Minimality effects in agrammatic comprehension

Nino Grillo

A new approach to agrammatic comprehension in Broca's aphasics is proposed that provides a link between processing based and representational approaches to the topic. The central claim is that the latest formulation of Relativized Minimality (Rizzi 1990, 2001; Starke 2001) can provide such a link and make it possible to explain some well acknowledged asymmetries in agrammatic comprehension.

1. Introduction

In this article I propose a new theoretical explanation of some comprehension patterns in agrammatic Broca's aphasia. I will claim that the Relativized Minimality (RM) locality principle (Rizzi 1990, 2001; Starke, 2001) is at the base of some of the most typical asymmetries in agrammatic comprehension, namely those between *canonical* and *non-canonical* structures. In the first part of the paper, I will briefly refer to the so-called *representational* and *capacity limitation* approaches aiming to show the necessity of providing a link between the two in order to solve certain major problems they pose, related to *variation* and *complexity*.[1] I will claim that both the *variation* and the *complexity* problems can be solved, integrating the two approaches and providing a definition of complexity valid in both representational and processing terms. In section 3 some recent developments of Relativized Minimality will be introduced. In section 4 I will claim that a limitation in processing resources can impede agrammatic patients in activating the complete array of morphosyntactic features normally associated with syntactic heads. If this is true it should be possible to predict the *canonical/non-canonical* asymmetry in agrammatic comprehensions mentioned above. Specifically, my prediction would be that sentences involving movement of an NP over another one (or the establishment of a long distance relationship over an intervening NP) should pose more problems than those in which movement does not cross

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[1] Some problems raised by representational approaches are very well known and debated (i.e. the so-called variation problem, or the related *optionality* problem in the sense of Avrutin in press). This is not so for other problems concerning capacity limitation approaches, i.e. the *complexity* problem. According to such approaches agrammatic comprehension should be attributed to (and restricted to) more complex syntactic structures, which presumably require more processing capacity. The complexity problem arises when we try to define syntactic complexity without making reference to a theory of syntactic representation, and using a generic definition of complexity (see e.g. Carpenter et al. 1994).

any 'potential intervener'. In this view the standard application of the fundamental anti-identity locality principle on impoverished structures generates the asymmetries. Relativized Minimality in fact should block the formation of a chain over an intervening element whenever it cannot 'see' any difference in the internal structures of the elements involved. The last part of the article is dedicated to the reanalysis of some of the structures typically problematic for agrammatic patients under this new perspective.

2. *Representational vs. capacity limitation approaches to agrammatic aphasia*

Until the end of the seventies, Broca's aphasia was interpreted as a syndrome whose effects were restricted to language production and it was assumed that comprehension was spared. Starting from a pioneer study conducted by Caramazza and Zurif in 1976, it appeared clear that comprehension was also, at least partially, compromised. Caramazza and Zurif showed that agrammatic aphasics' difficulties in comprehension do not extend to all types of sentences but are in fact restricted to semantically 'reversible' ones. When presented with reversible sentences aphasic patients are not capable of recovering the thematic information. This impairment is even more specific; only a subset of reversible constructions is problematic. So passives, object relatives and object clefts (among others) normally pose more problems than e.g. actives, subject relatives, subject clefts, adjectival passives. To account for these facts Grodzinsky (1990, 1999) has proposed the influential Trace Deletion Hypothesis (TDH). The main claim of the TDH is that not all the syntactic competence is lost in agrammatic aphasia, but only a very specific part of it: agrammatic patients would be incapable of representing traces at S-structure. The most important prediction of the TDH is that, missing the traces from the agrammatic representation, there will be no way to connect the moved elements to their original position and to assign them their original thematic role. Presented with an irreversible sentence (or with a sentence with no transformations) aphasic patients should be capable of recovering the thematic information from other systems external to the core grammar. In the case of irreversible sentences, agrammatic patients would apply a non-grammatical cognitive strategy that makes them assign the agentive theta role to the first NP encountered. This strategy gives positive results when the first NP of the sentence has to carry the agentive theta role (subject relatives, subject clefts…), but generates confusion when the first NP does not have to carry the agentive theta role (object relatives, object clefts, passives…). Crucially all the structures whose comprehension is compromised in agrammatic patients involve the application of a transformation, but this characteristic does not suffice to predict their comprehension patterns. The problems arise only when the moved element does not carry the agentive theta role. Presented with an active sentence agrammatic patients perform at a level above chance (they comprehend more than half of the sentences presented by the examiner). According to the TDH this is so because the first NP encountered has to carry the agentive theta role. This situation is mirrored with passive sentences, in which there is an inversion in the linear order of the respective positions of theta roles. In these cases the application of the cognitive strategy assigning the agentive theta role to the first NP encountered contrasts with the presence of the by-phrase, which also assigns the theta role agent. The presence of two NPs carrying the same theta role in the same sentence is claimed to confuse the patients, who answer at random, performing at chance level. Grodzinsky's analysis has obtained good results in predicting not only the comprehension pattern of English-speaking agrammatic patients but also with languages such as Chinese, Japanese,

