Proceedings of Sinn und Bedeutung 11, E. Puig-Waldmüller (ed.), Barcelona: Universitat Pompeu Fabra, pp.180-193.

SOME PSYCHOLINGUISTIC COMMENTS ON NPI LICENSING*

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Abstract

In this paper, we discuss the relevance of c-command and licensing strength for NPI licensing. Furthermore, we review the results of an experiment using event-related brain potentials (ERPs) in which we investigated the difference in strength of licensing the German negative polarity item *jemals* 'ever'. The two licensing contexts under discussion are negation and wh-question. We found a sustained negativity on the Negative polarity item (NPI) in wh-context compared to the context where the NPI appeared in the scope of negation. We discuss our ERP results in the light of some recent theoretical proposals on negative polarity licensing.

1 Introduction

Crosslinguistic research done on negation (or more generally: negative contexts) in the recent decades[1] has revealed that in many languages of the world there are items or series of items comparable to the English *any, anyone, anywhere, anytime / ever* etc., which are *deficient* in the sense that their distribution is limited to negative contexts or contexts which might in some way or the other be reduced to negation. Thus, unlike their *normal* indefinite counterparts, Negative Polarity Items (henceforth: NPIs) need some sort of a licenser in order to be grammatical; cf. (1) vs. (2) and (3).

(1) a. She has bought *some* books.
b. She has met *someone*.
c. She has been *somewhere* last year.
d. She has had *some time* ago an accident.

(2) a. She has bought *any* books.
b. *She has met *anyone*.
c. *She has been *anywhere* last year.
d. *She has had *any time* ago / *ever* an accident.

(3) a. She has **not** bought *any* books.
b. She has **not** met *anyone*.
c. She has **not** been *anywhere* last year.

*We would like to thank the audience of the *Sinn und Bedutung 11* conference in Barcelona for their helpfull comments and their suggestions. The present research was supported by a grant from the Deutsche Forschungsgemeinschaft (DFG) to D.S. (FOR 375/1-4).

[1] Cf., among others, Bernini and Ramat (1996), Vallduví (1994), Progovac (1994), Lee (1996), van der Wouden (1997), Giannakidou (1997), Giannakidou (1998), Lahiri (1998), Tovena (1998), Błaszczak (2001), Pereltsvaig (2004); see also Haspelmath (1997).

d. She has **not** *ever* had an accident before.

The contrast between (2) and (3) shows that NPIs are obviously *sensitive* to the presence of negation (or some other appropriate licenser; see below). What the precise conditions are on licensing of NPIs is the subject of numerous papers or books published in the recent years or decades. While the theoretical research on NPIs has a rich tradition, going back at least to Klima (1964), until recently there has been almost no work done on the processing of NPIs. It has been only recently that scholars *re-discovered* polarity phenomena for psycholinguistic research and put processing of NPIs high on their research agenda. In the present paper we will report some important results of an online experiment done on the processing of NPIs. Due to space constraints, we will focus our attention on two studies which have been conducted on the processing of the NPI *jemals* 'ever' in German. The method used in the studies to be presented below was that of Event Related Potentials (henceforth: ERP). As will be shown below, this method is especially rewarding since it allows us to gain a quite precise picture of what is going on in our brain while we are processing grammatical versus ungrammatical sequences. From the point of view of a theoretical linguistics, ERP-studies on NPIs are especially interesting since they offer psycholinguistic evidence for its claims.
The paper is organized in the following way. In section 2 we formulate two important claims of the theoretical research regarding licensing of NPIs. In section 3 we will introduce the ERP method and then, in section 4, we will report the results of two ERP-studies. We will focus on the question of whether the theoretical claims (which of course are empirically based) are mirrored psycholinguistically. The paper will be closed by a summary in section 5.

2 Two important findings of the theoretical NPI-research

2.1 Relevance of c-command

As was pointed out above, NPIs need to be licensed by an appropriate licenser, hence they are only allowed in contexts in which such a licenser is available. But if it were only the presence of a licenser that mattered, why should the examples in (4) be ungrammatical?

