Commentary

Comprehension of passives in Broca’s aphasia

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Abstract

Drai and Grodzinsky have statistically analyzed a large corpus of data on the comprehension of passives by patients with Broca’s aphasia. The data come, according to Drai and Grodzinsky, from binary choice tasks. Among the languages that are analyzed are Dutch and German. Drai and Grodzinsky argue that Dutch and German speaking Broca patients should be relatively good (that is, perform above chance) on comprehension of passive sentences, since in Dutch and German passives the relative order of the object and lexical verb is the underlying order and hence no movement takes place. We will demonstrate that both their linguistic arguments and their selection of Dutch data are invalid.

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1. Introduction

In the Drai and Grodzinsky (D&G) paper (this issue) a statistical analysis is presented of cross-linguistic data of sentences that vary in their syntactic analysis with respect to the concepts of movement and voice (the latter being called mood by D&G). In our view, D&G convincingly show that only movement—and not voice—affects comprehension in Broca’s aphasia.

In English passives, there is movement and voice change as compared to active sentences, so it is not possible to explain why Broca patients perform at chance level on passive sentences. Is it because of movement or because of change of voice? This question can be answered by looking at languages in which there is voice change, but no movement. According to D&G, Dutch and German are such languages. They argue that there is no movement in Dutch and German passives, because the relative order of the internal argument and the lexical verb is unchanged as compared to actives. This, they argue, is the reason for the relatively good comprehension of Broca patients on passive sentences, which is shown by the studies of Friederici and Graetz (1987); Kolk and van Grunsven (1985); Kolk, van Grunsven, and de Keyser (1985) for Dutch and by Burchert and De Bleser (2004) for German. Are D&G right? We will judge their proposal on three different points: (1) the theory; (2) the methodology; (3) the empirical data.

First we will argue that D&G’s theoretical considerations with respect to the syntactic analysis of Dutch and German are mistaken: there is movement in all four variants of passives in Dutch and German. We will also show that their argument regarding the relative order of the internal argument and the lexical verb makes the wrong prediction for Dutch and German active sentences. Subsequently, we will show that there are some drawbacks on the methodology D&G present. At least one Dutch study should not have been included (Friederici & Graetz, 1987), one other Dutch study did not test the crucial construction (Kolk & van Grunsven, 1985) and one study with data contradictory to their theory has in fact been excluded (Bastiaanse & Edwards, 2005).
Finally, we show that D&G’s proposal makes the wrong predictions on the basis of empirical data of two studies, one on Dutch (Bastiaanse & Edwards, 2004) and one on German (Burchert & De Bleser, 2004).

An alternative hypothesis will be formulated, which is applicable not only to the comprehension data in Dutch and German (and many other languages), but also to the cross-linguistic production data of patients with Broca’s aphasia.

2. The theory: Word order in Dutch (and German)

Dutch and German are so-called SOV-languages, meaning that the basic order is subject–object–verb. This order is visible in the embedded clause, where the finite verb is in final position (see 1).

(1) de jongen die de meisjes kust
the boy who the girls kisses

In the declarative matrix clause, the finite verb is in second position (2), non-finite verbs (infinitives, participles) remain in their base position, as is shown in (3 and 4)

(2) de jongen kust het meisje
the boy kisses the girl

(3) de jongen wil het meisje kussen
the boy wants to the girl kiss

(4) de jongen heeft het meisje gekust
the boy has the girl kissed

The examples show that the finite verb in declarative matrix clauses is always in second position, which is why this movement operation of the finite verb is called Verb Second. The second position is the only one that is fixed in Dutch and German matrix clauses. In declarative matrix sentences, most constituents can be placed before the finite verb: the subject (as in the examples above), an adverbial phrase (gisteren kuste de jongen het meisje: lit. yesterday kissed the boy the girl), a pronoun object (dat weet ik niet: lit. that know I not, meaning I don’t know). When an adverbial phrase or a pronoun precedes the verb, the subject is (virtually) always placed directly after the verb, as can be seen in the examples. There is no fixed position for the subject in Dutch or German: it is adjacent to the finite verb, preceding the finite verb when there is no topicalization, following the verb when another constituent is topicalized. Dutch native speakers use about the same number of topicalized declarative sentences as sentences in which the subject is in first position (Jansen, 1981).