Serbo-Croatian, and Hebrew. Nevertheless the TDH has been strongly criticized and serious doubts have been shed over its validity.

At the root of the criticism directed at the TDH, its variants (see Hickok 1992; Mauner et al. 1993) and more generally at any representational approach to the topic, lies the observation that, if they correctly predict a variation in performance level based on the structure type, under their perspective, no variation is attested varying the task. This prediction happens to be false: Linebarger et al. (1983) demonstrated that agrammatic patients' performances vary considerably when they have to comprehend a sentence than when they simply have to judge its grammaticality. Crucially agrammatic patients seem to get good results even when asked to judge the grammaticality of a sentence that requires the correct representation of traces in order to be correctly judged.

These facts, together with other evidence of a clear processing deficit in agrammatic patients (slowed lexical access, delayed priming, syntactic priming effects…) have brought many researchers to believe that the linguistic knowledge of agrammatic patients is intact and to hypothesize that what is compromised is the *processing capacities necessary to use that knowledge* (for an extensive presentation see Kolk 1998; Avrutin 2000 and reference cited therein). The general claim of this approaches is that, in the presence of a limitation of processing resources (general or specific), it is natural to expect a variation in performance dependent on the nature of the task: the more difficult the task the lower the chance of the agrammatic patient accomplishing it correctly. This would explain the difference in performance between simple grammaticality judgments, and the more complex operation of comprehension (which requires also the execution of the previous task). A general principle of complexity (based on the observations conducted on normal subjects) is used to explain the attested variation in comprehension: the more 'complex' a sentence is to process, the lower the performance. The most important result obtained through this move from a representational approach to capacity limitation approach is that with the latter we can correctly predict the task dependent variation together with the attested variation in performance between different subjects. This variation cannot be explained in representational terms.

The role of complexity is central to any approach in *processing* terms to language comprehension deficits. Nevertheless it is not rare to find rather generic definitions of complexity, or no definition at all in the literature. The 'definition' provided is sometimes not more than a scale of complexity level derived by psycholinguistic studies conducted on normal adult speakers. These studies have the merit of telling us which constructions are more complex. What they cannot say is why this is so. To answer to this question (and to understand the mechanisms at the base of sentence comprehension) we need to make reference to a representational theory. Only a theory of syntactic representation can tell us *why* it is that one syntactic structure is more complex than another. Of course we want the psycholinguistic evidence and the theoretical reasoning to point in the same direction, and in this sense the psycholinguistic evidence is the source of confirmation or falsification for the theoretical hypothesis. Nevertheless a theory of syntactic complexity can be stated only in representational terms.

In the following sections I will attempt to address these problems from a new perspective that permits to obtain some (preliminary) interesting results. The present approach, in fact, permits to provide a non-trivial definition of syntactic (and computational) complexity. Complexity is defined here in terms of relative quantity (and quality, defined in terms of level

of embedding in a feature tree) of morphosyntactic features whose presence is required for a structure not to be ruled out by the anti-identity locality principle.

3. *Relativized minimality and the "Cartographic Approach"*

In the first formulation of Relativized Minimality (Rizzi 1990) the fundamental distinctions that the principle is sensitive to are those between Heads and Specifiers, and in the latter class between A and A' type. It has been clear since the beginning that the above distinction needed to be enriched to account for several apparent exceptions to the principle (see for example the treatment of D-linking and referentiality in Rizzi 1990 and Cinque 1990). It is only in recent years that the system has been shown to be able to handle this and other problematic apparent exceptions. This result is due in great part to the development of an analysis in terms of the fine grained featural composition of syntactic elements, instead of the simpler A/A' distinction.