(4) a. *John gave *anything* to **no one**.
b. *Students who have **not** read this book will get *any* bad grades.

The relevant observation is that in (4) though there is a potential licenser (*not, no one*) present in the sentence, it is not c-commanding the NPI. Obviously, in order for an NPI to be grammatical, it has to occur in the scope (be c-commanded) by the licensing operator; cf. (5) (Klima (1964); see also Linebarger (1987) for the notion of *immediate scope*).[2]

(5) a. John gave **nothing** to *anyone*.

[2]Given that there are cases where an NPI is grammatical although it is not overtly c-commanded by negation (cf. (i)), the relevant condition on NPI-licensing cannot be stated in terms of an overt c-command requirement (as claimed, e.g., by (Laka 1994)), but must be formulated as an LF condition (as argued among others by Linebarger (1987), Progovac (1994), Giannakidou (1997), Giannakidou (1998), (Lahiri 1998)). In order to explain the grammaticality of (i), where there is no c-command relation at s-structure between negation (or inherently negative element) and the NPI contained in a topicalized clause, it must be assumed that at LF the missing c-command relation is re-established.

(i) That he has stolen *anything* was **never** proved.
(from Giannakidou (1998) referring to Ross (1967) and Linebarger (1980))

b. Students who have read this book will **not** get *any* bad grades.

2.2 Relevance of licensing strength

Another important observation is that not all NPIs are licensed in all negative polarity contexts, i.e., contexts in which NPIs are *normally* licensed. In (6) the usual negative polarity contexts are listed (cf. Giannakidou 1997, Giannakidou 1998).

(6) **Yes/No questions**: Did you see *anyone*?

Wh-questions: Which student saw *any* professor?

Antecedents of conditionals: If you see *anyone*, let me know.

S-comparatives: She ran faster than *anyone* expected.

restrictor of $\forall$: Every student who had read *anything* about Einstein, passed the exam.

***before*-clauses**: Before John talked to *any* students, the class started.

quantifiers like *few*: Very few students read anything.

Now, given that the monotone decreasing quantifier *weinig* 'few' in Dutch is a NPI-licenser, as evidenced by (7), why does the NPI *ook maar* 'at all' fail to be licensed in (8-a), but is perfectly fine in the context with sentential negation *niet* in (8-c) or in the context with the negative determiner *geen* 'none' in (8-b) (van der Wouden 1997).

(7) a. **Weinig** monniken *kunnen* vader abt *uitstaan*.
(few monks can father abbot stand)
'Few monks can stand father abbot.'

(8) a. ***Weinig** kinderen hebben *ook maar* iets gezien.
(few children have at all anything seen)
'Few children have seen anything at all.'

b. **Geen** van de kinderen heeft *ook maar* iets gezien.
(none of the children has at all anything seen)
'None of the children has seen anything at all.'

c. De abt heeft het geheim **niet** aan *ook maar* iemand verteld.
(the abbot has the secret not to at all anybody told)
'The abbot didn't tell the secret to anybody.'

Or, to mention another example, given that NPIs are *normally* licensed in questions in Polish (cf. (9)), why cannot negative pronouns–which have also been analysed as NPIs in Polish (see Błaszczak (2001) and the references cited there)-be licensed in this context, but require the presence of sentence negation instead; cf. (9) (adapted from Błaszczak (2001)).

(9) a. A czy *ktokolwiek* był już w Afryce?
(and whether anyone be-3.SG.PAST already in Africa)
'Has anybody ever been to Africa?'

(10) a. *Widziałeś tam *nikogo*?
(saw-2.SG.M there nobody-ACC)
'intended: Did you see anyone there?'

b. **Nie** widziałem tam *nikogo*.
(NEG saw-1.SG.M there nobody-GEN true)
'I haven't seen anybody there.'