The main difference between Dutch and German grammar is that Dutch has no overt case system on articles, whereas in German nominative, genitive, dative and accusative case are marked on the article (and sometimes on the noun as well). This might be the reason why German word order is more free than in Dutch. For example, in Dutch the sentence de jongen kust het meisje: ‘the boy kisses the girl’ always means that the boy is the agent, unless highly contrastive stress is put on de jongen (the boy), whereas comparable German sentences are more common, probably since case marking reveals what is the subject and what is the object: in both der Jungen küssst das Mädchen (the nom boy kisses the girl) and das Mädchen küssst der Jungen (the girl kisses the nom boy), the article of the phrase ‘the boy’ is marked for nominative case.

Some other word orders are common in German, but only grammatical in Dutch when contrastive stress is used. This is relevant with respect to the D&G paper, because it is critical in D&G’s argument. In German a sentence like vom Jungen wird das Mädchen geküsst (by the boy is the girl kissed) is perfectly normal. Its Dutch counterpart door het meisje wordt de jongen gekust can only be used in a context with contrastive stress on the first constituent, for example, door het meise j wordt de jongen gekust en door de vader wordt de moeder gekust: ‘by the girl is the boy kissed and by the father is the mother kissed’ with stress on het meisje: ‘the girl’ and vader: ‘father’. This is comparable to the English sentence by this girl the boy is kissed, which has the same contextual restrictions.

Let us now look at four possible forms of the passive in Dutch (5a–d).

(5a) het meisje wordt door de jongen gekust
the girl is by the boy kissed

(5b) door de jongen wordt het meisje gekust
by the boy is the girl kissed

(5c) het meisje wordt gekust door de jongen
the girl is kissed by the boy

(5d) het meisje wordt gekust de jongen
the girl is kissed the boy

According to D&G, there is no movement in Dutch and German passives and they give the example of an active sentence changing into a short passive sentence, like (5d) (p. X): _heeft het meisje object,theme gekust (_has the girl kissed) → het meisje subject,theme wordt gekust (the girl is kissed). They argue that het meisje ‘the girl’ maintains its position relative to the participle gekust: ‘kissed’ and therefore they assume that there is no movement in this passive construction. There are a couple of
objects against this analysis. First of all, the grammatical function of *het meisje* 'the girl' changes from object to subject. Under any linguistic account incorporating the concept of movement, such a change must involve movement. This can be illustrated by case change in English pronouns: *(has) she is kissed* → *(has) she is kissed*. Accusative *her* becomes nominative *she*, hence, it must have been moved from object to subject position, both in English and in Dutch (or German, where this case change is also visible on the determiner). We are not aware of any theory that includes the concept of movement, but states that there is no movement in Dutch and German passives. Nevertheless, D&G mention that 'the syntactic analyses we assume are not controversial' (p Y).

The D&G-paper becomes a little bit confusing when the table with the variables *voice* (which they call *mood*) and *movement* is given (their Fig. 3). Here another Dutch example is used, namely the topicalized passive sentence *door het meisje wordt de jongen gekust:* by the girl is the boy kissed.¹ D&G say that 'the “logical object” is located in Subject position’ (pZ). We do not know exactly what a "logical object" is, but we assume that D&G mean the theme, which is originally in object position, hence, *de jongen* 'the boy'. This is indeed in subject position, because it is the subject (it is adjacent to the finite verb *wordt*: ‘is’, here following the finite verb because the *by*-phrase is topicalized). It can only be there after movement, since, underlying, it is the object. This can be clearly seen in German, where the case of 'the boy' changes from accusative to nominative; this must involve movement. This is another argument that movement has taken place in this sentence, although the thematic roles are still in their basic order (agent–theme).