    Given the definition in (1), (taken from Rizzi 2001) the question of the sensitivity of the principle rely on the definition of 'same structural type'.

(1)   Y is in Minimal Configuration (MC) with X iff there is no Z such that
         (i)   Z is of the same structural type as X, and
         (ii)   Z intervenes between X and Y.

A possible definition is provided by Chomsky (1995) in a formulation in derivational terms of RM: the Minimal Link Condition.

(2)   Minimal Link Condition: K attracts a only if there is no b, b closer to K than a, such that
         K attracts b.

In the above definition the 'sameness' of the intervening element is defined in terms of identity of features. As Rizzi points out, there is sufficient motivation to believe that, while a distinction in terms of A vs. A' has turned out to be too restrictive, the formulation above is too permissive. Quantificational adverbs and negation, for example, differ in featural make-up from wh- elements and yet they do interfere with them (for an exhaustive argumentation see Rizzi, 2001). To solve this puzzle Rizzi makes use of the recent development of the Cartographic Approach, *the attempt to draw maps as detailed and precise as possible of syntactic configurations* (see Belletti, 2002; Cinque, 1999, 2001; Rizzi, 1997, 2004). Rizzi shows that the cartographic studies offer a series of positions which we can continue to define as A' for convenience, but which can provide us with the needed distinctions.

(3)   Force Top* Int Top Focus Mod* Top* Fin IP (Rizzi 1997, 2001b)

Each of these positions, in fact, can be defined by its particular set of morphosyntactic features, and such features can be catalogued in virtue of the "class" they belong to.

(4)   a. Argumental: person, gender, number, case
         b. Quantificational: Wh-, Neg, measure, focus…
         c. Modifiers: evaluative, epistemic, Neg, frequentative, celerative, measure, manner…
         d. Topic.

In virtue of this classification Rizzi can derive a definition of 'same structural type' which permits us to avoid the excessive freedom of movement generated by the Minimal Link Condition on one side, and the excess of restriction generated by the simple distinction A/A' on the other. Rizzi express this intuition as in (5) below.

(5)   'Same structural type' = Spec licensed by features of the same class in (4).

Given the above formulation, we expect RM effects only between features that belong to the same class, but not among features that belong to different classes.[2]

4. *Processing derived structural deficit*

Given RM's capacity to 'look inside' the labels and operate upon sets of morphosyntactic features, it follows quite naturally that the possibility to form a chain over an intervening element will depend on the nature and the number of features actually represented. Changing one or both variables, that is, changing the nature and number of the features associated to a particular node in the syntactic tree, we should expect a variation in terms of legitimacy to form a chain, especially if such modifications imply the change of "class" in the sense defined in (4). Let us use an example to make this point clearer, given the familiar configuration in (6).

(6)   . . . X . . . Z . . . Y . . .

We know that the possibility of forming a chain between X and Y depends on the nature of the elements involved; following the extended formulation of RM presented above, such possibility will depend on the morphosyntactic features associated with each element. Therefore, we should rewrite the schema in (6) as in (7).

(7)   . . .   X   . . .   Z   . . .   Y   . . .
       $\{\alpha,\beta,\gamma,\delta,\varepsilon\}_{\text{class Q}}$ $\{\alpha,\beta,\gamma,\delta\}_{\text{class A}}$ $\{\alpha,\beta,\gamma,\delta,\varepsilon\}_{\text{class Q}}$

In (7) a particular set of morphosyntactic features (represented with Greek letters) is associated with every node. Given this configuration, RM should permit the formation of a relation Σ between X and Y: the presence of the element ε suffices for RM to see the difference between X and Z and therefore to authorize the movement of Y over Z (it is necessary to think about ε as the distinctive feature of the particular head and the relevant relation we are considering, i.e. a [wh-] feature in the head of a FocP, which if missed would imply a change of "class" of the relevant set from Argumental to Quantificational). Let's see what a variation in the composition of features of each set would produce (8).