Intuitively, we could say that some licensing contexts (some licensers) are somehow more 'negative' than the others. Thus, for example, negation and negative quantifiers are obviously stronger lincensers than monotone decreasing quantifiers like *few* since the latter, while licensing some types of NPIs, is not able to license NPIs like *ook maar* in Dutch. In a similar vein, we could say that sentence negation is a stronger licenser than questions since the latter context, while being able to license NPIs like *ktokolwiek* 'anybody' in Polish, is too weak to license negative pronouns. This intuition corresponds in fact to an older view that expressions of negation vary according to their 'negative strength', which is to say that some of them feel more negative than the others (van der Wouden 1997). So, for instance, according to Jespersen (1917), one can distinguish strong and weak negative expressions, the former being represented by, e.g., *not* and *never* and the latter by expressions like *hardly* and *seldom* (cf. also Klima (1964)). Some authors have proposed even various hierarchies of affective contexts (see van der Wouden (1997) for discussion). To mention just one example, four classes of affective contexts related to each other in a hierarchical order are distinguished in Edmondson (1981), Edmondson (1983), whereby the degree of negativity increases from left to right, the negatives being the strongest affective (negative polarity) context, cf. (11) cited from van der Wouden (1997).

(11) Hierarchy of affective contexts (Edmondson)
$comparative \supset conditional \supset interrogatives \supset negatives$

In the more recent literature scholars have attempted to define the "negative strength" of negative polarity contexts in terms of how many of De Morgans's rules they satisfy (Zwarts (1996), van der Wouden (1997)). The more De Morgan's rules a given expression satisfies, the stronger it is. An alternative account based on (non)veridicality (which is defined in terms of truth) was presented by Giannakidou (1997), Giannakidou (1998)). Both approaches (based on downward monotonicity (algebraic functions) or based on (non)veridicality (truth values)), differentiate, for example, between negation (or negative quantifiers) and questions in that the latter context is a weaker licenser.

2.3 Partial conclusions

In the sections above two important observations were mentioned. Firstly, c-command is relevant for the licensing of NPIs, and secondly, not all licensers are equally 'negative' but rather 'strong' and 'weak' licensers have to be distinguished. Below, we ask whether these two observations are reflected in language processing.

3 On event related brain potentials (ERPs)

Before we give an overview about two ERP-studies on the processing of NPIs in German, we will briefly introduce the experimental technique of ERPs.

An ungrammaticality in a sentence compared to the analogous grammatical construction might reflect certain effects in the human brain reaction. Is it possible to apply such reactions on language specific areas? That means, is there a difference in the processing of, for example,

syntactic or semantic anomalies? The technique of ERPs provides a perfect tool to investigate language processing on-line because ERPs are continuous and have a very high temporal (*millisecond-by-millisecond*) resolution (Kutas and van Petten 1994). This distinguishes this technique from more quantitative measures like, e.g., reaction times. ERP effects (components) are characterized by a set of quantitative (peak latency) and qualitative parameters (polarity, topography, experimental sensitivity). Distinct ERP patterns have been found in response to linguistically distinct experimental manipulations. They are identified by a nomenclature which refers to their polarity (N/negativity versus P/positivity), post-stimulus peak latency and topographic distribution. Table 1 gives a brief overview of four main markers which have been identified in the literature regarding language processing.

components	time window	distribution	what does it show?	literature
ELAN (early left anterior negativity)	peaks between 120 and 220 ms	left or bilateral anterior	phrase structure violations	cf. Friederici (2002); Hahne (1998); Neville, Nicol, Barss, Forster and Garrett (1991)
LAN (left anterior negativity)	peaks between 300 and 500 ms	left or bilateral anterior	morphosyntactic violations	cf. Coulson, King and Kutas (1998); Gunter, Stowe and Mulder (1997); Friederici and Frisch (2000)
N400	peaks around 400 ms	centro-parietal bilateral often with a slight focus on the right hemisphere	semantic or thematic integration	cf. Kutas and Hillyard (1980); Friederici and Frisch (2000)
P600	peaks between 600 and 900 ms	centro-parietal distribution	syntactic reanalysis and repair; syntactic complexity	Osterhout and Holcomb (1992); Kaan, Harris, Gibson and Holcomb (2000)

Table 1: *ERP components and their interpretation*

After having given some insight on ERPs, let us turn to the first study of NPI processing in German.

