Turkish Agrammatic Aphasia
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CHAPTER 2. OBJECT SCRAMBLING and FINITENESS

Abstract
This study investigates word order and finiteness in Turkish agrammatic aphasia. We compared the production of simple active sentences in base order (SOV) with active sentences in which the object moves over the subject – that is, object scrambling (OSV). We elicited the same finite verbs for both sentence types. However, the production of finite verbs varied with respect to inflection: tense and grammatical mood marked with agreement morphology. The main finding of the study is that object scrambling (OSV) is impaired but finiteness is not. This excludes the claim that a single deficit in tense inflection (TP) can explain difficulties with derived word order and finite verb inflection in agrammatic aphasia (Friedmann & Grodzinsky, 1997), since we found that the same node, TP, is affected by overt argument movement (object scrambling) and not by a tense (T) or mood feature (C). We suggest that the difficulties with verb inflection do not stem from a deficit in finiteness and that overt syntactic movement hampers sentence production in agrammatic aphasia irrespective of the hierarchical position of the elements in the syntactic tree.
2.1. Introduction

One of the defining features of agrammatic Broca’s aphasia is the omission or substitution of free and bound grammatical morphemes (Goodglass, 1968; Caramazza & Berndt, 1985; Marshall, 1986). Many studies have demonstrated that not all grammatical morphemes are equally affected in agrammatic production. Special attention has been paid to verb inflection. Finite verbs seem to be difficult for agrammatic speakers (Miceli, Silveri, Romani & Caramazza, 1989 for Italian; Friedmann, 2000 for Hebrew and Arabic; Bastiaanse, Hugen, Kos & Van Zonneveld, 2002a; De Roo, 2001 for Dutch; Stavrakaki & Kouvava, 2003 for Greek; Wenzlaff & Clahsen 2004, 2005; Burchert, Swoboda-Moll & De Bleser, 2005 for German).

There is, however, no consensus among these researchers about the origin of the problems with finite verbs. According to some authors, specific aspects of finite verbs are impaired (tense, aspect, agreement or mood), while other authors claim that the problems are related to movement of finite verbs.

The first to relate the agrammatic problem to the position in the syntactic tree was Hagiwara (1995). She showed for both production and comprehension that the higher the node was in the syntactic tree, the more difficult it was for agrammatic patients. Friedmann (2000) claims that the syntactic tree is pruned from the tense node up, but only for production. Therefore, functional projections from TP are unavailable for agrammatic speakers. Agreement, which according to Friedmann is located under tense, is supposed to be intact. These theories assume that (part of) the syntactic representations are no longer available to agrammatic speakers.

An objection to the Tree Pruning Hypothesis (TPH) comes from studies of several languages that either show that tense is intact, at least in some agrammatic patients (e.g., Burchert et al., 2005 for German; Stavrakaki & Kouvava, 2003 for Greek), or that other aspects of verb inflection may be impaired (e.g., agreement: Burchert et al., 2005 for German).

A different approach to the verb inflection problem has been provided by Bastiaanse and Van Zonneveld (1998). They argue that the main problem in agrammatic aphasia is not verb inflection or finiteness per se, but an impairment in applying a linguistic rule called ‘overt syntactic movement’. They showed that Dutch agrammatic speakers have fewer problems with finite verbs in their base position than with finite verbs that have been moved. This led to their more general Derived Order Problem Hypothesis (DOP-H), which states that overt movement of any constituent, including verbs, in a sentence
resulting in a derived order is difficult for agrammatic speakers, regardless of its landing site in the syntactic tree (Bastiaanse & Van Zonneveld, 2005). This is supported by several studies on the relationship between verb inflection and verb position in Dutch and English (Bastiaanse et al., 2002a; Bastiaanse et al., 2002b; Bastiaanse & Thompson, 2003). Moreover, Stavrakaki and Kouvava (2003) demonstrated that the ability of Greek agrammatic speakers to produce past tense inflection drops when the patients have to produce a sentence with an object clitic, suggesting that the production of functional categories in agrammatic speech might be dependent on the syntactic complexity of the sentence structure. Note that Bastiaanse et al. (2002a, 2002b) do not mention anything on which aspect of verb inflection (i.e. agreement, tense, mood or aspect) is more vulnerable.

The present study aims to provide a unified account of the production of finite verbs at the sentence level by investigating two grammatical morphemes in Turkish necessary for finiteness marking: (1) tense/epistemic modality and (2) grammatical mood. The production of these morphemes is tested in verbs in their base position, while the complexity of the sentence is varied. Therefore, the question addressed is whether different aspects of the inflectional phrase (i.e. tense or mood) are impaired in linguistically simple and complex sentences.

In the next section, some crosslinguistic data on the often ignored concept of ‘grammatical mood’ will be presented. Section 3 aims to show that the previous findings in the literature are controversial not only with respect to the production of functional categories but also in relation to word order (i.e. overt syntactic movement). Relevant data about Turkish grammar, object scrambling and the relevance of mood to a finiteness feature are given in Section 2.4. The main argument in the present paper is that overt syntactic movement is impaired in Turkish agrammatic production, but finiteness (i.e. grammatical mood and tense/epistemic modality) is not.

2.2. Previous Studies on Grammatical Mood

As already mentioned, there are only a few studies on mood marking in agrammatic aphasia. Seven German agrammatic speakers were tested in a sentence completion task where they were asked to read aloud an incomplete sentence and fill the gap at the verb position with one of the two (1 correct, 1 incorrect) inflected finite verbs given to them (Wenzlaff & Clahsen, 2005). Matrix clauses in the study were either preceded by a

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18 The DOP-H (Bastiaanse & Van Zonneveld, 2005) comprises both comprehension and production. In this study, only evidence for production is considered.
conditional *wenn* ‘if’ (*Wenn* du zuverlässig gewesen wärst, *hättest* du gewarted ‘if you had been reliable, you would have waited’) or a temporal *als* ‘when’ clause (*als* ich traurig gewesen *bin*, habe ich geweint ‘when I was sad, I cried’) or unreal wish clauses that are introduced by *wenn* ‘if’, imposing a different verb form than the conditional *wenn* ‘if’, (*Wenn* sie doch mehr geduld *hätte!*, ‘if only she had more patience!’). High accuracy scores for mood marking were reported for all types of clauses. The patients were able to produce mood marking, even though the same patients tested in a previous study showed tense and agreement dissociation, only the latter being well preserved (Wenzlaff & Clahsen, 2004). Their hypothesis is known as the Tense Underspecification Hypothesis (TUH).