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[2] Note that for the present purposes Rizzi's account is equivalent to the one in Starke (2001), I assume the system I will present to be entirely translatable into Starke's model and I will sometimes refer to the latter for ease of presentation.

(8)   . . .   X   . . .   Z   . . .   Y . . .
         $\{\alpha,\beta,\gamma,\delta\}$class A $\{\alpha,\beta,\gamma,\delta\}$class A $\{\alpha,\beta,\gamma,\delta\}$class A

Given the new configuration in (8) and particularly the composition of feature sets associated with each element, it's clear that RM will disallow a relation between X and Y.

Crucially we should expect a limitation in the possibility of forming a chain over an intervening element in the case of a reduction in the number (and quality) of features associated with each syntactic node.

Given these premises, my hypothesis is that comprehension patterns of Broca's aphasics can be thought of as the consequence of "underspecification", that is, an impoverishment in the number and quality of morphosyntactic features in their syntactic representations. This underspecification is seen as a consequence of the limitation of their processing capacities. Given the difficulties in maintaining the activation of lexical information for agrammatic aphasics, it is plausible to think that the information associated with the heads of the syntactic trees can be "impoverished" of some important feature, as an effect of a fast decay of information or because of a more general processing deficit that makes possible only a laborious and partial recovery of information (see Zurif et al. 1993 among others). Furthermore, the representation of some features (i.e. "discourse related"; see Grodzinsky & Reinhart 1993; Avrutin 1999, 2000, 2004) seems to be extremely costly in terms of processing resources since it requires a continuous shifting from the narrow syntactic level to the discourse level. Following this intuition, I will try to reduce agrammatic aphasic's comprehension patterns to a special case of RM violation due to the correct application of this constraint to featurally impoverished syntactic structures.

Consider for instance an object cleft, whose comprehension is notoriously compromised in agrammatic aphasics.
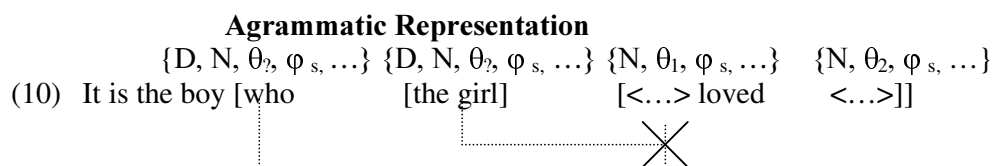
         Normal Representation
         $\{D, N, \theta_2, \varphi_{s, acc}, \Sigma\}$ $\{D, N, \theta_1, \varphi_{s, nom}\}$ $\{D, N, \theta_1, \varphi_{s, nom}\}$ $\{D, N, \theta_2, \varphi_{s, acc}, \Sigma\}$
(9)   It is   the boy [who   [the girl]   [<the girl>   loved   <the boy>]]

The representation of an object-cleft in normal adult speakers is schematized in (9). RM authorizes the formation of the relevant chains between the moved NPs and their traces in virtue of the presence of the features $[\varphi_{s,acc};\Sigma]$ distinct from the features $[\varphi_{s,nom}]$. It is specifically the presence of the Σ feature (that we can call a 'relative' feature), that defines the object <who> as a member of a class distinct from the one to which the subject <the girl> belongs. The former belongs to the Operator's class while the latter belongs to the Argumental class.

Let us consider the same structure impoverished with respect to some morphosyntactic feature.

Agrammatic Representation

$\{D, N, \theta_?, \varphi_s, \ldots\}$ $\{D, N, \theta_?, \varphi_s, \ldots\}$ $\{N, \theta_1, \varphi_s, \ldots\}$ $\{N, \theta_2, \varphi_s, \ldots\}$

(10)   It is the boy [who   [the girl]   [<…> loved   <…>]]

Because of the extreme impoverishment of features actually represented, RM blocks the formation of the relevant chains; as a consequence it is impossible to assign the correct theta role to each argument. The situation changes completely with subject relatives, which are correctly interpreted by agrammatic patients. In this case, in fact there is no NP intervening between the moved constituent and its trace, which means that there could be no RM effects.

