

How much verb moves to second position?

Theoretical and experimental evidence

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1 Goal

The reasons for the appearance of V2 (and V1) are so far not totally clear. On the one hand, V2 seems to be in the service of turning a proposition into a speech act with anchoring speech in actual time, making reference to the addressee's knowledge etc., on the other hand, V2 arises also in dependent clauses which can hardly be speech acts, and it does not occur in thousands of languages which are pragmatically as efficient as V2-languages.

Leaving the reason for V2 aside, our goal is to shed light on the formal nature of V2. In doing so, we will also explore whether language processing reflects the competence grammar of V2. We will show that the verb as a lexical element is not interpreted in V2/V1 position, and that it is always reconstructed into its base position. We will further show that the reconstruction property is used in on-line language comprehension.

The talk is organized as follows: In the first part we will show that the verb in V2 is not interpreted in C but in its underlying position. The verb is in C only for its finiteness features. The lexical verb, if any, is reconstructed to its base position. Part 2 will provide experimental evidence to the extent that the verb's reconstruction is active in on-line comprehension.

2 How much verb moves?

How much verb moves?

It is widely known that only the inflected verb moves, and that of the inflected verb only the minimal verb moves. According to Kremers, (2009), this is a prosodic word ω . In particle verbs, the particle is a separate prosodic word. The particle verb as a whole is phonological phrase.

- (1) $(\varphi \text{ zijn moeder}) (\text{wil}) (\varphi \text{ op bellen})$
 $\omega \quad \omega \quad \omega \quad \omega \quad \omega$

Assuming that the C-position, the target of V2, is a head position which is mapped prosodically as in

- (2) $C \leftrightarrow \omega$

the C-position is filled by the minimal verb and the particles remains in its underlying position.

V2, if morphophonologically based, is expected to be a semantics-free operation as far as the lexical verb is concerned. This is verified by the separability of prefix verbs which have a non-compositional meaning.

- (3) a. auf + hören
up listen
'to stop'
b. an + fangen
at catch
'to start'

As Bierwisch, (1983, 146 f.) shows, transient semantic ambiguities as in (4) do not seem to disturb the parsing process. Although finite verb and particle can be at unlimited distance (...), nothing like a garden path effect seems to arise.

- (4) Hört der Pianist ... noch vor der Probe {zu üben auf+hört /die Bänder an+hört}
'Does the pianist ... {stop practicing /listen to the tapes} before the rehearsal?'

The syntax of particle verbs is perfectly compatible with the hypothesis that V2 has little or nothing to do with the verb but rather with the finiteness features (tense, phi-features). The minimal verb moves along as expected under requirements of morphological integrity and generalized pied-piping.

3 Negative polarity

The verb *brauchen* ('to need', 'to be obliged to') is a negative polarity item (NPI), on a par with other NPI such as *jemals* ('ever'), *überhaupt* ('at all'), *auch nur ein bisschen* ('even a little') etc.

- (5) Niemand/ *Klaus hat den Kranken **jemals** besucht
nobody/ Klaus has the patient ever visited
'Nobody ever visited the patient'/*'Klaus has ever visited the patient'
- (6) Nur die wenigsten/ *die meisten haben **überhaupt** zugehört
only the fewest/ the most have at all listened
'Only the fewest people listened at all'/*'Most of the people listened at all'
- (7) Keiner/ *jeder hat **auch nur ein bisschen** aufgepasst
no one/ everyone has also only a little attended
'Nobody paid even a little attention'/*'Everybody paid even a little attention'
- (8) ... dass er sich *(nicht) zu fürchten **braucht**
that he REF not to be-afraid needs
'... that he doesn't need to be afraid'

Conclusion: The NPI must be in the scope of a negative (or downward entailing) operator. This principle seems to be violated in V2-clauses.

- (9) Er **braucht** sich nicht zu fürchten ~~braucht~~
'He doesn't need to be afraid'

The conclusion must be that what we see is not what we get at the LF-side of the grammar. At the LF-side of the grammar, the structure of (9) is actually as in (10).