In Korean the production of the propositive mood marker *–ca* and the imperative mood marker *–la* (i.e. Cenyek mek-ela ‘have dinner!’) were tested in the speech of one agrammatic aphasic speaker (Lee, 2003). In matrix clauses, the production of these mood markers, which pertain to the highest node in Korean phrase structure, was found to be intact. However, different results were found for embedded clauses, where the target sentence involved the production of the complementizer *–ko*, along with the mood markers mentioned above (*Cipey* kacako hayssta, ‘(she) suggested to go home’). The patient produced the complementizer, which is represented above mood in a Korean embedded clause, almost perfectly. However, he very often omitted the mood markers suffixed after the complementizer *–ko*. A relevant argument in this respect has been put forward by Stavrakaki and Kouvava (2003). They suggest that the ability to produce mood marking is dependent on the complexity or context of the sentence structure in embedded clauses. For instance, their two Greek agrammatic speakers omitted the obligatory mood marker ‘na’ (to) in four out of five obligatory contexts. The authors suggest that these were contexts where the patients had to overtly realize the mood marker *–na* before the embedded negation *–min*, which resulted in a more complex computational process.

These findings seem to suggest that mood as a functional category is not absent in agrammatic aphasia, but more data are required to decide whether grammatical mood marking is difficult for agrammatic speakers or not. This could determine whether or not the problems agrammatic speakers encounter with finite verbs at the sentence level stem from a deficit in finiteness (e.g., tense or mood) or from a problem with derived word order. Previous studies produced mixed results, not only with respect to the production of inflectional morphemes (finiteness, i.e. agreement, tense/aspect or mood), but also with
relationship to word order – more specifically, overt syntactic movement in languages with and without Verb Second constraints.

2.3. Overt Syntactic Movement in Languages with and without a V2 Constraint

Previous studies on the relationship between verb inflection and verb position in agrammatic aphasia have produced a mixed pattern of results in Verb Second languages (e.g., German and Dutch). Excessive use of clause-final infinitives in spontaneous speech has been one of the main topics (e.g., Bastiaanse & Van Zonneveld, 1998; De Roo, 1999, 2001; Kolk & Heeschen, 1992). Some researchers suggest that the use of clause-final infinitives is due to the omission of finiteness markings (i.e. Kolk & Heeschen, 1992; Friedmann & Grodzinsky, 1997; De Roo, 1999, 2001; Wenzlaff & Clahsen, 2005) whereas others argued against this (e.g., Bastiaanse et al., 2002a).

It has been shown that Dutch agrammatic speakers produce finite verbs in their base-generated position (i.e. in the embedded clause) significantly better than finite verbs moved to the second position (i.e. in the matrix clause) in the sentence (Bastiaanse et al., 2002a; Bastiaanse & Thompson, 2003). In Dutch, the base position of verbs is argued to be sentence final, as can be seen in embedded clauses (e.g., de jongen die een fiets koopt – lit: the boy who a bike buys), but in Dutch matrix clauses, finite verbs move to the second position in the sentence following a rule called Verb Second (e.g., de jongen koopt een fiets ‘the boy buys a bike’). The difficulties with matrix clauses are due to problems with derived structures and not due to the finiteness of the verb per se.

It can be concluded that there is some debate over whether finiteness or syntactic movement is the main problem in agrammatic aphasia. Those researchers who believe that finiteness as such is impaired do not agree on which aspect of finiteness is impaired: tense, agreement, mood or aspect (Lee, 2003; Stavrakaki & Kouvava, 2003; Wenzlaff & Clahsen, 2005; Burchert et al., 2005). Those who assume that syntactic movement is impaired expect problems only with finite verbs in sentences where the verb is not in its base position or in which other constituents have been moved. They do not predict which finiteness features will be impaired once the verb has been moved.

In Turkish there is no overt verb movement. Yarbay Duman, Aygen and Bastiaanse (2005) showed, however, that overt syntactic movement (e.g., NP movement) hampers sentence production even in the absence of finiteness and that finite verb inflection, e.g., the present progressive tense, is relatively well preserved in Turkish agrammatic aphasia.
In a sentence completion task, Turkish relative clauses involving noun phrase movements but which are participle constructions where the verb of the Relative Clause appears in a non-finite form are shown to be difficult for Turkish agrammatic speakers. This is particularly interesting when the syntactic structure of non-finite relative clauses in Turkish is considered. Turkish Relative Clauses involve neither a complementizer/wh-word (CP) nor tense inflection (TP). They consist of structures smaller than IPs/TPs or CPs, namely, Aspect Phrases (AspP) (Aygen, 2004). Apart from this, the production of matrix clauses in basic subject-object-verb (SOV) order (Erguvanlı, 1984) with finite verbs in present progressive tense is relatively well preserved in Turkish agrammatic speech. Clearly, more crosslinguistic data are needed on the production of finite verbs and on performance in constructions with overt syntactic movement. Some explanation of the basics of Turkish grammar is provided below.

2.4. Turkish Linguistics

2.4.1. Clause Internal Object Scrambling
Turkish is a subject pro-drop and highly agglutinative (rich in inflectional morphology) language with an SOV base order, meaning that the base position of the object is just before the verb in Turkish (Erguvanlı, 1984; Kural, 1991 among others). This is illustrated in (1) below:

(1) Adam duvarı boyadı
    the man-nom the wall-acc paint-past/3 sg.
    ‘The man painted the wall’

In SOV languages such as Turkish, object scrambling refers to OSV order. In these structures, the direct object, which must be marked definite by the presence of accusative morphology, leaves its VP-internal base position and moves over the subject. This is shown in (2a) below, where $t_i$ shows the base position of the object, which is coindexed with the object in sentence-initial position (Aygen, 2004). According to Erguvanlı (1984), sentence initial position in Turkish hosts the Topic of a sentence, which suggests that the object is topicalized in an OSV order as a result of the syntactic process – scrambling.19

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19 In Turkish the sentence initial position is the Topic position. The immediate pre-verbal position is the ‘default’ Focus position but not the only focus position. Turkish has a focus field in the preverbal area rather than a single focus in the immediate preverbal position (Göksel & Özsöy, 2000; 2003). Accordingly, a focused constituent (or focused constituents) can occur in any pre-verbal position in a Turkish sentence – in
(2) a. Duvarı adam tı boya-dı
    the wall-acc the man-nom paint-past/3 sg.
    ‘The man painted the wall’

There are some restrictions to object scrambling. Indefinite objects not marked with the accusative case cannot be moved in front of subjects in Turkish. This is shown in (2b).