If we understand D&G correctly, they (1) use the *Trace Deletion Hypothesis* (TDH); (2) assume that additionally the position of the internal argument (or theme) relative to the lexical verb (in their example the participle) is crucial for understanding passives. This means that comprehension of passives is impaired in English but not in Dutch speaking Broca patients. In English the theme has been moved over the lexical verb and, following the TDH, obtains the agent role by default. By contrast, in Dutch the theme maintains its position relative to the lexical verb and correctly receives the theme role. Now let us compare the different Dutch actives and passives and see what the original TDH and the new theory (which includes the position of the internal argument relative to the lexical verb) predict. Like Grodzinsky (1995), we will assume that the *by*-phrase receives its theme role from the passive morphology (*by-*phrase in combination with participle) and is base-generated in the standard passives *(5a and 5c).*

\[
(5a) \quad \text{het meisje}_{i} \text{ wordt door de jongen}_{j} \text{ gekust}
\]

\[
(5b) \quad \text{door de jongen}_{i} \text{ wordt het meisje}_{j} \text{ gekust}
\]

\[
(5c) \quad \text{het meisje}_{j} \text{ wordt gekust door de jongen}_{i}
\]

\[
(5d) \quad \text{het meisje}_{j} \text{ wordt gekust}
\]

According to the TDH, in *(5a)* *de jongen:* 'the boy' receives its agent role through passive morphology. The NP *het meisje* (the girl) has been moved from object to subject position. The trace is deleted in Broca’s aphasia and therefore *het meisje* (the girl) has no theta role. Following the Default Principle, it will receive the agent role. The result is two agent roles, which will cause chance level performance. By contrast, the new theory assumes that the only relevant factor is the position of the internal argument relative to the lexical verb, thus predicting above chance performance.

In *(5b)* both arguments have been moved, the subject *het meisje* 'the girl' from its underlying object position to subject position and the *by*-phrase is in sentence-initial position, where it can only get through topicalization (i.e., movement). According to the TDH, both traces have been lost and therefore the arguments will receive the correct thematic roles by default, according to their linear position in the sentence (although D&G might assume that the theme *het meisje:* 'the girl' has not been moved; in that case it will receive the theme role too). This will result in above chance performance. The theme is still to the left of the verb, so under the new assumption, the patients are also expected to perform above chance level.

For *(5c)*, the TDH predicts chance performance: *het meisje:* 'the girl' has been moved, so it receives the agent role by default and *de jongen:* 'the boy' receives an agent role by passive morphology. Since the relative order be-

¹ Notice that in D&G’s Fig. 3 the agent and theme have changed roles compared to the example earlier.
between the internal argument and the lexical verb is unchanged, the new theory predicts above chance performance.

For (5d) the same predictions are made: TDH expects chance performance, the new theory above chance performance.

Finally, let us look at simple Dutch active sentences, such as (5e):

\[ \text{De jongen kust het meisje} \]

(5e) 
\begin{align*}
\text{the boy} & \quad \text{kisses the girl} \\
\text{het meisje} & \quad \text{by the boy} \\
\end{align*}

In this sentence, the order of internal argument and lexical verb has changed. Interestingly, D&G’s argument of the position of the object relative to the lexical verb predicts that simple Dutch (and German) active sentences will be understood at chance level. Since the basic order of Dutch and German is SOV and the finite lexical verb is moved to second position, in simple active sentences the lexical verb is before the object instead of its original position after the object. So, in sentences like (5e) voice remains the same (=active), but as a consequence of (verb) movement the relative order of the internal argument and the lexical verb is reversed. The TDH predicts that Broca patients perform above chance on these sentences, but according to D&G’s adjustments, they will perform at chance level. In Table 1 the predictions of the TDH and the new theory of D&G are summarized.

3. The methodology: The Dutch studies

D&G’s analysis of Dutch passives used three studies: Friederici and Graetz (1987); Kolk and van Grunsven (1985) and Kolk et al. (1985). Patient K., described in Kolk et al. (1985) was also included in Friederici and Graetz (1987) as patient Koe. Also, it is not clear which passive variants were tested by Kolk et al. (1985). These are two reasons why we think it is not right to include the Kolk et al. (1985) study.

