

Two Forms of Negation in Korean Broca's Aphasia*

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Lee, Miseon. 2007. **Two Forms of Negation in Korean Broca's Aphasia.** *Korean Journal of Linguistics*, 32-2, 319-335. This study investigated agrammatic Broca's aphasic comprehension and production of two forms of negation in Korean (i.e., the short-form negation and the long-form negation). Although the internal structure of a NegP is controversial, it is generally agreed that both forms have the same syntactic status within a NegP, as either the head or the specifier of a NegP. Under these theories, some accounts (e.g., Ouhalla 1990; Rispens et al. 2001) predict the same disruption to the short-form negation (SFN) and the long-form negation (LFN). As predicted, this study found no difference between SFN and LFN in near-normal comprehension. The results from the elicited production task, however, showed a dissociation between the preserved SFN and the impaired LFN although both are elements from the same functional category NegP. It is suggested, then, that while syntactic representation of negation is intact in Broca's aphasia, appropriate processing of LFN in production is hindered by its syntactic status as the functional category and its syntactic complexity. Error patterns observed supported these possibilities. (Hanyang University)

Key words: negation, agrammatic Broca's aphasia, Korean, production, comprehension

1. Introduction

Broca's aphasia with agrammatism has been known to have difficulties producing closed-class words and functional morphemes such as inflections, although some open-class words are also problematic. Given this well-known difficulty with functional categories, it can be expected that negation will present problems to speakers with Broca's aphasia.

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Although little has been reported in literature on negation in Broca's aphasia, the relevant studies to date have shown dissociations between affirmatives and negatives, and also between production and comprehension of negative sentences. Bebout (1993) studied the differences between syntactic negation with *not* and morphological negation with a derivational affix *un-* in production and comprehension. The aphasic subjects with mostly nonfluent aphasia evinced a double dissociation: one between *not* negation and *un-* negation and the other between production and comprehension. The aphasics performed better on the negative sentences with *un-* than those with *not* in production, but this difference was not found in comprehension.

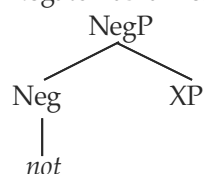
A truth-value judgment study done by Juncos-Rabadàn (1992a) demonstrated that fluent aphasic patients also had problems with negative sentences with *not* (e.g., *Smoking is not healthy*) while performing well on sentences with *un-* (e.g., *Smoking is unhealthy*). In another study of Spanish-speaking fluent aphasics, Juncos-Rabadàn (1992b, recited from Rispens, et al. 2001) reported that the aphasic patients had difficulty understanding negative sentences containing the negation *no* (e.g., *el chico no empuja a la chica*, literally meaning "the boy not pushes the girl"). Interestingly, the same aphasics performed well on comprehension of negative sentences with a negative polarity item along with the negation *no* (e.g., *el chico no coge nada*, literally meaning "the boy not takes nothing"), even better than on comprehension of affirmatives.

Rispens, Bastiaanse & van Zonneveld (2001) compared the performance of agrammatic aphasic patients of English, Dutch and Norwegian on production and comprehension of negation. They found no difference between negative sentences and affirmative sentences in comprehension across languages. However, a crosslinguistic difference was found in production: that is, English aphasics were worse than Dutch and Norwegian aphasics in production of negatives but not of affirmatives. The authors attributed these results to the internal structure of the negation phrase (NegP), which is distinct between English and Dutch/Norwegian.

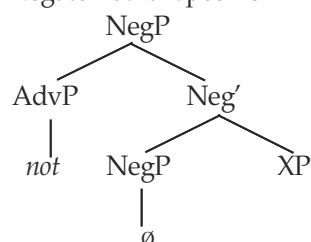
There are two possible internal structures of a NegP, depending on languages: that is, the negation word/morpheme is the head of a NegP in some languages or the specifier of a NegP in other languages, as shown in (1) (cf. Pollock 1989; Ouhalla 1990; Laka 1990; Zanuttini 1997).

(1) Two possible structures of a NegP

a. Negator as a head



b. Negator as a specifier



In English, the negator *not* is the head of a NegP. Consider the following sentences in (2):

- (2) a. Chris always loves his parents.
 b. *Chris not loves his parents.
 c. *Chris loves not his parents.
 d. Chris does not love his parents.