(2) b. * Duvari adam tı boya-dı
    wall the man-nom paint-past/3 g.
    ‘The man painted the wall’

Figure 2.1. Graphical matrix clause representation of basic SOV order (left) and scrambled OSV order (right) in Turkish

In the syntactic tree of a matrix clause, basic SOV (left) and scrambled OSV (right) sentences can be graphically represented as in Figure 2.1, following Aygen’s analysis (2002; 2004). As shown in the tree, OSV order is derived from base SOV order by means of overt movement of the object over the subject. A syntactic movement is regarded as ‘overt’ when a word or a phrase is pronounced in a position where it is not originally sentence initial position, in immediately pre-verbal position or it/they can scramble to another preverbal position (see, Göksel & Özsöy, 2000; 2003 for several examples).
generated (e.g., Chomsky, 1995). In other words, overt movement changes the order of the constituents in a sentence, as is the case for object scrambling. The default position of finite verbs in Turkish is T (V+v+to-T raising for feature checking). Note that the finite verb in Turkish moves to T to check inflectional features but this movement does not change the order of constituents i.e. the verb is still in the final position both in SOV and OSV order. The movement of the verb (V+v+to-T raising) is represented by dashed lines in Figure 2.1.

In Turkish the default position for the subject DP (Determiner Phrase) is SpecTP. At this position, the subject DP has two functions: (a) It ‘values’ the agreement features on tense; that is, a T head can have access to the information as to who the subject is in terms of person and number; (b) It satisfies the extended projection principle (EPP)\(^{20}\) (see Figure 2.1, SOV representation).

However, both SOV and OSV orders are possible in Turkish. When the object overtly moves over the subject, the subject is frozen in situ and deletes its uninterpretable T through Agree with T (see Figure 2.1, OSV representation). In other words, the finite verb in OSV order gets the ‘valuing’ of the agreement features on T in the following way: (1) when the verb is at v, it is in a Spec-Head relationship with the subject with the related value and interpretable phi features; and (2) the verb carries these features to T. Thus, the object needs to overtly move to the SpecTP to satisfy the EPP on T.

It is important to note that the reason for overt movement of the object in cases of object scrambling is to satisfy the EPP on T, which is accompanied by verb raising to T, and the overt movement of the object is to an A position – SpecTP (Aygen, 2002; 2004). This movement results in a word order (OSV) different from base (SOV) order which also topicalizes the object. In the next section, the relevant aspects of finiteness in Turkish are presented.

### 2.4.2. Finiteness in Turkish: Tense/Epistemic Modality and Mood

The feature licensing finiteness at the clausal level as the availability of nominative subject is dependent on the presence of a complex feature with two components in Turkish. These features are Mood (marked with agreement morphology in Turkish) at Comp and Tense/Epistemic Modality at INFL. Put differently; finiteness requires the combination of

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\(^{20}\) EPP is a principle that requires Infl (T) to have a specifier. In Chomsky (1995) an uninterpretable feature on the head T requires an argument (DP) to move into its specifier position. This argument is usually the subject and can be the object in scrambling languages such as Turkish and Japanese. This property of heads like T is called the EPP property.
a Mood feature at Comp and a Tense/Epistemic Modal feature at INFL. Both have to be present for the clause to be finite and to have a nominative subject, even if one of these features is not overtly marked on the verb by inflectional morphology (Aygen, 2004).

The mood feature in Turkish is manifested by agreement morphology that varies with the mood category of the clause. For instance, the past tense of the verb boyamak ‘to paint’ (e.g., I painted) illustrates that the 3rd person in the indicative mood is a null morpheme in Turkish (see also 1 & 2a above). However, the third person in the non-indicative subjunctive/optative mood is marked with –SIN (see 3 & 4 below).

(3) Adam duvar-ı boya-sın
    the man-nom the wall-acc paint-mood

(4) Duvar-ı adam tı boya-sın
    the wall-acc the man-nom paint-mood

‘Let/have the man paint the wall’

Two different finite verb conjugations are presented below. Boya is the verb stem, –di is the past tense – which is, according to Aygen (2004), following Lyons (1977), a specific kind of epistemic modality that holds the distinction between [+/-past] and [-/+/remoteness] – as an interpretable feature that has a referential status in due time (i.e. certainty of past) in a similar manner to other epistemic modal markers such as –ebilir ‘can’ (it expresses the degree of certainty of the speaker with respect to the truth of his/her proposition). Mood morphemes marked by agreement morphology are represented in italics below.

<table>
<thead>
<tr>
<th>Indicative Mood</th>
<th>Non-Indicative Subjunctive/Optative Mood</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. sg. boyadım</td>
<td>1. sg. boyayayım</td>
</tr>
<tr>
<td>2. sg. Boyadin</td>
<td>2. sg. boya-Ø</td>
</tr>
<tr>
<td>3. sg. boyadi-Ø</td>
<td>3. sg. boyasın</td>
</tr>
<tr>
<td>1. pl. boyadik</td>
<td>1. pl. boya(y)alım</td>
</tr>
<tr>
<td>2. pl. boyadınz</td>
<td>2. pl. boya(y)ın</td>
</tr>
<tr>
<td>3. pl. boyadılar</td>
<td>3. pl. boyasınlar</td>
</tr>
</tbody>
</table>
In the present study two overt verb inflections are tested: the past tense/epistemic modality morpheme –DI (T/I) in the third person indicative, which lacks overt mood marking (see 1 & 2a above); and the subjunctive/optative mood morpheme –SIN (C), which lacks overt tense/epistemic modal marking (see 3 & 4 above). It should be noted that the sentences that have mood inflection need to have an epistemic modal inflection to be finite, even if it is not represented overtly.

In the syntactic tree of a finite matrix clause in Turkish, finiteness can be graphically represented as in Figure 2.2. The graphical representation of finiteness in Turkish above is based on the analysis of Aygen (2004) for finiteness in Turkish.