4 Two ERP-studies on the processing of NPIs in German

4.1 Relevance of c-command?

The aim of the experiment by Drenhaus, Saddy and Frisch (2005) and Drenhaus, beim Graben, Saddy and Frisch (2006) was to investigate the relevance of c-command for NPI licensing. Three types of sentences were compared: first, the licenser is present and it c-command the NPI ((12-a)); second, there is no licenser at all ((12-b)); third, the licenser is present but it does not c-command the NPI *jemals* 'ever' ((12-c)). The analysis of the ERPs revealed that an unlicensed NPI ((12-b) and (12-c)) induce a biphasic N400-P600 patterns compared to the correct condition (12-a).

(12) a. **Kein** Mann, der einen Bart hatte, war *jemals* glücklich.
(no man who a beart had was ever happy)
'No man who had a beart was ever happy'

b. *Ein Mann, der einen Bart hatte, war *jemals* glücklich.
(a man who a beart had was ever happy)
'*A man who had a beart was ever happy.'

c. *Ein Mann, der **keinen** Bart hatte, war *jemals* glücklich.
(a man who no beart had was ever happy)
'*A man who had no beart was ever happy'

Drenhaus et al. (2005) interpreted the P600 components as a marker of syntactic repair attempts (Friederici 1995, Friederici 2002). Regarding the P600 components, no significant difference was found by comparing the ERPs in the incorrect conditions (12-b) versus (12-c). However, both elicited N400 effects differ significantly. Condition (12-b) induced a stronger effect than condition (12-c). Drenhaus et al. interpreted the results for unlicensed negative polarity items as a reflection of both semantic as well as syntactic processing problems compared to their licensed counterparts. The costs to integrate an NPI semantically in structures without negation compared to structures with a non-c-commanding negation are higher. Therefore, these results imply a combination of semantic properties and hierarchical constituency during the processing of negative polarity items. Additionally, they show that a linearly preceding but structurally not accessible licenser is used erroneously as a licenser (see, Drenhaus et al. (2005) and Drenhaus et al. (2006) for discussion). That suggests that the c-command relation between licenser and licensee (NPI) is not as important as had been argued in the theoretical literature, e.g., Haegeman (1995) and Laka (1994) (compare section 2.1 above).
Drenhaus et al. investigated only the failures of NPI licensing within the context of negation. The second study to be mentioned below goes a step further and extends the conditions, that is, besides negation also a question context was included in the experiment. The second study addresses the question of licensing strength, whether the distinction between a *weak* and a *strong* licenser–suggested by the theoretical literature (compare section 2.2)–can be found in psycholinguistic investigations.

4.2 Licensing strength?

The second study (Drenhaus, Błaszczak and Schütte under review), investigated the processing of the NPI *jemals* 'ever' in two different licensing contexts (negation and wh-question ((13-d)and (13-a)). Additionally, two contexts which failed to license the NPI *jemals* (definite determiner (13-b) and indefinite determiner (13-c)) were tested. Former ERP-studies (see above) found a biphasic N400-P600 pattern on the NPI when it was not licensed compared to a grammatical licensing context (negation). Therefore, similar results were expected in this study as well, by comparing the ungrammatical conditions (13-b) and (13-c) with the grammatical condition (13-d). Furthermore, similar ERPs were expected when the ungrammatical conditions are compared with the grammatical context where the NPI is licensed by wh-operator.
For space reasons, we will not present the whole analysis and interpretation in this paper (for an exhaustive analysis and interpretation of our results compare Drenhaus et al. (under review)).[3] Rather, we will focus on the question of whether the licensing strength plays a role during the processing a negative polarity item. Following the theoretical literature on licensing strength (e.g., Zwarts 1995, Zwarts 1996, Zwarts 1997, van der Wouden 1997, Giannakidou 1998), and given that negation is analyzed as a stronger licenser than a wh-operator, a difference in the

[3]For the statistical analysis of the ERP effects a repeated-measures analyses of variance (ANOVA) have been carried out with two factors: LICENSER, with four levels: correct negation context (13-d), correct WH context (13-a), incorrect definite context (13-b) and incorrect indefinite context (13-c) and a topographical factor REGION with three levels: anterior (electrodes F3, FZ and F4), central (electrodes C3, CZ and C4) and posterior (electrodes P3, PZ and P4).