- (10) Er -t sich nicht zu fürchten **brauch** †

4 Association with focus

In the unmarked case of association with focus, the focus particle precedes and c-commands the associated focus. Inversion leads to marked constructions which always have an emphatic exclamative flavor.¹

- (11) a. [Nur mit CLARISSA] hat er getanzt
b. [Nur GETANZT] hat er mit Clarissa

¹The superscript ^M indicates the marked character of the constituent/clause.

- (12) a. ^M[Mit CLARISSA nur mit CLARISSA] hat er getanzt!
 b. ^M[GETANZT nur GETANZT] hat er mit Clarissa!

This inversion effect is absent if the reordering is induced by V2.

- (13) dass er mit Clarissa nur TANZTE
 ‘that he only DANCED with Clarissa (he didn’t KISS her)’
 (14) Er TANZTE mit Clarissa nur TANZTE
 ‘He only DANCED with Clarissa (he didn’t KISS her)’

Once again, this fact follows if V2 is in reality only the movement of the finiteness feature to C while the focalized verb stays in the position in which it is preceded and c-commanded by the focus particle. If so, (14) is at LF like (15).

- (15) Er -te mit Clarissa nur TANZte

5 Periphrastic *tun*

Certain registers of German allow the insertion of *tun* (‘to do’) as the carrier of the finiteness morphology. This happens mainly when *tun* is in V2-position, but *tun* is also OK in final position.

- (16) Der Klaus tut grade den Müll hinunter tragen FREQU
 the Klaus does now the garbage down carry
 ‘Klaus is right now carrying the garbage down’
 (17) Ich glaube, dass der Klaus grade den Müll hinunter tragen tut INFREQU
 ‘I believe that Klaus is right now carrying the garbage down’

The verb *tun* is semantically active. It is incompatible with an individual-level predicate (ILP) such as *own*, *resemble*, *lie on a lake* etc.

- (18) *Der Klaus tut einen guten Charakter besitzen
 the Klaus does a good character own
 ‘Klaus has a good character’
 (19) *Der Klaus tut seinem Vater ziemlich ähneln
 the Klaus does his father much resemble
 ‘Klaus resembles his father quite a lot’
 (20) *Konstanz tut am Bodensee liegen
 Konstanz does at-the Bodensee lie
 ‘Constance lies at the Bodensee (Lake Constanz)’

Tun is automatically reconstructed into its clause-final base position. It meets its

semantic restriction to stage-level predicates (SLP) under first merge. This explains the data so far.

Interestingly, the semantics of *tun* can be suspended, however. This is the case when the predicate has been moved to SpecCP such that no finite verb would be left to satisfy the V2 requirement. In this case, *tun* steps in as the default carrier of the relevant features.

- (21) [Einen guten Charakter besitzen] tut der Klaus auf alle Fälle
 a good character own does the Klaus in any cases
 ‘Klaus has a good character in any case’
- (22) [Seinem Vater ähneln] tut nur der Klaus
 his father resemble does only the Klaus
 ‘Only Klaus resembles his father’
- (23) [Am Bodensee liegen] tut Stuttgart zum Glück nicht
 at-the Bodensee lie does Stuttgart luckily not
 ‘Luckily Stuttgart does not lie at the Bodensee (Lake Constance)’

Tun must be inserted in C in order to satisfy V2. It cannot be reconstructed into the clause-final position. Otherwise it would yield the semantic incongruity. The examples show that “V2” is primarily “Features2”. The lexical part of the verb is irrelevant.

6 Verb doubling

A number of German dialects as well as Yiddish show verbal doubling according to which the infinitival form of the verb or a projection of it is in the Vorfeld (SpecCP) while the verb itself reappears in its finite form in V2-position (C⁰). German data from Fleischer, (2008), Yiddish data from Cable, (2004).