According to the Minimalist Program (Chomsky 1995), English verbs only move covertly to T and AgrS to check its features after Spell-out, and when *not* occurs, the verb cannot move up to T and AgrS covertly (2b) or overtly (2c). This can be explained only if we assume that *not* is the head of a NegP: then, passing over a head *not* will violate the Head Movement Constraint (HMC, Travis 1984).

On the other hand, the Dutch negator *niet* and the Norwegian negator *ikke* are the specifier of a NegP. Both languages, unlike English, allow the verb in the second position, as the result of overt movement over the negation words, as exemplified in (3b) and (4b):

(3) Negation in Dutch

- a. Jan leest_i het boek *t_i*.
 'John reads the book.'
 b. Jan leest_i het boek niet *t_i*.
 John reads the book not ('John does not read the book').

(4) Negation in Norwegian

- a. Jens leser boka.
 'John reads the book.'

b. Jens leser; ikke t_i boka.

John reads not the book ('John does not read the book').

Based on their crosslinguistic data, Rispens et al. (2001) have argued that agrammatic aphasic patients have more difficulty producing negative sentences when the negation word is the head of a NegP as in English than when it is the specifier of a NegP as in Dutch and Norwegian. In other words, the negator as a functional head is more difficult for aphasics than the negator as a lexical head (i.e., the head of an AdvP), although both occur within a functional projection NegP. While Rispens et al. consider the internal structure of a NegP responsible for the crosslinguistic variation in production of negative sentences, there are other possibilities. Ouhalla (1993), for example, has claimed that agrammatic aphasics have problems projecting functional categories higher than VPs in the tree. Given that a NegP is a functional projection, therefore, Ouhalla predicts production difficulties with negation for all agrammatic aphasics across languages. This hypothesis well accounts for the observed dissociation between preserved morphological negation with *un-* and impaired syntactic negation with *not* observed in Bebout (1993) and Juncos-Rabadàn (1992a).

The Tree-pruning hypothesis (TPH, Friedmann & Grodzinsky 1997), on the other hand, has argued that not all functional projections are equally impaired. Based on the finding that tense but not agreement is impaired in the speech of Hebrew- and Palestinian Arabic-speaking agrammatic patients, the TPH proposes that agrammatics produce trees intact only up to T in some patients.

Similarly, Hagiwara (1995) has claimed that the agrammatic tree is impaired at various sites in accordance with the degree of severity of impairment. She proposes that the higher a functional projection is in the tree, the more susceptible it is to impairment. According to her, therefore, if the elements from a higher functional projection are intact, then those from a lower projection should also be intact.

Both the TPH and Hagiwara's hypothesis suggest that production of negation will be more impaired than other functional elements from lower projections in a language. Furthermore, since the position of a NegP in the tree is language-dependent, as exemplified in (5), (6) and (7), these two hypotheses predict crosslinguistic variations in production

of negation, with Norwegian negation being more severely impaired than English negation and with Dutch negation being the least impaired.

- (5) English:
 [AgrSP John_j does_i [TP t_i [**NegP** [Neg' not [AgrOP [VP t_j read the book]]]
- (6) Dutch:
 [AgrSP John_k reads_i [TP [AgrOP the book_j [**NegP** not [VP t_k t_j t_i]]]
- (7) Norwegian:
 [AgrSP John_j reads_i [**NegP** not [TP [AgrOP [VP t_j t_i the book]]]

The goal of the present study was to investigate Broca's aphasic production and comprehension of Korean negative sentences and thereby to examine the validity of the previous accounts discussed above. Before proceeding to the experiments, a sketch of the negation structures in Korean is presented.

2. Negation in Korean

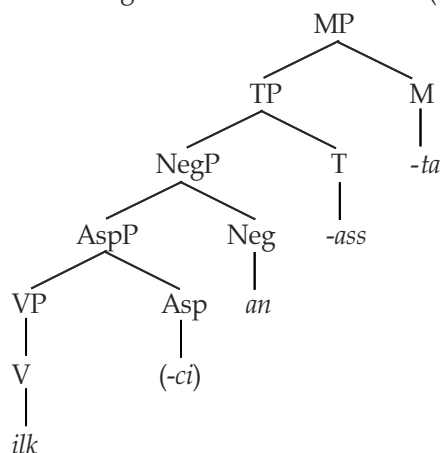
As is well known, there are two distinct forms of negation in adult Korean: the short form negation (SFN) and the long form negation (LFN), as illustrated in (8).