ERPs between the two grammatical licensing contexts ((13-a) and (13-d)) might be expected. In this sense, it can be hypothesized that the processing of an NPI (integrating process) in the context of an accessible but weaker licenser (such as a wh-operator) should be harder compared to a licensing context which contains an accessible but stronger (more "prominent") licenser such as negation.

(13) a. Welcher Lehrer hat den Schüler *jemals* geschlagen? *(WH)*
(which teacher has the student ever hit)
'Which teacher has ever hit the student'

b. *Der Lehrer hat den Schüler *jemals* geschlagen. *(DEF)*
(the teacher has the student ever hit)
'*The teacher has ever hit the student.'

c. *Ein Lehrer hat den Schüler *jemals* geschlagen. *(INDEF)*
(a teacher has the student ever hit)
'*A teacher has ever hit the student.'

d. Kein Lehrer hat den Schüler *jemals* geschlagen. *(NEG)*
(no teacher has the student ever hit)
'No teacher has ever hit the student.'

4.2.1 Subjects

Sixteen undergraduated students (mean age 25 years, 5 male) from the University of Potsdam participated in this experiment after giving informed consent. All subjects were monolingual, right-handed and had normal or corrected-to-normal vision.

4.2.2 Material

The subjects saw 36 sets of 4 NPI-conditions (2 grammatical and 2 nongrammatical) intermixed with 144 related sentences which makes a total of 288 sentences. The sentences were presented in a pseudo-randomized order. All sentences consisted of a single main clause. In order to avoid case ambiguities all NPs were [+MASCULINE]. The wh-element (*welcher*) appeared in the grammatical condition (13-a) and the negator (*kein*) in the grammatical condition (13-d); the ungrammatical conditions (13-b) and (13-c) lack of any element to license the negative polarity item *jemals* (ever).

4.2.3 Procedure

16 training sentences (4 in each of the critical conditions, see above) were presented to the subjects. After this trainings set, the 144 critical sentences and the 144 related sentences were randomly presented in the center of a screen, with 400ms (plus 100ms interstimulus interval) for the initial subject phrase, the object phrase and for each of the other words in isolation. 500ms after the last word of each sentence a single noun was presented on the screen for 400ms. The task of the subjects was to judge within a maximal interval of 3000ms by pressing one of two buttons whether this noun was part of the sentence the subject had read before (probe detection). The distribution of probes was balanced over the conditions (50% correct probes and 50% incorrect probes, respectively). 1000ms after their response, the next trial began.
The EEG was recorded by means of 16 AgACl electrodes with a sampling rate of 250Hz (with impedances < 5kOhm) and were referenced to the left mastoid (re-referenced to linked mastoids offline). Following the nomenclature proposed by the American Electroencephalographic

Society (Sharbrough, Chartrian, Lesser, Lüders, Nuwer and Picton 1995) the electrodes were placed on the scalp. The horizontal electro-oculogram (EOG) was monitored with two electrodes placed at the outer canthus of each eye and the vertical EOG with two electrodes above and below the right eye.

4.2.4 The data

Only trials with correct answers in the probe detection task and without artifacts were selected for the ERP analysis (94,3% of all trials). The data were filtered with 0.2 Hz (high pass) to compensate for drifts. Single subject averages were computed in a 1300 ms window relative to the onset of the critical item (*jemals* 'ever') and aligned to a 200 ms pre-stimulus baseline. Two time windows were analysed: 300-450 ms for the N400 and 650-800 ms for the P600 effects. Furthermore, a third time window (250-700) was computed to investigate the differences between the two grammatical conditions (1a and 1d).

