus of the inflectional deficit does not lie in the application of any syntactic operation, but in the lexical specification of the item entering the enumeration. However, such an analysis relies on the misassignment or unspecification of a particular set of features: ϕ-features and verbal features of tense, aspect and mood. There is no principled way of accounting for the limits of the set of features affected - i.e. ϕ-features and verbal inflectional features being affected becomes accidental. This represents a loss of explanatory adequacy with respect to the syntactic account of agrammatism initiated by Grodzinsky (1990).

The puzzle that a minimalist account of the kind outlined above poses is then: how can we account for the inflectional deficit associated with agrammatism together with the deficit of XP-movement (but not X^0 movement) if Move is stated in terms of Agree? That is, how can we predict general impairment in the application of an operation without automatically predicting impairment in the application of the operation that is the composite of the first?

The basic operations Move and Agree remain unchanged in Chomsky 1999:

(14) a.   'a relation Agree, holding between α and β, where α has interpretable features and β has uninterpretable ones, which delete under Agree' (p. 3). 'The agreement relation removes the uninterpretable features from the narrow syntax' (p. 2). 'Matching of probe-goal induces Agree, eliminating uninterpretable features' (p. 4).

  b.   'The combination of Agree/Pied-Pipe/Merge is the composite operation Move, preempted where possible by the simpler operations Merge and Agree' (p. 7).

  c.   '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).

However, a neater distinction is drawn between X^0 and XP movement: 'There are good reasons to suspect that a substantial core of head-raising processes, excluding incorporation in the sense of Baker (1988), may fall within the phonological component. (...) The interpretative burden is reduced if, say, verbs are interpreted the same way whether they remain in situ or raise to T or C. (...) Verbs are not interpreted differently in English vs. Romance, or Main Scandinavian vs. Icelandic, or embedded vs. root structures. More generally, semantic effects of head-raising in the core inflectional system are slight or nonexistent, as contrasted with XP-movement, with effects that are substantial and systematic. That would follow insofar as head-raising is not part of narrow syntax. (...) Overt V-to-T raising, T-to-C raising, and N-to-D raising are phonological properties, conditioned by the phonetically affixal character of the inflectional categories.' (Chomsky 1999: 30-31).

This new approach undoubtedly raises many questions, especially with respect to PF (e.g. what kind of operations are allowed on the way to PF, if X^0

movement is among them?). However, on the other hand, it offers advantages over previous versions of minimalism in allowing a natural formulation of part of the agrammatic deficit. The dissociation of X^0 movement, spared in agrammatism according to the literature, from XP-movement resolves the puzzle outlined above. In actual fact, the data of agrammatism outlined not only give support to this theoretical distinction, but render it necessary.

In the present framework, if the operation Agree is applied in a deficient manner by agrammatic patients, as a consequence Move will be deficient, but not X^0 movement, because this last operation belongs to the PF component and it is not subsumed by Move. This prediction meets the empirical evidence. Evidence that would run contrary to the analysis here would involve an inflectional deficit without XP-movement deficits, or an intact inflection with XP-movement deficits. I have not been able to find any such case in the literature.

Inflectional and word order deviations constitute a natural class in virtue of the hypothesis put forward here, which can be stated as follows.

(15)   Agrammatism results in part from unability of the application
        of the operation Agree. This results in impairment of (i) overt
        inflectional patterns related to agreement (and structural
        Case), (ii) grammatical phenomena resulting from the
        application of Move, since Move is a composite
        operation of Agree; these include XP-movement: wh-
        movement and raising (in passives, etc.).

Note that, with respect to Case, only structural Case may be considered here -- and in e.g. Grodzinky's 1990 work.[3] Other phenomena that are not covered by (15) are e.g. absence of determiners, and governed prepositions

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[3] Our predictions run contrary to what seem to be the facts of Lukatela, Crain and Shankweiler 1988 for Case in Serbo-Croatian, which seems to be spared in contexts of subcategorisation.

(Grodzinsky 1990), which by hypothesis do not conform a natural class with the phenomena considered here. There is another area in which agrammatic subjects fail in a systematic way, namely the resolution of pronominal reference (Grodzinsky et al. 1993), and the introduction of discourse referents in general (Avrutin & Manzoni 2000); as argued by Avrutin and Manzoni (2000), this may result from an impairment in discourse devices, rather than a grammatical breakdown. An analysis in terms of discourse disruption is unlikely to extend to the facts of e.g. gender inflection, for which a grammatical account is called for.

In principle, (15) should grant disruption in the production of inflection and grammatical markers, but not necessarily in their comprehension (unless comprehension depends exclusively on inflectional markers in a particular construction); production and comprehension of sentences with displaced constituents should also be affected.

Regarding the TDH of Grodzinsky (1986, 1990, 1995), the minimalist formulation of 1999 renders its reformulation necessary, since traces are dispensed with, etc.; this need not be more than a technical matter. However, the analysis presented here would seem to make the TDH redundant (or at least partially redundant, to an extend that I leave for future research). This follows from the fact that the TDH singles out grammatical representations in which relations are mediated by a (XP-)trace; these are equivalent to representations which result from the application of Move. Further, the application of Move fails if Agree fails, because the first is a composite of the second. I discard the possibility that the operation Agree (or Move) should fail without consequence for the output, whether this is sentence production or grammaticality judgement. One of our theoretical assumptions should be that operations are only performed if they have an effect at the interfaces. This does not preclude, though, that the aphasic patient can handle the situation by extralinguistic devices.

In this paper I have tried to show how linguistic theory informs the study of agrammatism. More importantly, the linguistic evidence provided by agrammatism has a bearing on the evaluation of competing linguistic theories. In the case at hand, our analysis of some phenomena associated with agrammatism lends support to the last version of minimalism (Chomsky 1999) over previous ones, because this helps tease apart impaired agreement and XP-movement from spared X^0 movement.

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