- (8) a. Affirmative sentence
 Mina-ka chayk-ul ilk-ess-ta.
 Mina-NOM book-ACC read-PAST-DECL
 'Mina read a book.'
- b. Short form negation (SFN)
 Mina-ka chayk-ul an ilk-ess-ta.
 Mina-NOM book-ACC NEG read-PAST-DECL
 'Mina did not read a book.'
- c. Long form negation (LFN)
 Mina-ka chayk-ul ilk-ci anh-ass-ta.
 Mina-NOM book-ACC read-*ci* NEG.do-PAST-DECL
 'Mina did not read a book.'

As shown in (8b), SFN *an* immediately precedes the verb in adult Korean. LFN *-ci anh*, on the other hand, immediately follows the verb stem.¹

Different views have been proposed on the issue of the internal structure of SFN and LFN in Korean. Yoon (1990), Ahn (1991) and Cho (1994) have argued that SFN and LFN are both the head of a NegP, as illustrated in Figure 1. According to Ahn (1991), the only difference between them is the overt realization of *-ci* in the head of an Aspect Phrase (AspP) for LFN.

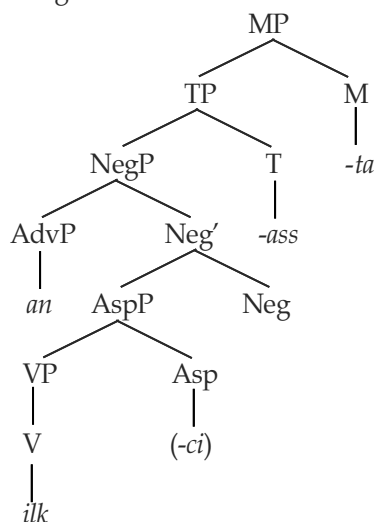
Figure 1. Korean negative sentence structure (following Ahn 1991)



Another view takes SFN *an* to the specifier of a NegP (Jung 1990; Park 1992; J.-H. Lee 1993; Hagstrom 2002), as shown in Figure 2. This view also finds little difference between SFN and LFN, both involving primarily the same internal structure of a NegP.

¹ *anh* in LFN is presumed to be a contraction of *an ha-* (*not* + dummy *do*) (e.g., Yoon 1990; Ahn 1991)

Figure 2. Korean negative sentence structure



Based on the studies discussed above, here SFN and LFN are considered to be generated in the same position within a NegP taking the same syntactic status, whether as a head or a specifier of a NegP.

Now the hypotheses relevant to negation in aphasia discussed earlier make the same prediction for the production of negation in Korean Broca's aphasia. Rispens et al. (2001) and Ouhalla (1993) predict no difference between SFN and LFN, although for different reasons: according to Rispens et al.'s claim that aphasic patients will have problems if the negator is the head of a NegP, SFN and LFN will be intact or impaired to the same degree because their syntactic status is the same. According to Ouhalla, all negators should be impaired because, whether SFN or LFN, they are elements from a functional projection above a VP. The TPH (1997) and Hagiwara's hypothesis (1995) also predict the same degree of impairment for both forms of negation in Korean because they imply that all the elements from a certain functional category should be disrupted to the same degree.

3. Methods

3.1 Subjects

Aphasic subjects: Four Korean-speaking Broca's aphasic subjects (two males and two females; mean age = 40.5 years) participated in this study. They were all right-handed, and had 12-16 years of education; they ranged in age from 37 to 45 years. None of the subjects had a history of prior neurological disease, drug or alcohol abuse, psychiatric disorders, developmental speech/language disorders, or learning disabilities. CT scans performed at the onset of symptoms demonstrated a unilateral left-sided lesion. All subjects were between 7-40 months post-stroke at the time of the study, and none had received treatment focused explicitly on negation. Testing of visual and hearing acuity showed abilities adequate for test performance. The diagnosis of Broca's aphasia was based on administration of a Korean version of the Boston Diagnostic Aphasia Examination (K-BDAE, S. Kim, unpublished ms.) and/or a Korean version of the Western Aphasia Battery (K-WAB, H.-H. Kim, unpublished version), and clinical evaluation by two speech therapists. All the subjects were diagnosed as having Broca's aphasia with agrammatism based on the clinical features of their speech production (cf. M. Lee 2000).

Control subjects: Four normal native speakers of Korean also participated in the study as a control group. They were all monolingual Korean speakers and were matched with aphasic patients in age (mean age = 39.9 years), education, handedness and dialect.