- (24) PRUSSIAN

Schaden schadet ihm das nichts
 harm harms him that nothing

‘This does not harm him’ (Reuter, 1967)

- (25) PRUSSIAN

Schnifke schnûwe schnöffft hei nich, man Branntwîn sûpe söppt hei sêr
 snuff snuff snuffs he not but brandy guzzle guzzles he very

‘He does not snuff tobacco but he guzzles a lot of brandy’ (Frischbier, 1876)

(26) ALEMANNIC

Syn bischt schoon albig der glych verdamt Schelm!
be are-you still always the same damned rogue

‘You are still the same old rogue!’ (Splügen, Davos) (Dieth, 1939)

(27) YIDDISH

Essen est Maks fish.
to-eat eats Max fish

‘As for eating, Max eats fish’

(28) YIDDISH

Essen fish est Maks.
to-eat fish eats Max

‘As for eating fish, Max eats them’

The relevant issue in this context is that the finite verb is the “undecorated” minimal verb. It is nothing but the carrier of the relevant features.

As one can expect, verb doubling cannot occur in clause-final position, the position in which the semantics of the verb is active:

(29) *Ich glaube, dass ihm das nichts schaden schadet
I believe that him this nothing harm harms

No information about Yiddish!

7 Experimental investigation of V2 movement

7.1 Experimental evidence in the literature

The V2 phenomenon is only poorly studied in the area of sentence processing. Most studies that involve a contrast between V2 and V-base order employ this contrast only to investigate some other phenomena.

We will present three studies on the contrast between V2 and V-final order: Scheepers et al., (2000), Bott and Schlotterbeck, (2015), de Swart and van Bergen, (2016).

7.1.1 Scheepers et al. (2000)

Scheepers et al., (2000) conducted an eye tracking study with V2/V-final sentence with clause initial subject/object ambiguities as illustrated in (30) and (31).

- (30) v2 S-O vs. O-S
- Offenbar /_{Verb} ängstigte /_{NP1} die strenge Lehrerin /_{NP2} den stillen Schüler /_{ADV} ein wenig, / ...
 - Offenbar /_{Verb} ängstigte /_{NP1} die stille Schülerin /_{NP2} der strenge Lehrer /_{ADV} ein wenig, / ...
- (31) V-FINAL S-O vs. O-S
- dass /_{NP1} die strenge Lehrerin /_{NP2} den stillen Schüler /_{ADV} ein wenig /_{Verb} ängstigte, / ...
 - dass /_{NP1} die stille Schülerin /_{NP2} der strenge Lehrer /_{ADV} ein wenig, /_{Verb} ängstigte / ...

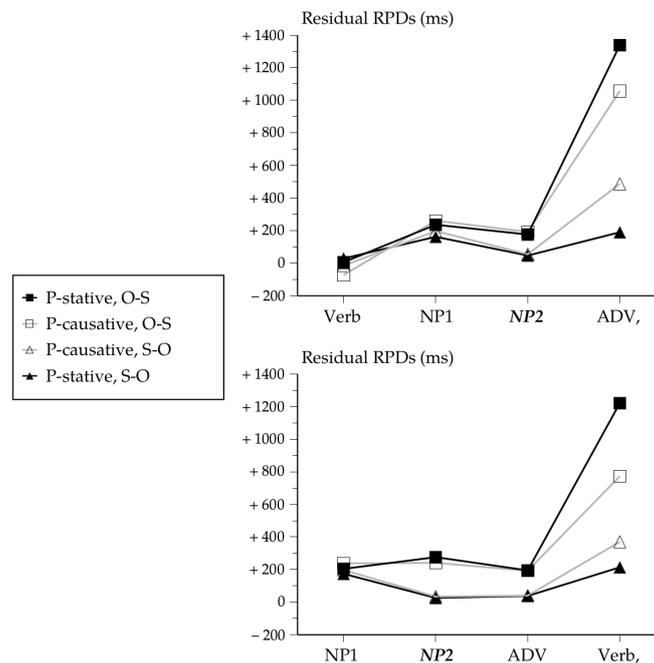


Figure 1: Mean residual regression path duration at the target region (Scheepers et al., 2000, p. 122)

- Preference for s-o vs. o-s order (shorter first pass RTs; shorter regression path duration).
- At the clause final region, interaction of argument order and verb type (regression path duration). Sensitivity to the argument ordering preference of the verb type (causatives vs. statives) indicates that some verb-related processing takes place at the clause final region irrespective of the actual surface position of the verb.