One of the critical points in the D&G argumentation is the good comprehension of Dutch Broca patients on sentences with a topicalized by-phrase (door de jongen wordt het meisje gekust: ‘by the boy the girl is kissed’). Kolk and van Grunsven (1985) did not test this passive construction, they only tested the standard Dutch pas-

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Predictions made by the trace deletion hypothesis (TDH) and D&amp;G’s new theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Het meisje wordt door de jongen gekust</td>
<td>At chance</td>
</tr>
<tr>
<td>Door de jongen wordt het meisje gekust</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>Het meisje wordt gekust door de jongen</td>
<td>At chance</td>
</tr>
<tr>
<td>Het meisje wordt gekust</td>
<td>At chance</td>
</tr>
<tr>
<td>De jongen kust het meisje</td>
<td>&gt;chance</td>
</tr>
</tbody>
</table>

Friederici and Graetz (1987) tested several Dutch passive constructions, among which (5a) and (5b). They found that Broca patients perform above chance on passives such as (5b) door de jongen wordt het meisje gekust: ‘by the boy is the girl kissed’. There can be two reasons why the Dutch patients performed above chance on these passive sentences in which the by-phrase is topicalized. (1) The contrastive stress that is needed to make the sentence grammatical; (2) the TDH, which assumes that het meisje ‘the girl’ receives its agent role by passive morphology (by-phrase + participle), the theme has not been moved and/or receives its theme role because of its linear order in the sentence, but in both cases the sentence is understood perfectly well. Although D&G’s theory can also explain these results, we think it is based on the wrong assumption that there is no movement in this sentence, as explained above. We do agree, of course, that the position of the internal argument relative to the lexical verb is the same, but as we will argue later, this theory is incapable of accounting for all Dutch data.

What is more difficult for the TDH to explain are the good results on the ‘theme first’ passive sentences (5a) from the Friederici and Graetz (1987) study. The TDH predicts chance level performance here, but the Dutch patients perform above chance. One of the reasons for this performance level may be the way in which these sentences were tested. Unlike D&G suggest, Friederici and Graetz (1987) did not use a binary choice test, but a test with one target picture, one picture with a role reversal and one picture with a lexical distractor. On the lexical distractor, the agent, verb or theme was different. Consider that the theme is different. In that case, there are three pictures: one of a boy kissing a girl (target), one of girl kissing a boy (role reversal), and one of a boy strangling a girl (lexical distractor). This is not a very reliable way to test comprehension of sentence order, since even without a spoken sentence, the patient can pick out the right picture. For an example, see Fig. 1.
The patient hears 'the girl is kissed by the boy', understands the verb *kisses*, but does not know who is the agent and who is the theme (or has two agents in his analysis, as the TDH predicts). Just by looking at the lexical distractor, which has a similar agent and theme as one of the other pictures, he can give the correct answer by pointing to the picture with the same division of the thematic roles.

Another methodological objection to the D&G analysis is that it seems as though they took all the Dutch and German data together and then compared the actives and the passives. If they were only interested in the agent first passives (*door de jongen wordt het meisje gekust*; 'by the boy the girl is kissed'), they would not have included the Kolk and van Grunsven (1985) study, which did not test this sentence type. This means that they added the scores of the agent-first and theme-first passives, which is methodologically incorrect if one wants to compare sentence with different word orders. Concluding that these sentence types are similar, since they are both in the passive voice and they both lack movement, is misleading; the order of the arguments is different, so there is movement in at least one of the sentence types. Concluding that the order of the arguments (and, hence movement) is irrelevant because the relative order of the internal argument and the lexical verb is the same, is illogical, because this is exactly what is tested.

Also, adding Dutch and German data is dubious from a methodological point of view. Dutch and German are both SOV-languages and their passivization rules are overlapping (though not identical, since passive construction (5c), in which the verb precedes the theme, is not possible in German). As said above, word order is much more free in German and case morphology plays an important role in sentence comprehension. What remains for Dutch is the study by Kolk and van Grunsven (1985), which only compared actives to the normal passive (5a) not to the topocalized one (5b). This study included 11 Broca patients.