3.2 Materials

Forty negative sentences were used for both production and comprehension tasks, half employing SFN such as (9a) and the other half LFN such as (9b).

- (9) a. Mina-nun ankyeng-ul an ssu-ess-eyo.
 Mina-TOP glasses-ACC NEG wear-PAST-DECL
 b. Mina-nun ankyeng-ul ssu-ci an-ha-ess-eyo.
 Mina-TOP glasses-ACC wear-*ci* NEG.do-PAST-DECL
 'Mina is not wearing glasses.'

For each of the testing sentences, a black-and-white line drawing which describes two contrasting situations was used in the production task. For example, the picture stimulus used to elicit negative sentences in (9) describes a boy who wears glasses and a girl who does not.

3.3 Procedures

Since both tasks employed the same targets, the production task preceded the comprehension task. All responses were scored as correct or incorrect on line. In addition, those from the production sessions were tape-recorded, transcribed and analyzed by the examiner. Self-corrections occurring within the given time frame (10 seconds for comprehension, 30 seconds for production) were accepted.

Elicited production task: In the production task, picture stimuli were presented one at a time in random order. For each picture, a context and a test question were auditorily presented by the examiner and the subjects were asked to answer the test question starting with a given cue, as exemplified in (10):

- (10) a. Context (auditorily presented in Korean):
 This boy is Minswu and this is Mina.
 Minswu is wearing glasses.
 b. Test question:
 Mina-nun etteha-yo? (cue) Mina-nun?
 Mina-CT how-INTR Mina-CT²
 'How about Mina?' "Mina is?'

Given that the two forms of negation are alternating each other in Korean, the production task was carried over two sessions to elicit both negation forms equally. In the beginning of each session, three practice items were provided with priming sentences to establish that subjects understood the task and the targeted negation form. An example of a practice item used in the LFN session is presented in (11).

2 CT = Contrastive Topic marker; INTR = Interrogative marker

- (11) a. Context:
This boy is Minswu, this girl is Yenghi, and this is Mina.
Minswu is eating a banana.
- b. Priming:
Kulentey, Yenghi-nun panana-lul mek-ci anh-a-yo.
but Yenghi-CT banana-ACC eat-ci NEG.do-NonPAST-DECL
- c. Test question:
Mina-nun etteha-yo? (cue) Mina-nun?
Mina-CT how-INTR Mina-CT
'How about Mina?' 'Mina is?'

Only responses in which the targeted negation form was produced correctly in the correct position were accepted as 'correct'.

Comprehension task: The comprehension task involved a truth-value judgment task. In this test, subjects were auditorily presented with a context, and were given a negative sentence, either SFN or LFN, which they had to evaluate as true or false based on the given context. An example is presented in (12).

- (12) a. Context (auditorily presented in Korean):
Minswu went to school. Mina is still home.
- b. True test sentence for truth-value judgment:
Mina-ka hakkyo-ey an ka-ess-eyo.
Mina-NOM school-to NEG go-PAST-DECL
or
Mina-ka hakkyo-ey ka-ci anh-ass-eyo.
Mina-NOM school-to go-ci NEG.do-PAST-DECL
'Mina didn't go to school.'
- c. False test sentence for truth-value judgment:
Mina-ka hakkyo-ey ka-ess-eyo.
Mina-NOM school-to go-PAST-DECL
'Mina went to school.'

3.4 Results

Percentage correct production and comprehension of negative sentences was calculated for each aphasic subject (see Table 1). Non-parametric Wilcoxon-tests were then performed for comparisons within subjects.

Table 1. Percentage correct production and comprehension

Aphasic	Production		Comprehension	
	SFN	LFN	SFN	LFN
1	95	0	85	80
2	90	0	100	85
3	100	0	100	95
4	75	10	80	90
Mean	90	3	91	88

As seen in Table 1, aphasic subjects produced SFN significantly better than LFN ($z = -8.367, p = .000$): mean percentage correct production of the former was 90%, while mean percentage correct production of the latter was only 3%. Errors with LFN mostly involved production of SFN although the subjects were modelled and instructed to produce LFN. Even when producing SFN, the aphasic subjects seem to be aware that the targeted form was LFN and thus they made several unsuccessful attempts to produce LFN, yielding ungrammatical forms in many cases (e.g., *mek-e anh-a-yo, mek-e-yo ani-yo*). With respect to SFN, the errors were mainly misplacement of the negator *an*, not immediately preceding the verb (e.g., *an ankyeng ssu-ess-eyo* "(Mina) isn't wearing glasses"). Other errors were classified as 'no response', that is, no production of negation at all. Normal controls had no difficulty producing either form of negation, and did not make any errors with LFN or SFN. Their performance was 100% correct both on production and comprehension tasks.