4.3 Results

4.3.1 Behavioral data

Let us start with the behavioral data. Accuracy percentages and response latencies of the probe detection task (table 2) were analyzed, even though there was no specific hypothesis for this data. It is crucial to mention that the probe detection task was a measure to decide whether subjects had really read the experimental sentences and to decide which trials would be part of the ERP analysis.

Conditions	**Accuracy in percentage (STD)**	**Reaction times in milliseconds (STD)**
(13-a) Welcher Lehrer [...] *jemals ... (WH)*	94.79% (3.91)	747.54ms (106.85)
(13-b) *Der Lehrer [...] *jemals ... (DEF)*	97.22% (4.29)	791.72ms (108.24)
(13-c) *Ein Lehrer [...] *jemals ... (INDEF)*	94.97% (3.04)	793.54ms (117.67)
(13-d) Kein Lehrer [...] *jemals ... (NEG)*	96.88% (2.73)	760.93ms (90.9)

Table 2: *Mean accuracy rates (in percent) and reaction times (in ms) for all four conditions across all 16 subjects (with standard deviations in parentheses)*

The analysis of the data revealed that in the comparison of (13-d) versus (13-a) the subjects made more errors in the probe detection task when the condition (13-a) was presented first ($F1(1,15)= 5.87$, $p < .03$; $F2 < 1$). There was no difference with regard to the response latencies (($F1 < 1$; $F2 < 1$).[4] This finding suggests that the WH-context ((13-a)) was much harder for subjects compared to the context with negation ((13-d)). This might be interpreted as a reflex of higher processing load; however, we do not want to overestimate this difference.

[4]The statistical analysis and the interpretation of the remaining comparisons is given in Drenhaus et al. (under review).

4.4 ERP data

The ERP patterns from the onset of the critical item (negative polaritiy item, onset at 0 ms) up to 1000 ms thereafter are displayed in figure 1, 2 and 3.
Figure 1 shows the grand average ERPs for the conditions *WH* (weak licenser) compared to the two incorrect conditions *INDEF* and *DEF* at three electrodes. Visual inspection shows that the definite context ((13-b)) is more negative than the the correct negation context ((13-d)). However, the incorrect indefinite context ((13-c)) does not differ from the correct context in which the NPI is licensed by negation ((13-d)) during the N400 time window. Moreover, both incorrect conditions (13-b) and (13-c) are more positive (P600) compared to the grammatical condition (13-d).

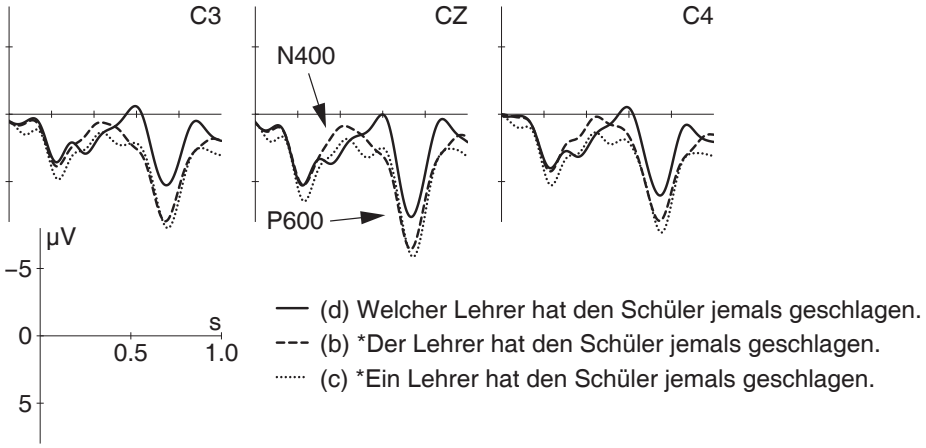

Figure 1: ERP voltage averages for the conditions (*WH*) (solid), the incorrect (*INDEF*) (dotted) and the incorrect (*DEF*) (dashed) at the central electrodes C3, CZ and C4. Time onset of the critical stimulus (the NPI) at 0 s. Negativity is plotted upwards. For presentation purposes only, ERPs were filtered off-line with 8 Hz low pass.