As shown in the tree, both C and T/Infl are responsible for finiteness. Accordingly, a finite clause hosts mood features that are marked with agreement morphology. Technically, these mood/agreement features on C are assumed to be unvalued and uninterpretable because the C head (the highest head), has no access to the number, person or gender specifications of the subject clause. The T head selected by C has the same features as C. Once T is valued, i.e. when T knows who the subject is, then so does C via a process called Agree. Agree is a matching process in situ without movement (see e.g. Chomsky, 2005). The analysis of finiteness presented for Turkish that suggests that C is the host of mood/agreement features is in line with the recent analysis in the Minimalist Program.  

![Figure 2.2. Graphical representation of finiteness in Turkish](image)

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21 According to Chomsky (2005; 2008), both tense and agreement features are inherited from C. Consequently, tense features are also assumed to be present both on C and T/INFL. This does not make any difference to our predictions in the present paper, since it is assumed that T has the basic tense features only if it is selected by C.
2.5. The Present Study
This study investigates the role of word order and finiteness in Turkish agrammatic production. Above, three hypotheses have been mentioned that are relevant to the present study. The TPH expects problems in all base and derived order sentences from the T-node up. The TUH predicts problems with tense but not with mood. The DOP-H expects problems with sentences in overtly derived order. These problems may be reflected in more word order errors and/or inflectional errors to both tense and mood in sentences with derived order. The general question is whether different aspects of the inflectional phrase are selectively impaired due to a deficiency in the use of finiteness or whether it is overt syntactic movement that is impaired. More specifically, we investigate whether a single deficit in the Tense node (TP) in terms of the syntactic tree can explain the difficulties with sentence production and verb inflection in Turkish agrammatic production. The answer to this question enables us to evaluate whether the observed deficits in finite verb inflection (finiteness) and in constructions related to overt syntactic movement in agrammatic aphasia are indeed independent of each other.

Turkish is a particularly suitable language for this kind of investigation because it shows no overt verb movement, whereas NP movement is often applied. This allows a separate investigation of the two factors, overt syntactic movement and finiteness, and their comparison to each other. For this, the role of syntactic movement in Turkish agrammatic production is assessed through the comparison of matrix clauses in base (SOV) and in derived order (OSV; object scrambling). Sentences with object scrambling have been selected for testing since, in such clauses, the target of the movement is to specTP (Aygen, 2004). This will illustrate what happens, for example, when a verb argument overtly moves to specTP and the finite verb moves to T for feature checking. Aygen’s (2004) analysis of finiteness is used in this study, where tense/epistemic modality is a feature at T/Infl and mood is a feature at C. The production of the –DI morpheme, as certainty of past, and the mood morpheme –SIN are tested, both in sentences in base (SOV) and derived order (OSV).

Different approaches generate different predictions in the light of this syntactic characterization of Turkish. If the problem stems from a ‘pruned’ syntactic tree (TPH; Friedmann & Grodzinsky, 1997) where there are no landing sites from T-node up, i.e. the finiteness domain in Turkish, then a deficit in derived order sentences (OSV) should co-occur with a deficit in tense and mood inflection both in the SOV and the OSV conditions,
due to the landing site of the object movement (specTP)\textsuperscript{22} and the position that these features take (T/C) in the syntactic tree.

However, if the problems with finiteness stem from selective under-specification of tense features (TUH; Wenzlaff & Clahsen, 2005), then we expect no deficiency in mood marking but only in tense inflection. More specifically, significantly more errors will be made in tense inflection than in mood inflection. However, no difference in terms of word order is expected.

Finally, if the errors made by agrammatic speakers do not stem from a deficit in finiteness but from a problem with overt syntactic movement (derived order) (DOP-H; Bastiaanse & Van Zonneveld, 2005), then errors in finite verb inflection, tense/epistemic modality and grammatical mood could be observed, though more so in derived sentences. Errors in word order are expected for OSV sentences: as, if overt syntactic movement causes problems for patients, more word order and/or inflectional errors are expected for OSV sentences but, again, these inflectional errors could be both to tense and mood. This is captured in Table 2.1.

<table>
<thead>
<tr>
<th></th>
<th>TPH</th>
<th>TUH</th>
<th>DOP-H</th>
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<tbody>
<tr>
<td>SOV</td>
<td>tense+mood</td>
<td>tense</td>
<td>----</td>
</tr>
<tr>
<td>OSV</td>
<td>tense+mood</td>
<td>tense</td>
<td>tense+mood</td>
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<tr>
<td></td>
<td>word order</td>
<td>word order</td>
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Table 2.1. Summary of error type predictions for the base (SOV) and derived (OSV) order sentences for Turkish

The TPH states that the nodes that enable the production of tense and mood are unavailable. Therefore, at best, the patients will score at chance level (33\% for tense and 33\% for mood in Turkish\textsuperscript{23}). The DOP-H predicts relatively intact inflection in the SOV-condition. However, inflectional errors may occur in derived sentences. Both the TPH and DOP-H predict word order errors in the OSV condition. The difference between the TPH and the two other hypotheses is that the TPH predicts inflection errors for both conditions.

\textsuperscript{22} The TPH (Friedmann & Grodzinsky, 1997) does not expect problems with the subject since it is base-generated in specTP.

\textsuperscript{23} There is a three-way distinction for tense (present, past, future) and mood (indicative, opatitive/imperative, conditional) in Turkish (Aygen, 2004).
2.6. Methods

2.6.1. Subjects
Eight Turkish-speaking individuals with agrammatic Broca’s aphasia (mean age 55 years) participated in the study. All patients were right-handed and had normal auditory and visual acuity. They had a single lesion in their left hemispheres and were at least with five months post-onset. All the patients suffered from right hemiplegia at the time of the study. None of the patients had major articulatory problems. All the patients were obtained from the Ankara Physical Medicine and Rehabilitation Center (Turkey).

The aphasia type was established with the Gülhane Aphasia Test (Tanrıdağ, 1993) and confirmed by a speech therapist. Based on spontaneous speech production, the speech therapist confirmed that all the patients had non-fluent (i.e. slower than normal) speech, being able to produce simple and short utterances, but having difficulty with the production of complex utterances. Relevant patient data are given in Table 2.2. Eight native speakers of Turkish with no language or speech impairment history served as the control group. All were right-handed. This group was matched on age and education with the Broca’s aphasia group.