(11)   It is the boy [who [<the boy> loved the girl]]

In short, even an underspecified representation of a subject cleft allows us to form the relevant chain and to recover the thematic information: no potential binders intervene between the moved element and its trace.[3]

4.1. Minimality in agrammatic comprehension

Following the same line it is possible explain other comprehension patterns highlighted in the literature. It seems that comprehension is compromised whenever there are potential interveners (i.e. NPs) between a moved NP and its trace, whereas it is preserved when no potential antecedent intervenes. Below I provide a short list of some of the relevant structures, together with a short analysis that basically follows the one highlighted in the previous section.

4.2. Subject vs. object relatives

(12)   a. The lion that kicked the tiger
         b. [The lion] [< the lion> that [<the lion> kicked the tiger]]

Under current assumption in (12) no NP intervenes between the moved subject and its trace. Our hypothesis correctly predicts a performance above chance in the comprehension of these structures by agrammatic patients. In (13b) the representation of an object relative by a normal adult speaker is schematized. The subject NP intervenes between the moved object and its trace. In such a case only a full representation, which includes all the relevant features,
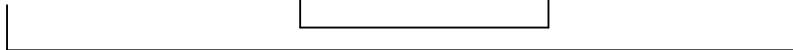
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[3] The intuition of the existence of some long distance principle at work in agrammatic aphasia is not new. We can find some speculation in this direction in Hickok, Zurif & Canseco-Gonzalez (1993) who claim that some sort of long distance principle is at work: '…it seems that when two elements that need to be 'associated' are separated by lexical material, comprehension is poor' (Hickok, Zurif & Canseco-Gonzalez 1993). However, they rapidly abandon this direction in favor of the RTDH claiming 'there is nothing in linguistic theory which corresponds to the present definition of long distance' Much the same intuition is been expressed by Friedmann and Shapiro (2001, see below) see also Grodzinsky (2000c).

will be authorized by RM. RM in fact will permit the formation of a chain only if it 'sees' the two NPs as members of two different classes in the sense explained above.
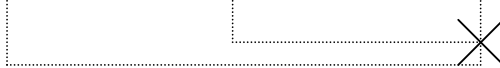
(13)   a. The lion that the tiger kicked

Normal Representation

$\{D, N, \theta_2, \varphi_{s, acc}, \Sigma\}$ $\{D, N, \theta_1, \varphi_{s, nom}\}$ $\{D, N, \theta_1, \varphi_{s, nom}\}$ $\{D, N, \theta_2, \varphi_{s, acc}, \Sigma\}$

b. *The lion*   [*that*   [*the tiger*]   [*<the tiger>kicked <the lion>*]]

Agrammatic Representation

$\{D, N, \theta_?, \varphi_s, …\}$ $\{D, N, \theta_?, \varphi_s, …\}$ $\{N, \theta_1, \varphi_s, …\}$ $\{N, \theta_2, \varphi_s, …\}$

c. *The lion*   [*that* [*the tiger*   [*<...>*   *kicked* *<...>*]]

Given an impoverished representation like the one in (13c), it will be impossible to connect the moved phrases to their traces, which will end up in the impossibility to assign the correct theta role to each argument.

4.3. Passives, unaccusatives and adjectival passives

It is a well-known fact that comprehension of semantically reversible passives is compromised in agrammatism, while this is not the case for their active counterpart. Following Baker, Johnson & Roberts (1989) (see also Collins 2004) it is possible to hypothesize that a minimality effect in passives can be induced by movement of the internal argument over the passive morphology on the verb to which, as they hypothesize, the external argument is assigned. This account is supported by data from aphasic comprehension of unaccusatives (Piñango 1999) and adjectival passives (Grodzinsky et. al 1991).

Piñango (1999) has showed that agrammatic patients are capable of correctly comprehend sentences with unaccusatives constructions such as *the girl spun because of the boy*.[4] Under current approaches the syntactic subject of unaccusatives originates in a post-verbal position and only after a transformation it rejoins the subject position. The present approach predicts correctly a positive performance by agrammatics: the moved NP, in fact, does not cross any other argument which means that there can be no RM effect even if the representation is underspecified.

The same is true for agrammatic comprehension of adjectival passives, which Grodzinsky et al. (1991) show to be unimpaired. Under current assumptions the subject of adjectival passives (as in *John was interested in Mary*) is generated in [Spec,VP], this means that contrary to what we have seen for normal passives no minimality effect are expected to arise.