### 4. The empirical facts

Apart from the Kolk and van Grunsven (1985) study, there is another Dutch data source that has not been mentioned by D&G, probably because it did not use a binary choice task (but remember that Friederici & Graetz (1987) did not use one either). Bastiaanse and Edwards (2004) investigated word order in Dutch and English Broca and Wernicke patients. Here only the data of the 13 Dutch Broca patients are relevant. Two tests were used: (1) a sentence comprehension test and (2) a sentence anagram test. In both tests, active and passive sentences were presented. The sentence comprehension test only included semantically reversible sentences with four different structures: simple actives (agent–verb–theme: *de jongen kust het meisje*: ‘the boy kisses the girl’), embedded clauses with basic word order (agent–theme–verb: *laat zien op welk plaatje de jongen het meisje kust*: ‘show me in which picture the boy the girl kisses’), questions (verb–agent–theme: *op welk plaatje kust de jongen het meisje?:* ‘in which picture kisses the boy the girl?’) and passives like the one in (7a) (theme–agent–verb: *het meisje wordt door de jongen gekust*: ‘the girl is by the boy kissed’). This was not a binary choice test, but four alternatives were presented to the patients: the target picture, its role reversal, a lexical distractor with a different verb and the lexical distractor with reversed roles. This avoids the undesired effects of the Friederici and Graetz paradigm, since now the correct picture can only be chosen when the lexical verb as well as the grammatical information are both correctly understood. The large majority of the errors were role reversals, only sporadically a lexical distractor was chosen, which is why we think it is appropriate to interpret the results as if they come from a binary choice task. The results are clear: Dutch Broca patients scored at chance on the passives (when they made an error, they pointed to the role reversal) and above chance on all active constructions.

On the sentence anagram task, passive sentences like (5c) subject–verb-by–phrase (*de jongen/wordt gekust door het meisje*: ‘the boy/is kissed by/the girl’ and active sentences like (5e) *de jongen/kust/het meisje*: ‘the boy/kisses/the girl’) were tested. Reversible and irreversible active and passive sentences were used and the Broca patients scored above chance on the active sentences and at chance on the passive sentences. All errors they made were reversal errors: the agent and theme were switched.

Again, if it is true that it is the position of the internal argument relative to the lexical verb that matters (as D&G suggest), then Dutch Broca patients are expected to perform at chance level on simple active sentences.
such as (5e): het meisje kust de jongen: ‘the boy kisses the girl’, in which the verb has been moved over the object. This is not found in any of the Dutch studies: Friederici and Graetz (1987); Kolk and van Grunsven (1985) and Bastiaanse and Edwards (2004) report above chance performance on these simple active sentences.

Let us now have a look at the German data collected by Burchert and De Bleser (2004). They presented actives and short and long passives to six Broca patients. For the long passives they used canonical and topicalized structures. The data of the Dutch patients from Bastiaanse and Edwards (2004) and of the German patients from Burchert and De Bleser (2004) are summarized in Table 2.

What can we conclude from these studies? Whatever sophisticated statistics one uses to analyze these data, the fact is that the majority of the Dutch and German patients of these studies perform at or below chance level on the passive sentences with the theme role in first position (23/40) while most of them perform above chance level on the active sentences (28/33).3

In sum, we have two empirical reasons to reject D&G’s theory on the comprehension of Dutch passives in Broca’s aphasia. First, on a test in which four pictures are presented instead of three as well as on a sentence anagram test, at least the study of Bastiaanse and Edwards (2004) showed that these patients perform at chance level on passive sentences (making role reversals). Second, D&G wrongly predict that Dutch and German Broca patients will perform at chance level on simple SVO-sentences, because the position of the object relative to the lexical verb changes.

The German data are slightly different. Although most patients perform at chance level on the passives and all of them above chance level on the actives, as a group they perform above chance level on the passives. Interestingly, four out of seven patients score at chance level on the topicalized passives, which is predicted neither by the TDH, nor by D&G’s new theory. Overall, the German patients perform better on the passives than the Dutch ones. One explanation might be that German speakers, including Broca patients, rely more on morphology, since morphology in German is a better cue to assign thematic roles than word order. This idea is supported by the study of Burchert, De Bleser, and Sonntag (2003), who tested comprehension of canonical and non-canonical active sentences. For three out of five Broca patients there is no difference between their level of performance on canonical sentences and non-canonical sentences in which case morphology rather than word order reveals who is agent and who is theme.