2.6.2. Materials and Procedure
A sentence completion test was developed. There were two main conditions in the test. These were (A) the base-order condition (N=30) and (B) the derived-order condition (N=30). Each of these two main conditions consisted of two sub-conditions, where half of the finite verbs in the sentences were marked with past (n=15) and the other half with mood inflection (n=15). Accordingly, each patient was tested on a total of 60 test items manipulating two variables: word order and verb inflection.

<table>
<thead>
<tr>
<th>Table 2.2. Patient Data</th>
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<td>Gender</td>
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<td>B1</td>
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<td>B8</td>
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The patients were presented with two pictures in which the same action was performed by a different person and with a different object (see Figure 2.3). First, the patients were familiarized with the subject and the object of the sentence. The familiarization sentence was a conjoined sentence with an existential verb (i.e. burada adam ve kapı var ama burada kadın ve duvar var ‘here is man-nom and door-nom but here is woman-nom and wall-nom’). The same sentence was used for both sentence types, since non-case-marked objects in Turkish do not appear in front of the subject\textsuperscript{24,25} (see Section 2.4.1). Then, each patient was prompted with the target word order and verb inflection once before he or she was asked to complete the final sentence similarly. Each sentence pair was reversed so that each picture pair was used twice throughout the test. The test sentences are provided in Appendix 2A. An example follows:

**SET I**

1. **SOV – Mood Condition (-movement, +mood)**

Tester: Bu adam kapıyı boyasın ama bu [patient: kadın duvarı boynız]

Literal: This the man-nom the door-acc paint-mood but this [patient: the woman-nom the wall-acc paint-mood]

‘Let the man paint the door but let the woman paint the wall’

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\textsuperscript{24} Ten native speakers of Turkish were asked for their acceptability judgments of the sentence ‘burada kapı ve adam var’ ‘here door-nom and man-nom’. All suggested that the sentence sounded strange to them.

\textsuperscript{25} Turkish lacks the definite article ‘the’. The accusative case on the object (–I) marks definiteness. However, there is no corresponding morphological difference for a definite subject in Turkish (e.g., man-nom ‘a/the man’), as there is for an object, though definite subjects may be preceded by a demonstrative pronoun.
2. OSV – Mood Condition (+movement, + mood)
Tester: Bu kapıyı adam boyasın ama bu [patient: duvarı kadın boyasın]
Literal: This the door-acc the man-nom paint-mood but this [patient: the wall-acc the woman-nom paint-mood]
‘Let the man paint the door but let the woman paint the wall’

SET II
3. SOV – Past Condition (-movement, +past)
Tester: Bu kadın duvarı boyadı ama bu [patient: adam kapıyı boyadı]
Literal: This the woman-nom the wall-acc paint-past but this [patient: the man-nom the door-acc paint-past]
‘The woman painted the wall but the man painted the door’

4. OSV – Past Condition (+movement, +past)
Tester: Bu duvarı kadın boyadı ama bu [patient: kapıyı adam boyadı]
Literal: This the wall-acc the woman-nom paint-past but this [patient: the door-acc the man-nom paint-past]
‘The woman painted the wall but the man painted the door’

The sentential conjunction ‘ama’ (but) is used in our test sentences in order to conjoin two finite main clauses with the same word order (SOV … but … SOV or OSV … but … OSV), which enables us to perform a sentence completion task that makes the production of the prompted word order pragmatically necessary and most appropriate (SOV followed by SOV, OSV followed by OSV) in Turkish. It is thus important to note that the contrastive meaning in the sentences is given by the presence of two new arguments already in contrast.26 Accordingly, when ‘but’ is deleted (when two finite main clauses are not conjoined), both sentences still convey the same meaning.

All the sentences were distributed randomly in the test and were read with normal intonation. The test started with a practice trial and the practice trial continued until it was

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26 The insertion of the –DA (as for/too) topicalizer/focalizer particle in Turkish is made possible if there are topicalized/focalized arguments in the sentence (Göksel & Özsoy, 2003). The insertion of the –DA particle is possible in both SOV and OSV test sentences (e.g., the man painted the wall but as for the woman, (she) painted the door (SOV); the wall, the man painted but as for the door, the woman painted (it) (OSV)), which means that both arguments i.e. the subject and the object, are used appropriately in both SOV and OSV conditions. However, –DA cannot be attached to a phrasal constituent if that constituent is not a topicalized/focalized element (e.g., *the man painted the wall but as for the man, (he) painted the door (SOV); *the wall, the man painted but as for the wall, the woman painted (it) (OSV)).
clear that the patient understood the distinction between the types of sentences and types of inflections. When the test started, the experimenter pointed to the subject of the sentence in the SOV condition and to the object in the OSV condition to prompt the patients with the correct order. All responses were audio-recorded and transcribed in normal script.

2.6.3. Scoring
A sentence was counted as correct if the participant produced both the prompted verb inflection and the prompted word order correctly. No time limit was imposed. Self-corrections were allowed and only the final answer was analyzed. When requested, the experimenter repeated the cueing sentence again once.

A quantitative and qualitative analysis was developed. For the quantitative analysis, a simple correct-incorrect scoring system was used. If the patients produced a paraphasia for one element (i.e. the woman-nom rather than the man-nom), these were ignored. The total number of such sentences was not high (10 out of 240 test items in SOV and 11 out of 240 test items in OSV). The reason for counting these sentences as correct is specifically related to the OSV condition – these are sentences where the patients moved the object and used the prompted inflection correctly. Therefore, it allows us to look at the number of correctly moved objects and correctly produced prompted verb inflection more accurately throughout the test.

For qualitative analysis, an error analysis system was developed for the most frequent errors. These were (1) word order errors (a sentence that is produced with the prompted inflection but not with the prompted word order i.e. the production of SOV word order for the OSV condition, by leaving the object in its base position with the prompted verb inflection or vice versa). An example would be the production of ‘kadın duvarı boyasın’ (the woman-nom the wall-acc paint-mood) when ‘duvar kadın boyasın’ (the door-acc the woman-nom paint-mood) is required. (2) [inflection] errors (substitution errors within a finite paradigm i.e. the use of grammatical mood rather than past tense or vice-versa in a sentence produced with the prompted word order). An example would be the production of ‘kadın duvarı boyasın’ (the woman-nom the wall-acc paint-mood) when ‘kadın duvarı boyadı’ (the woman-nom the wall-acc paint-past) is required. (3) [inflection + word order] errors (an inflection error (see 2 above) and a word order error (see 1 above) co-occur). The production of ‘kadın duvarı boyasın’ (the woman-nom the wall-acc paint-mood) when ‘duvar kadın boyadı’ (the wall-acc the woman-nom paint-past) is required would be an
example. (4) omission of a constituent, and (5) others. The others category included several types of error such as semantic paraphasias, multiple errors, nil reactions, irrelevant responses and so on.