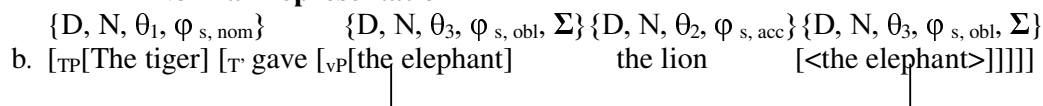[4] Note that this finding is problematic for the TDH.
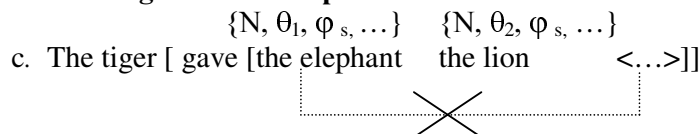
4.4. Datives vs. Double Object Constructions

Additional evidence in favor of the present approach is provided by agrammatic aphasic's performance with double object constructions and normal datives. It has been noted (see Hickok 1992 and references cited therein) that agrammatic patients experience much more difficulty in comprehending the former than the latter. Hickok cites the case reported by Caplan and Futter (1986), an agrammatic patient capable of understanding sentences like *The tiger gave the lion to the elephant* perfectly, but who systematically inverts the assignment of theta roles in *The tiger gave the elephant the lion*. Following Larson (1988 and subsequent work), the double object construction has to be considered as a derived construction obtained by an operation of passivization inside the VP. In these constructions, then, the indirect object has to be connected to its trace through a chain in order to get its theta role correctly assigned, which implies the crossing of the object NP. This unable us to expect a minimality effect to arise in case of underspecification of the relevant feature sets. In normal datives, on the other hand, no minimality is expected. The relevant structures are indicated below.

(14)   a. The tiger gave the lion to the elephant

Normal Representation

$\{D, N, \theta_1, \varphi_{s, nom}\}$ $\quad$ $\{D, N, \theta_3, \varphi_{s, obl}, \Sigma\}\{D, N, \theta_2, \varphi_{s, acc}\}\{D, N, \theta_3, \varphi_{s, obl}, \Sigma\}$

b. $[_{TP}[$The tiger$]$ $[_{T'}$ gave $[_{vP}[$the elephant$]$ $\qquad$ the lion $\qquad$ $[<$the elephant$>]]]]]$

Agrammatic Representation

$\{N, \theta_1, \varphi_{s}, \dots\}$ $\quad$ $\{N, \theta_2, \varphi_{s}, \dots\}$

c. The tiger $[$ gave $[$the elephant $\quad$ the lion $\qquad$ $<\dots>]]$

As we can see in the representation above the DP *the lion* intervenes between the elephant and its trace in the double object construction (14b,c) but not in the normal dative (14a). Again the correct application of RM over impoverished data gives rise to agrammatic comprehension.

4.5. Object vs. Subject Control

It is interesting to notice that we find much the same pattern in the comprehension of control structures. Caplan and Hildebrandt (1988) (cited in Hickok 1992) have tested the comprehension of such sentences in two patients A.B and C.V. Both patients demonstrate better understanding of object control than subject control structures. A.B. understood 100% of the former and only 33% of the latter, C.V. 85% and 25% respectively.

(15)   a. John told Mary$_i$ [PRO$_i$ to go]
        b. John$_j$ promised Mary [PRO$_j$ to go]

Note that in (15a) no potential controller intervenes between PRO and its actual controller *Mary*. This is not the case in (15b); in this case the subject in order to control PRO has to cross the direct object. The possibility to unify the explanation of these data under a general problem with non-local dependencies is appealing. I will live to further investigation questions regarding to what extent this analysis is on the right track and on how this relates to recent approaches to control as movement (see Hornstein et al. 2005 ch.4 and works cited therein).[5]

4.6. Hebrew OSV and OVS structures

Friedmann & Shapiro (2003) have examined aphasics' comprehension of active sentences of the basic form SVO and derived OSV-OVS in Hebrew. The results they obtained are quite clear and indicate that aphasic patients have more problems in comprehending the derived active sentences (of the OSV-OVS form), on which agrammatic performance is at chance level, than the normal active SVO on which their patients perform at a level above chance. The authors interpret these results as evidence in favor of the TDH. However it is clear that such evidences can be claimed to support the present hypothesis. Aphasic patients in fact perform badly only when they have to comprehend the structures in which an NP has been moved over another NP. It is worthwhile noticing that the authors (even if only in a footnote) try to express the same intuition we are developing here.