7.1.2 Bott & Schlotterbeck (2015)

Bott and Schlotterbeck, (2015) investigate the reconstruction of object quantifier (scope inversion) with V2 vs. V-final occurrence of the lexical verb.

- Goal: test whether scope computation applies incrementally or globally
- Assumption: minimally quantifier and verb are required to compute the scope
- Hypothesis A: global scope computation, no effect of verb position
- Hypothesis B: incremental scope computation, after 2nd quantifier in (32a) vs. after verb in (32b)

- (32) a. Jeden *seiner/dieser* Schüler lobte *genau ein/der neue* Lehrer voller Wohlwollen.
 b. Jeden *seiner/dieser* Schüler hat *genau ein/der neue* Lehrer voller Wohlwollen gelobt.

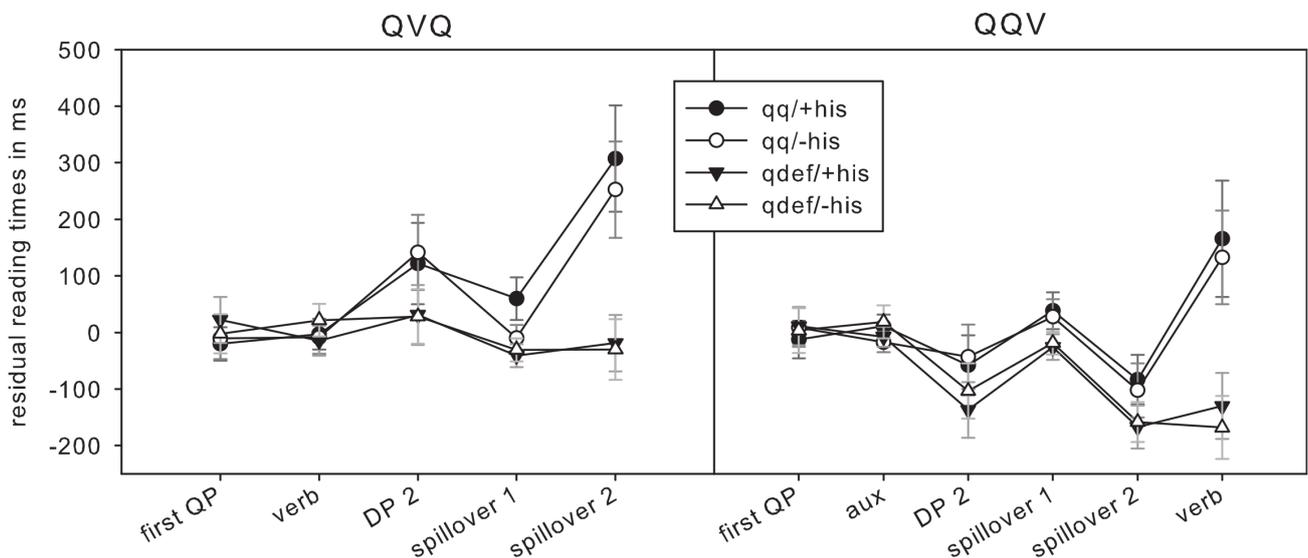


Figure 2: Mean residual reading times (95% CI), self-paced reading (Bott and Schlotterbeck, 2015, p. 68)

Self-paced reading:

- quantifier effect at the clause final region, irrespective of verb position; longer RTs for doubly quantified sentences

Eye-tracking:

- at the clause final region, longer *go-past times*, higher *first-pass regression ratios* for doubly quantified sentences with a bound pronoun (inverse scope)
- longer *second pass times* for doubly quantified sentences with a bound pronoun (inverse scope)

7.1.3 de Swart & van Bergen (2016)

Dutch: de Swart and van Bergen, (2016) investigated the role of V2 processing with a visual world paradigm.