2.7. Results

2.7.1. Quantitative Analysis

The control subjects showed a ceiling effect for all conditions. That is, this group of participants did not produce any errors throughout the test. Therefore, we will not statistically analyze their data further.

Table 2.3 shows the mean scores of correctly completed sentences for the agrammatic speakers in base and derived order, for the mood and past conditions. The number of correctly completed sentences for the SOV condition is significantly higher than the number of correctly produced sentences for the OSV condition (wilcoxon, z=-2.527, p=0.012).

Table 2.3. Total number (mean score) of correctly completed sentences in the base (SOV) and derived order (OSV) conditions, with their distribution within subtests. The maximum score is 240 in each main condition (SOV, OSV), and the maximum score is 120 in each subtest (mood, past).

<table>
<thead>
<tr>
<th></th>
<th>Base Order Condition (SOV)</th>
<th>Derived Order Condition (OSV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood</td>
<td>87 (10.87)</td>
<td>26 (3.25)</td>
</tr>
<tr>
<td>Past</td>
<td>94 (11.75)</td>
<td>17 (2.12)</td>
</tr>
<tr>
<td>total</td>
<td>181 (22.62)</td>
<td>43 (5.37)</td>
</tr>
</tbody>
</table>

The same was found in between-subtests comparison. The total of correctly completed sentences for the SOV mood (wilcoxon, z=-2.524, p=0.012) and for the SOV past conditions (wilcoxon, z=-2.533, p=0.011) were both significantly higher than for the OSV mood and OSV past conditions respectively. However, within-subtests comparison did not yield any statistical difference. Neither the total correct responses for the SOV mood and SOV past conditions (z=-0.509, p=0.611) nor the total correct productions for the OSV mood and OSV past conditions (z=-1.594, p=0.111) were different from each other. These results indicate that SOV sentences were produced better than OSV sentences.
regardless of the type of finite inflection, tense or mood on the verb.\textsuperscript{27} Individual scores for the test are given in Appendix 2B.

\textbf{2.7.2. Qualitative Analysis}

Table 2.4 and Table 2.5 below present total numbers (mean scores) and error types for the SOV-OSV mood, and the SOV-OSV past conditions respectively. There were significantly more word order errors for the OSV condition compared to the word order errors for the SOV condition (wilcoxon, \(z=-2.533, p=0.011\)). The effect of word order is also apparent in between-subtests comparison. More word order errors were produced for the OSV mood (wilcoxon, \(z=-2.384, p=0.017\)) and the OSV past conditions (wilcoxon, \(z=-2.530, p=0.011\)) compared to SOV mood and SOV past conditions respectively. However, there is no significant difference in word order errors between the SOV mood and the OSV past conditions (wilcoxon, \(z=1.000, p=0.317\)) nor between the OSV mood and the OSV past conditions (wilcoxon, \(z=-0.781, p=0.435\)).

There was a trend to produce more [inflection] errors for the SOV condition compared to the OSV condition (\(z=-1.913, p=0.056\)). Nevertheless, neither the comparison of the [inflection] errors for the SOV mood and OSV mood (\(z=-1.511, p=0.131\)) as such, nor the comparison of SOV past and OSV past (\(z=-0.966, p=0.334\)) were significantly different from each other. The same is true of the within-subtests comparison. We did not find any difference, neither in the comparison of SOV past and SOV mood (\(z=-0.316, p=0.752\)), nor in the comparison of OSV past and OSV mood (\(z=0.0, p=1.00\)).

\textbf{Table 2.4.} Total number (mean score) and error types in the SOV mood and OSV mood conditions

<table>
<thead>
<tr>
<th></th>
<th>total</th>
<th>word order</th>
<th>inflection</th>
<th>inflection + word order</th>
<th>omission</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOV Mood</td>
<td>33(4.12)</td>
<td>4(0.5)</td>
<td>13(1.62)</td>
<td>2(0.25)</td>
<td>2(0.25)</td>
<td>12(1.5)</td>
</tr>
<tr>
<td>OSV Mood</td>
<td>94(11.75)</td>
<td>56(7)</td>
<td>6(0.75)</td>
<td>14(1.75)</td>
<td>5(0.62)</td>
<td>13(1.62)</td>
</tr>
</tbody>
</table>

\textsuperscript{27} Although this study was designed as a group study and the design of the test does not allow for individual analysis (too few items), there are some individual comparisons that might be of interest. Of the eight patients, two (B1 & B4) produced Mood significantly better than Past inflection (\(\chi^2(1)=10.59, p<0.01\) & \(\chi^2(1)=6.67, p<0.01\)), whereas another patient (B7) produced Past significantly better than the Mood inflection (\(\chi^2(1)=11.43, p<0.01\)). However, the errors made are not only ‘inflection’ errors. Most errors involve word order. Moreover, none of these patients made more inflectional errors in Mood than in Past or vice versa.
However, there was another category that involved inflection errors, which we named [inflection + word order] errors.

The comparison of such errors for the SOV and OSV conditions showed that there are significantly more [inflection+word order] errors for the OSV condition (wilcoxon, $z=-2.023$, $p=0.043$). The comparison of overall inflectional errors ([inflection]+[inflection+word order] produced for SOV and OSV did not yield significance (wilcoxon, $z=-0.954$, $p=0.340$).

Finally, there were not many omissions for either condition. Nevertheless, patients produced more omissions for the OSV condition than for the SOV condition (wilcoxon, $z=-2.460$, $p=0.014$). Individual error analysis scores for the SOV-OSV mood and the SOV-OSV past conditions are given in Appendix 2C and 2D respectively.

### 2.8. Discussion

The study has two major findings. Firstly, Turkish agrammatic speakers have more problems with the production of sentences that involve overt movement of the object, namely object scrambling (OSV) than with the production of sentences where all the constituents are in their base positions (SOV). Secondly, finiteness is relatively unaffected in Turkish agrammatic production where there is no overt verb movement. Even though the patients produced inflectional errors (all within the finite paradigm), they produced tense/epistemic modality and mood marking relatively well at the morphosyntactic level. Accordingly, the patients did not show any impairment of finiteness at the morphosyntactic level, neither in the availability of the nominative subject nor for the verb features at T/C. Therefore, the data illustrate that the patients have major problems with derived order – overt syntactic movement in matrix clauses – and that the difficulties the patients have with verb inflection do not stem from a deficit in finiteness.