> 'a different possible type of modification would be to restrict impairment only to' non-local movement' as a movement of an argument over another argument of the same verb. Thus objects that move over subjects will lose their traces, because they move non-locally…'   (Friedmann & Shapiro 2003)

5. Some problems and some potential developments

There are several potential problems and questions that the present approach raises and need to be addressed. Given the preliminary stage of this work and for reasons related to space limitations I will not address these questions extensively here, I will limit myself to some preliminary considerations and I refer to Grillo (2003) and Grillo (in prep.) for a more extensive discussion.

A first question that merits more deepen investigation is related to one of the basic assumptions of this work. Through the whole paper I assumed implicitly that certain particular features and not others are more likely to be not represented/accessed by agrammatic patients. It is reasonable to question this point asking why certain features should be more complex than others to represent/access. The rationale behind this is that, assuming a feature geometric model *à la* Starke, the most embedded features are also the most 'marked' (specific); my assumption (possibly wrong) relates markedness and processing complexity as directly proportional. The additional assumption being that for economy reasons in case of reduction of processing resources we tend to specify more general features rather than more

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[5] But see the concluding remarks section for some additional comments on these and other constructions considered above.

specific ones. This seems to be quite a natural fact regarding all other mental skills and there seem to me to exist no special reasons for language to be an exception in this sense.

Another point that needs to be more extensively discussed is related to the theories of locality I made reference to. In fact given a strict reading of Rizzi and Starke's approach to locality it is not possible to derive all the patterns showed in the preceding sessions. If *relatives* and *clefts* comprehension patterns can be derived without any additional assumptions (crucially absence of a [*wh-*] feature would do the job, changing the class of the relevant set from Quantificational to Argumental in Rizzi's terms), the same cannot be said of other constructions such as *passives* or *control*, but also *double object*. In these cases in fact an impoverishment of the feature set is not connected to any change of class of the relevant feature set, which would not allow us to expect any locality effect (in this sense Rizzi and Starke make exactly the same prediction, for a more detailed analysis see Grillo, in preparation). Note that, regardless of aphasia, movement to A positions posit some problems to actual theories of locality, forcing to add some additional assumption to the basic anti-identity principle (e.g. some version of *equidistance*; see Hornstein et al 2004 chapter 5 for a review). I believe this question to be related with the one above; again it is not possible to address this point extensively here. Nevertheless it seems to me that data from agrammatism can be very precious in this respect. In Grillo (in prep.) I try to pursue the possibility that these data show how these *apparent* exceptions to locality in the A domain do not represent an exception at all (they do satisfy the anti-identity requirements). The intuition I want to pursue is that the anti-identity principle is more sensitive than in Rizzi's and Starke's models, or which is equivalent, that the actual feature tree relevant for locality could be less *flat* than what originally postulated by Starke. This possibility (the simplest possible) to my knowledge has not been pursued yet to account for this apparent anomaly of the locality principle.

A last point that is not possible to discuss here (but see Grillo 2003 for an extensive presentation) relates to the possibility to extend the present approach to comprehension deficits to populations other than agrammatic aphasics, namely children and normal adults with a temporal limitation of processing resources (e.g. normal adults in stressful situation, see Blackwell & Bates 1995, Dick et al. 1998).

6. Concluding remarks

In this paper I have pursued the hypothesis that a reduction of processing capacities can limit the accessibility and representation of the features sets associated with the syntactic heads and that the combination of this with Relativized Minimality approach to locality (Rizzi 1990, 2001; Starke 2001) should give rise to unusual minimality effects, allowing for a natural explanation of some typical comprehension patterns in agrammatism. The approach raises many questions that need to be addressed in future work, the empirical support however is strong and the explanation provides an interesting unified picture of locality effects. The effort to keep *representational* and *processing based* approaches to agrammatism in a coherent picture and the approach from a different perspective (a more promising *capacity limitation* framework and a natural derivation of the asymmetries from locality considerations) allow to recover the powerful intuitions expressed by Grodzinsky in his Trace Deletion Hypothesis.

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