Figure 2 displays the grand average ERPs for the conditions *NEG* (strong licenser) compared to the two incorrect conditions *INDEF* and *DEF* at three electrodes. The ERPs in the incorrect conditions (13-b) and (13-c) are more negative (N400) compared to the correct (13-d) condition. Additionally, there is a difference in the amplitude in both ungrammatical conditions (13-b) compared to (13-c), that is, the negativity (N400) is stronger in the condition where the NPI appears in a definite context ((13-b)). Furthermore, visual inspection reveals a positivity (P600) for both ungrammatical conditions (13-b) and (13-c) in comparison with the grammatical wh-context ((13-a)).[5]

[5]The statistical analysis and the interpretation of the presented data in Figure 1 and 2 is presented in Drenhaus et al. (under review).

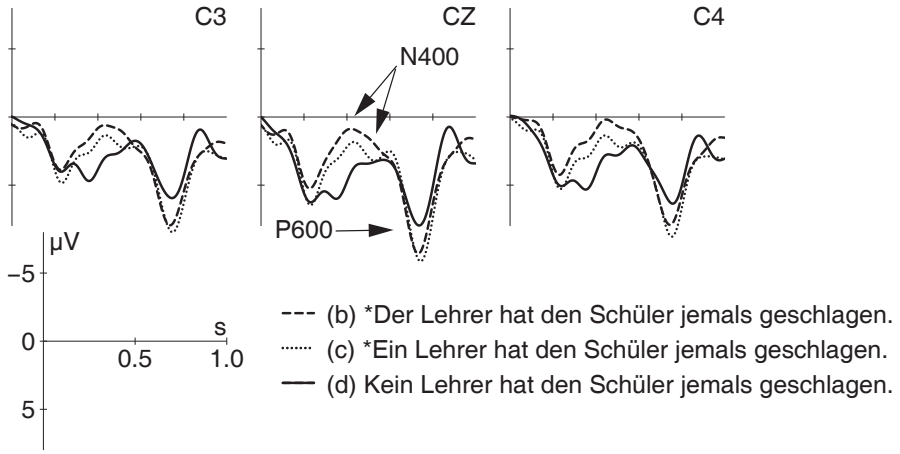

Figure 2: ERP voltage averages for the conditions (*NEG*) (solid), the incorrect (*INDEF*) (dotted) and the incorrect (*DEF*) (dashed) at the central electrodes C3, CZ and C4. Time onset of the critical stimulus (the NPI) at 0 s. Negativity is plotted upwards. For presentation purposes only, ERPs were filtered off-line with 8 Hz low pass.

Figure 3 displays the grand average ERPs for the conditions *NEG* (strong licenser) and *WH* (weaker licenser) at three electrodes. As you can see, the ERPs in the licensing condition with the wh-element ((13-a)) is more negative compared to the licensing condition with the negator ((13-d)).