The conclusion that tense and mood are morphosyntactically relatively unaffected in Turkish agrammatic speech could be objected to because the patients simply had to repeat the verb. However, several studies show that agrammatic speakers have severe difficulties...
with this. One is the study performed by Friedmann (2000), which shows that tense errors are made on a repetition test. Friedmann (2000) thus proposed that tense is impaired even for easy tasks such as the repetition of a simple four-word sentence. Second, inflectional errors were also made in the English prompting tests mentioned by Bastiaanse and Thompson (2003). In one test the patients heard the inflected verb three times; however, the majority of the English agrammatic speakers’ errors were inflectional. In the second test, the patients were prompted with the inflected verb again, and still they left it out. In another study of Turkish relative clauses (Yarbay Duman et al., 2005), many inflectional errors were made, even though the patients were prompted with the inflected verb. The patients also made inflectional errors in the present study. However, they neither show clear problems with tense at the morphosyntactic level, as suggested by Friedmann and Grodzinsky (1997), nor do they make more errors in tense than in mood, as suggested by Wenzlaff and Clahsen (2005). Therefore, we do not find support for Friedmann and Grodzinsky (1997) nor Wenzlaff and Clahsen (2005) and the results are not due to the experimental paradigm. In the following paragraphs, our data are discussed in more detail.

The data obtained in the study raise crucial issues about the use of word order and finiteness in agrammatic aphasia. When accounts related to ‘pruned’ syntactic nodes (TPH) are considered (Friedmann & Grodzinsky, 1997; Friedmann, 2000), the most urgent question that arises is how it can be that the same node, TP, is affected by overt argument movement and not by a tense or mood feature (e.g., feature checking). If tense is a feature at INFL and mood is a feature at C (Aygen, 2004), then the patients should not be able to use tense/epistemic modality and mood marking, since TP and CP nodes are assumed to be unavailable to agrammatic speakers. However, this was not the case in the present study. The patients are able to realize features that were moved to T and C despite having severe problems with overt syntactic movement (TP).28 Even when the patients produced errors in sentences with OSV order, they were able to produce grammatical finite clauses with the prompted finite verb inflection and the nominative subject (i.e. SOV).

The findings mentioned above have at least two implications. First, data from Turkish suggest that the difficulties with overt syntactic movement and finite verb inflection (i.e. tense) observed in many languages are most likely to be independent in terms of the syntactic tree, since tense as an epistemic modality and mood feature is relatively well preserved (T/C) at the morphosyntactic level, while object scrambling is

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28 According to the Tree Pruning Hypothesis (Friedmann, 2000), patients are impaired in the production of finite verbs even when they are required to repeat a finite verb, due to pruned CP/TP nodes.
impaired (specTP). Second, the assumption that finite verb forms are chosen according to their syntactic properties of movement within the syntactic tree (i.e. only non-finite verbs which do not raise to T for feature checking will be produced correctly in agrammatic speech; Friedmann, 2000) does not hold, since the data show that T/C nodes are not absent from agrammatic speech. Consequently, a single deficit in tense inflection fails to explain the difficulties with verb inflection and derived word orders in Turkish agrammatic production. This confirms the results of our previous study, where we showed that the movement of an argument hampers sentence production even in non-finite relative clauses (Yarbay Duman et al., 2005). Thus, the deficit in Turkish agrammatic sentence production does not follow from a functional hierarchy as such.

As correctly predicted by Wenzlaff and Clahsen (2005), grammatical mood is not a major problem in agrammatic aphasia. However, it has been suggested that interpretable tense-features – which require the establishment of an anaphoric relationship between the speech act and an event time in discourse, in the sense that the time of a given sentence is dependent on the time of a preceding sentence – are selectively underspecified in agrammatic speech (TUH; Wenzlaff & Clahsen, 2005). It is known from previous studies that discourse-related phenomena such as the interpretation of non-reflexive pronouns (i.e. Ruigendijk & Avrutin, 2003) are impaired in agrammatic aphasia. The absence of a dissociation between tense and grammatical mood in our data suggests that tense is not selectively underspecified in Turkish agrammatic speech, at least not at the morphosyntactic level and thus, agrammatism is not a general tense problem. However, the interpretation of tense as an anaphoric phenomenon could be useful in studies of agrammatic aphasia. The present study suggests that the notions of ‘Tense’ or ‘Mood’ are not impaired, which does not necessarily mean that the notion ‘Past’, i.e. the ability to refer to events/propositions at a certain past time is intact. Accordingly, we do not draw any conclusions as regards the use of ‘time reference’ as such in agrammatic speech since our test sentences do not require a time reference switch (e.g., I washed the trousers yesterday. I will wash the skirts tomorrow).

The findings of the study were correctly predicted by Bastiaanse and Van Zonneveld (2005) who suggest that derived orders are difficult for agrammatic speakers regardless of the syntactic tree landing site (DOP-H). As suggested by Bastiaanse and her colleagues in several studies (e.g., Bastiaanse et al., 2002a), finiteness is not the main problem in agrammatic aphasia. The data show that Turkish agrammatic speakers mostly correctly produce mood and tense morphosyntactically, along with a nominative subject in both
conditions. In addition, the patients did not produce any errors in accusative case marking. However, if sentences are syntactically more complex due to a syntactic movement operation, more inflectional errors are produced. Nevertheless, the numbers of overall inflectional errors for both conditions were not significantly different. This could be because the most common error type was de-scrambling. This is, for the OSV condition, where patients almost always produce sentences in base order (SOV) by leaving the object in its base position, and producing the prompted finite verb and nominal inflection correctly.29

There was an effect of the inflectional errors – the patients produced more [inflection] errors for the SOV condition compared to the OSV condition but they produced more [inflection + word order] errors for the OSV condition compared to the SOV condition. This effect is explained as follows: for the SOV condition, the patients did not have problems with [base] word order and thus, their errors were [inflection] errors, meaning that the patients produced the prompted word order correctly. An [inflection] error for the OSV condition indicates that the patient has successfully moved the object over the subject. However, the patients had problems with the movement of the object and hence were unable to derive the OSV order. Their errors for the OSV condition were thus mainly of the double-error type – [inflection+word order] errors. Consequently, the data indicate that the presence or absence of overt syntactic movement influenced the type of inflection errors – [inflection] versus [inflection+word order]. Otherwise, there is no difference in terms of overall number of inflectional errors – when all inflection errors ([inflection]+[inflection+word order]) in both conditions are compared, there is no difference. It is therefore suggested that Turkish agrammatic speakers make inflectional errors regardless of whether the sentence contains an overt syntactic movement or not. Nevertheless, where there is an overt syntactic movement, performance drops significantly.