In the comprehension task, the aphasic subjects performed relatively well on negative sentences, revealing no significant difference between SFN and LFN ($z = -1.134, p = .257$). Mean percentage correct comprehension was 91% for SFN and 88% for LFN.

A modality dissociation was only found for LFN ($z = -8.246, p = .000$), with better comprehension than production. However, such a dissociation was not observed for SFN ($z = -.447, p = .665$).

4. Discussion

Results from this study examining production of negative sentences were consistent with previous data from M. Lee (2000, 2003) showing

that elements from a certain functional category were not equally impaired in Korean agrammatic Broca's aphasia. Specifically, LFN presented production difficulty for aphasic subjects, while SFN did not. This finding runs counter to Rispens et al.'s (2001) account that predicts the same disruption to both forms of negation in production because as discussed earlier, the SFL and LFN take the same syntactic status within a NegP. Also, given that sentential negation is always a functional projection, the observed dissociation between SFN and LFN cannot be explained by Ouhalla's (1990) hypothesis. Neither do the TPH and Hagiwara's hypothesis (1995), which predict that negative sentences, whether SFN or LFN, are difficult for agrammatic aphasics to produce because negative verbs always involve a TP in Korean. Elements in a TP have been found impaired in Korean Broca's aphasic production (Halliwell 2000; Lee 2003). Thus, the selective production difficulty cannot be explained in terms of the internal structure of a NegP or its position in the syntactic tree. Furthermore, contrary to the TPH and Hagiwara's hypothesis, the aphasic subjects could construct higher nodes such as a CP and an MP in the tree even when lower projections TP and NegP seemed impaired (cf. M. Lee 2000, 2003). In other words, the impairment of functional categories was not hierarchical as proposed in previous work.

The difficulty that aphasic subjects encountered with LFN was not observed in comprehension; their comprehension was near normal for both forms of negation. This finding suggests that the syntactic representation of negation is unimpaired and normally accessed in Broca's aphasic comprehension. The observed dissociation between production and comprehension of LFN, then, raises the question of what underlies these patients' production difficulty with LFN.

A possible explanation is that Broca's aphasic patients have difficulty processing a functional category NegP in general, as observed crosslinguistically, but that another route is available for the aphasics to access SFN. Ahn (1991) claims that SFN *an* can be classified into two types: unstressed *an* as a functional head of a NegP and stressed *AN* as an adverb from a lexical category. Park (1990) even argues that *an* is an adverb, not a functional negator. An example of *an* as an adverb is given in (13), where *an* is modifying another adverb *ppalli* 'quickly' and thus cannot co-occur with an Negative Polarity Item *anwu-to*.

- (13) a. Mina-ka an ppalli ka-ss-ta.
 Mina-NOM NEG quickly go-PAST-DECL
 b. *Amwu-to an ppalli ka-ss-ta.
 Anyone-too NEG quickly go-PAST-DECL
- (14) Mina-ka an pap mek-ess-ta.
 Mina-NOM NEG meal eat-PAST-DECL

Young Korean children frequently produce sentences like (14) (e.g., Hahn 1981; Cho & Hong 1988; C. Lee 1993; Wexler 2000). Although it is still controversial whether young children have not developed functional categories, Y.J. Kim (1997) proposes that young children may use *an* as an adverb first, yielding the sentences like (14), and later develop it as a functional negator.

Yet Broca's aphasic patients have adult grammar, which normally does not allow sentences like (13) and (14). However, when they have problems processing a functional category NegP in production, they may substitute a functional negator *an* with a lexical adverb *an*. The error data derived from the present study revealed that our three aphasic subjects made predominantly word order errors for SFN, placing *an* before the object apart from the verb (e.g., an *ankyeng ssu-ess-eyo* "(Mina) isn't wearing glasses"). This error type resembles the sentence in (14) from child language, indicating that SFN *an* in aphasic production could be an adverb.