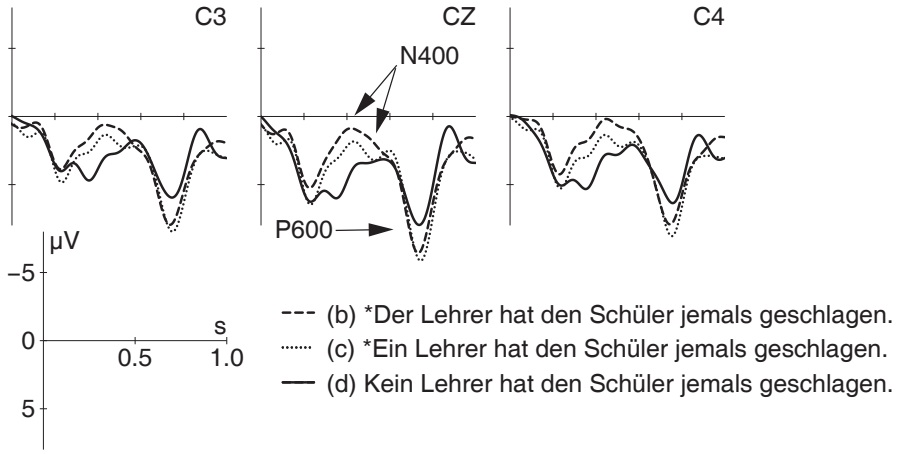

Figure 3: ERP voltage averages for the conditions (*NEG*) (solid) and (*WH*) (dotted) at the central electrodes C3, CZ and C4. Time onset of the critical stimulus (the NPI) at 0 s. Negativity is plotted upwards. For presentation purposes only, ERPs were filtered off-line with 8 Hz low pass.

The global ANOVA of both of the grammatical conditions *WH* ((13-a)) and *NEG* ((13-d)) in the time window from 250ms to 700ms revealed an interaction LICENSER x REGION (F (2,30) = 8.06, $p < .002$). Resolving the interaction showed that *WH* was more 'negative-going' than *NEG* in two regions (central: F (1,15) = 13.29, $p < .002$; posterior: F (1,15) = 11.14, $p < .005$) but not at the anterior sites ($F < 1$).

Someone could object that the negativity reported here in this comparison is a matter of interpretation due to the fact that two grammatical conditions are being compared. However, these findings can also be interpreted as a positivity for the condition with negation (condition (13-d) is more 'positive-going' compared to condition (13-a)). On the other hand, following the theoretical approaches to negative polarity licensing, negation is analyzed as a stronger licenser

compared to a wh-element. Considering this, the condition with negation ((13-d)) can be interpreted as a base-line for comparison. Another point, which favors such an interpretation of the data, is the morphology and topography of the negative-going wave. The revealed effect can be interpreted as an *N400* component.

5 Summary

In section 2.3 we asked whether c-command and licensing strength are reflected in language processing. The short answer is *yes*, they are. Regarding the first point, it has been shown that–although c-command matters for the NPI licensing–it seems that what counts more is the question of whether the licenser is present at all and then, secondarily, whether it is c-commanding the NPI. Regarding the second point, it was demonstrated that the theoretical distinction between 'strong' and 'weak' licensers has a reflex in language processing. The language processor seems to be sensitive to distinct licensing contexts. The wh-context induces a strong negativity (N400) on the negative polarity item *jemals* compared to the context with negation. How can we account for this result?
Kutas and Hillyard (1980) and Kutas and Hillyard (1983) showed that the amplitude of the N400 as a marker of semantic integration increases when an element is not expected or rather less expected in the context (cf. van Petten and Kutas 1991). In another study, these researchers found that subjects' expectation is independent of whether there is a semantic anomaly or not (Kutas and Hillyard 1984). They found a strong N400 on the last element in sentences like (14-c) compared to the condition (14-b) and their base-line condition (14-a). Additionally, condition (14-b) induced a weaker N400 compared to condition (14-a).

(14) a. The knight in shining armour drew his **sword**. (*base-line*)
b. The knight in shining armour drew his **blade**. (*weak N400*)
c. The knight in shining armour drew his **pay**. (*strong N400*)

In this sense, the found N400 effect for NPIs in questions can be interpreted in the following way: subjects found it less probable to expect an NPI in the 'weak' licensing context of questions than in the 'stronger' context of negation. That means, it is harder for the parser to integrate the NPI in this grammatical but 'weaker' context.

In sum, these results provide evidence for the theoretically distinction of 'strong' and 'weak' licensers (see, Figure 3). Moreover, the data provide further evidence for the fact that the licensing of an negative polarity item such as *jemals* 'ever' is bound to semantic and syntactic grounds (see, Figure 1 and Figure 2). However, more psycholinguistic research must be carried out to expand our understanding of the processing of *negative polarity items*.

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