5. An alternative account: The derived order problem hypothesis

The Derived Order Problem Hypothesis (DOP-H) (Bastiaanse, 2004; Bastiaanse & van Zonneveld, 2005) was launched to capture both the comprehension and the production deficits in Broca’s aphasia. It assumes that each language has a basic word order, for example, subject–verb–object for English and subject–object–verb

<table>
<thead>
<tr>
<th>Dutch</th>
<th>Above chance</th>
<th>At chance</th>
<th>Below chance</th>
<th>D&amp;G prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>het meisje wordt door de jongen gekust</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>het meisje wordt gekust door de jongen</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>de jongen kust het meisje</td>
<td>9</td>
<td>4</td>
<td>—</td>
<td>At chance</td>
</tr>
<tr>
<td>de boy kisses the girl</td>
<td>12</td>
<td>—</td>
<td>1</td>
<td>&gt;chance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>German</th>
<th>Above chance</th>
<th>At chance</th>
<th>Below chance</th>
<th>D&amp;G prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>der Gaul wird getreten</td>
<td>4</td>
<td>3</td>
<td>—</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>der Gaul wird vom Esel getreten</td>
<td>2</td>
<td>5</td>
<td>—</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>vom Esel wird der Gaul getreten</td>
<td>3</td>
<td>4</td>
<td>—</td>
<td>&gt;chance</td>
</tr>
<tr>
<td>der Esel tretet den Gaul</td>
<td>7</td>
<td>—</td>
<td>—</td>
<td>At chance</td>
</tr>
</tbody>
</table>

a Sentence comprehension test.  
b Sentence anagram test.

3 If we include the data of Kolk and van Grunsven (1985), still half of the Dutch patients perform at or below chance level (19 above chance, 18 at or below chance).
for Dutch and German. Further, it assumes that Broca patients have difficulties understanding and producing sentences with a derived word order, the derived order being the result of a movement operation. For example, sentences with derived subjects, such as unaccusative sentences and passives in which the theme precedes the agent, will be more difficult to produce and parse than sentences containing the basic word order. It also predicts that word order of sentences with moved verbs and poor grammaticality judgment of sentences with illegally moved verbs or verbs that have illegally not moved (Wiegers, 1998; Bastiaanse, 2004). Since verb movement does not affect the meaning of the sentence, it does predict above chance performance on comprehension of active matrix clauses. This is the main difference between the DOP-H and D&G’s theory. The DOP-H predicts above chance performance on Dutch active sentences, D&G predict at chance performance, since according to their theory the crucial aspect is the relative order of the lexical verb and the internal argument. Let us compare the performance of Broca patients predicted by D&G and by the DOP-H, using the earlier given Dutch data of Bastiaanse & Edwards (Table 3).

For the three sentence types that have been tested by Bastiaanse and Edwards (2004), D&G’s theory makes the wrong prediction, whereas the DOP-H makes the correct prediction. The latter is not very surprising, since the DOP-H is partially based on these data. The DOP-H should be applicable for German data as well, and it is for most of the patients tested by Burchert and De Bleser, but, as said, not on the German group data, maybe due to the reliance on morphology by German speakers.

6. Conclusion

Despite the merits of the TDH, which is only meant to account for comprehension, we have shown that the new theory of D&G does not describe the Dutch and German data adequately. Their theory is, at least partly, based on biased data, because of the choice of foils in the Friederici and Graetz (1987) study. We do not agree with D&G that the relative order of the internal argument and the lexical verb is the main issue. According to the DOP-H, we expect problems when word order of the sentences is derived. For comprehension this implies that the DOP-H predicts that those sentences in which thematic roles are not in the basic order, that is, sentences in which the theme precedes the agent, will result in chance level performance. Unfortunately, the influence of verb movement, which is highly relevant to D&G’s theory, cannot be tested in the same way as NP- and PP-movement in actives and passives, but both Bastiaanse (2004) and Friedmann (2003) have shown that parsing of sentences with moved verbs is impaired in Broca’s aphasia, at least for Dutch and Hebrew Broca patients, respectively.

The idea of D&G to test sentences with voice change and movement is interesting enough, but since there is movement in all Dutch and German passives, as outlined above, this passive is not the right one to test their theory.

References