Rispens et al. (2001) also found the same pattern of errors in their crosslinguistic study of seven agrammatics: regardless of their native language, all but one resorted to so-called *constituent negation* as in (15a) when required to produce sentence negation as in (15b). Rispens et al. attribute the production of constituent negation to the narrow scope of constituent negation (i.e., the following NP 'the banana') than sentential negation.

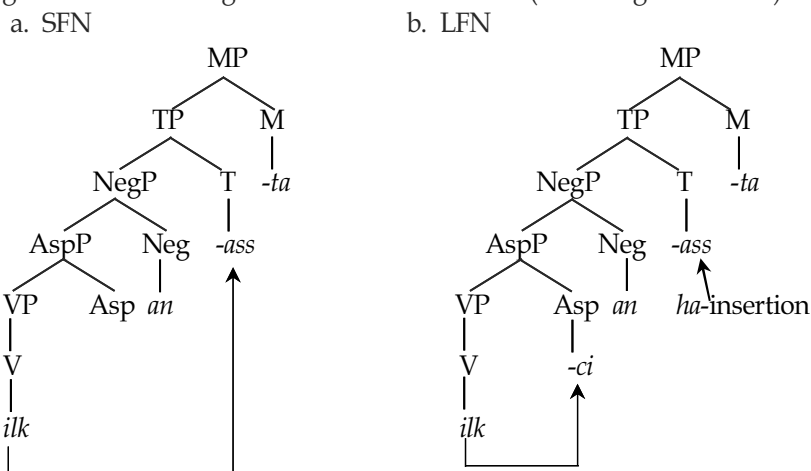
- (15) a. The boy eats not the banana.
 b. The boy does not eat the banana.

On the other hand, there is no such lexical alternative to LFN in Korean. Thus, when they are asked to produce LFN but have problems with a NegP, then Broca's aphasic patients could produce either nothing

because of their inability to process the NegP or SFN *an* as an adverb. In fact, the errors made by our aphasic subjects were mostly substitution of SFN for LFN (85% of all errors).

Moreover, the syntactic complexity of LFN, as compared to SFN, could be another factor that affects the observed dissociation between the intact SFN and the impaired LFN in production. According to Ahn (1991), LFN involves at least two syntactic processes in deriving a negative verb, as shown in Figure 3: one is the verb movement up to Asp(ect), combining with an affix *-ci*, and the other is the *ha*-insertion in T, combining with *an*. Meantime, SFN only requires the verb movement to T.³ Drawing on the child language acquisition data, Hagstrom (2002) even suggests that LFN, unlike SFN, entails movement of a negator to C.

Figure 3. Korean negative sentence structure (following Ahn 1991)



Errors observed in the production of LFN indicate that aphasic subjects may have difficulty combining the verb stem with Asp *-ci*, or the negator *an* with the inserted verb *ha*. Examples are *mek-e anh-a-yo*

³ If a negator is the head of a NegP as shown in Figure 3, the verb movement to T violates the HMC, as S. Kim (1993) pointed out. However, this view of the negator as a functional head allows the verb movement passing over a head for some reasons, which will not be discussed further here.

and *mek-e-yo ani-yo*, after several unsuccessful attempts to produce the target *mek-ci anh-a-yo*.

It is not yet clear whether the functional status of LFN alone is responsible for the dissociation between LFN and SFN in agrammatic production, nor do we know whether the dissociation is only due to the syntactic complexity of LFN. Rather, it is possible for the functional status and the syntactic complexity to interact with each other. To determine between these possibilities, further research to negation is needed.

5. Conclusion

This study presents experimental data from four Korean-speaking Broca's aphasic subjects who showed dissociation in production between the impaired LFN and the intact SFN. This result is in accordance with the previous observations that not all elements from a certain functional category are equally impaired in agrammatic production. However, it conflicts with the predictions of previous hypotheses that SFN and LFN should be impaired to the same degree because of their internal structure or configurational position of a NegP. Instead, two other possible accounts were suggested: first, although our Broca's aphasic subjects have difficulty with the functional category NegP in production, for SFN, there is an alternative *an* which is an adverb from a lexical category. However, such a lexical alternative is not available for LFN. Second, LFN is syntactically more complex than SFN, and thus more difficult to process. Further, these two factors could interact with each other, multiplying the difficulty with LFN.

Considering the near-normal comprehension of both forms, the representation of the NegP appears to be intact. Rather, limited access causes the selective difficulty with LFN only in production.

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