It is interesting to observe that the patients who had difficulty with OSV sentences in the OSV condition did not benefit from any of the other word order variants that Turkish permits (Turkish also allows SVO, OVS, VOS and VSO orders). The absence of a tendency to use any other word order variant and the systematic production of SOV by

29 Turkish agrammatic speakers in another study (Yarbay Duman et al., 2005) produced more inflectional errors when there was overt syntactic movement. Those inflectional errors were produced in a sentence completion test where there was a relationship between the movement of the argument (the subject or the object) and verb inflection. In the present study, there is no relationship as such – the movement of the noun phrase (the object) does not have an effect on verb inflection. Therefore, leaving the object in its base position (de-scrambling) was sufficient to avoid the movement operation, resulting in a well-formed sentence in base order, as part of the patients’ grammar.
leaving the object in its base position (de-scrambling), seems to suggest that it is overt syntactic movement that is one of the main problems in agrammatic aphasia. Additional arguments can also be found in the literature. For instance, it is arguable that ‘frequency’ could affect Turkish agrammatic speakers’ ability to produce derived word orders, including OSV order, since basic SOV order in Turkish is more frequent than other orders.

However, Bastiaanse et al. (Bastiaanse & Van Zonneveld, 1998; Bastiaanse et al., 2002; Bastiaanse & Thompson, 2003) showed that completing an embedded clause is significantly easier than completing a matrix clause for Dutch agrammatic speakers. The Dutch embedded clause is in base order (SOV), whereas the order of a Dutch matrix clause is derived (SVO). Although the Dutch matrix clause is twice as frequent as the embedded clause (Corpus Gesproken Nederlands), it is significantly more difficult to produce. Similar findings have been reported for German (Rausch, Burchert & De Bleser, 2005). This implies that the frequency of a sentence structure does not play a decisive role in agrammatic production.30

Nevertheless, from a pragmatic point of view, the issue of word order variation could be approached as a question of appropriate versus inappropriate use of a particular word order in a given context, and not as the use of ‘base’ or ‘derived’ word orders. In our study, we prompted the patients with SOV order to elicit an SOV sentence and with OSV order to elicit OSV sentence. Apart from this, the experimenter pointed to ‘the subject’ in the SOV condition and ‘the object’ in the OSV condition, in the accompanying pictures, before asking the patient to construct the sentence. Therefore, the context of presentation of the stimuli for an SOV condition required the production of SOV, and the context of presentation of the stimuli for an OSV condition required the production of OSV. Nevertheless, the patients mostly left the objects in their base position and produced SOV order for an OSV condition. We suggest that the use of appropriate/inappropriate word orders in agrammatic aphasia is a consequence of the ease of the production of the basic word order in Turkish due to a ‘syntactic’ deficiency in producing derived word orders, and cannot be attributed to a deficiency in pragmatics. This is plausible in that pragmatic deficits (‘appropriateness’ or ‘topic/focus precedence’) have never been considered as

30 There is no corpus study of spoken Turkish, neither regarding word order nor verb inflection. Regarding verb inflection frequency, a possible effect of frequency cannot be excluded if the patients have heard the verb before.
Moreover, both sentence types (SOV and OSV) in our task were minimal-pairs, except for the overt syntactic movement operation in the latter: both were finite main clauses with three constituents and both included the same lexical and morphological elements. Therefore, both clauses make the same demands on short-term memory processing, as long as it is not assumed that syntactic movement is a complex operation for the patients.\textsuperscript{32} Nevertheless, the patients have problems only with the OSV sentences. Moreover, the patients make more omissions in the OSV condition than the SOV condition, even though both sentence types included the same lexical and morphological elements, suggesting that the deficit is structural.

We have not yet tested all word order variations in Turkish. We do not yet know whether all overt syntactic movements would show the same effect in Turkish agrammatic speech. Therefore, we cannot generalize our findings to all word order variations in Turkish.

We conclude that sentence production, including verb inflection, is generally difficult for Turkish agrammatic speakers. However, sentences that involve overt phrasal movement (OSV) are more difficult than sentences in base order (SOV). The problems Turkish agrammatic speakers have with verb inflection do not stem from a deficit in finiteness, since we have shown that object scrambling is impaired but finiteness is not in Turkish agrammatic production. Therefore, we propose that difficulties with overt syntactic movement and verb inflection are independent in terms of the syntactic tree.

This study shows that finiteness is not the main problem in Turkish agrammatic aphasia, which suggests that neither the ‘Tense’ nor the ‘Mood’ notions are impaired. However, our account does not exclude the possible difficulties that agrammatic speakers could have when ‘referring’ to events/propositions at certain time points – i.e. selective problems with the notion ‘past’– nor does it assume that Turkish agrammatic speakers can produce as many finite verbs as non-brain-damaged Turkish speakers. Future research will investigate the notion of ‘past’ in comparison to the notion ‘future’, conveyed both by

\textsuperscript{31} This is in line with our findings. The patients are aware of the pragmatic rule that new elements (both the subject and the object in both conditions) cannot be left out of a sentence: there were not many omissions throughout the test.

\textsuperscript{32} Observe that the patients followed the test carefully: they almost always produced the prompted verb inflection (past or mood) and the prompted case marker (nominative and accusative) for both conditions (see Slobin, 1991), for several types of nominal and verbal inflections (e.g., several types of case markers and tense forms), with varied sentence structure (e.g., main/embedded, active/passive, finite/non-finite) when Turkish agrammatic speakers and healthy Turkish native speakers were asked to make free descriptions of the same picture).
finite verbs and participles in clauses with and without overt phrasal movement in Turkish (see Yarbay Duman & Bastiaanse, 2009; Chapter 4).