- Factor 1: V2 AUX vs. LEXICAL VERB
- Factor 2: Subject ANIMATE vs. INANIMATE

They found

- higher fixation proportion to the animate subject in the lexical verb condition, suggesting that at least some information of the verb enters influences language processing
- a follow-up experiment however indicates that this effect is due to lexical association and not to means of sentence processing

7.2 Rationale of the experiments

- Generally the processor makes maximal use of available information for predictive left-to-right parsing → the verb in V2 can in principle be fully interpreted.
- We assume that with respect to the processing of the (finite) lexical verb (if there is one) interpretation is pending.
- Grammar determines that the position of the finite verb (C head) is a functional position and not a lexical head position and therefore no valid position for exhaustive interpretation.
- Reliable semantic interpretation can only proceed as soon as *a minimal propositional domain* has been reached → this is the point at which the verb is reconstructed into its base position.
- Explains why verb-related processing in German appears to be clause bound (such as argument order and quantifier scope computation above): it's the minimal domain that includes interpretable verb information.

The following experiments make use of NPI-licensing in German to detect consequences of the verb reconstruction process in on-line processing:

- Experiment 1: immediate effect of NPI-licensing with *brauchen*
- Experiment 2+3: intervention effect indicates that the verb-final base position is subject to NPI-licensing
- Experiment 4+5: show that reconstruction and subsequent licensing applies with nominal NPIs in a parallel fashion

8 Experiment 1: Immediate licensing of *brauchen* (self-paced reading)

8.1 Rationale

Rationale: NPI licensing

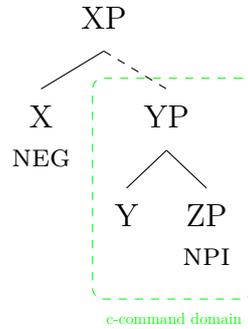


Figure 3: Schema of NPI licensing

- NPIs such as *any* have to be licensed by downward entailing operators (e. g. negation).
- NPI-licensing is obtained by the c-command relation.

Rationale: Verb reconstruction + NPI-licensing

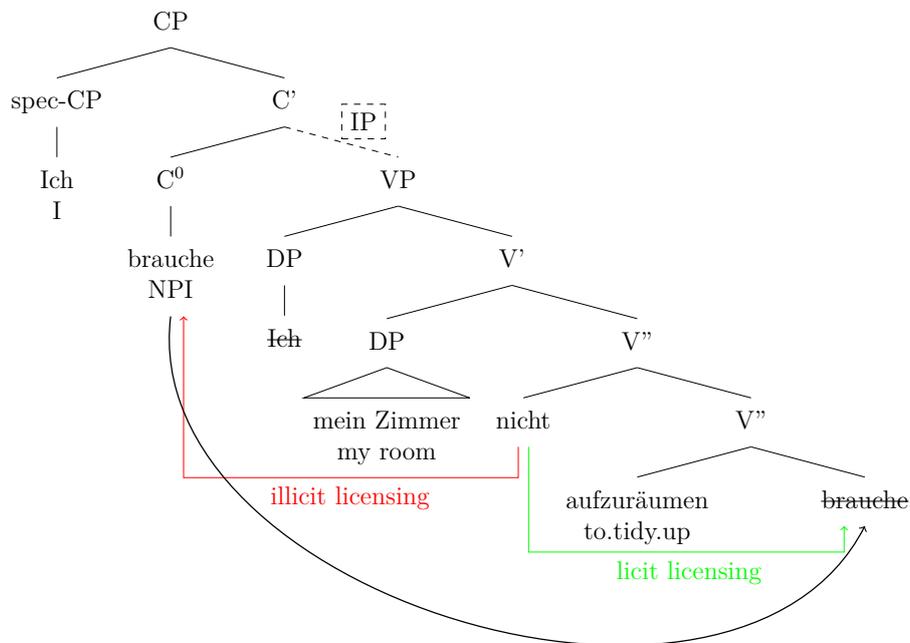


Figure 4: NPI-licensing directions for verbal NPIs in V2 and in V-final position

Rationale: Verb lowering + (failure of) NPI-licensing

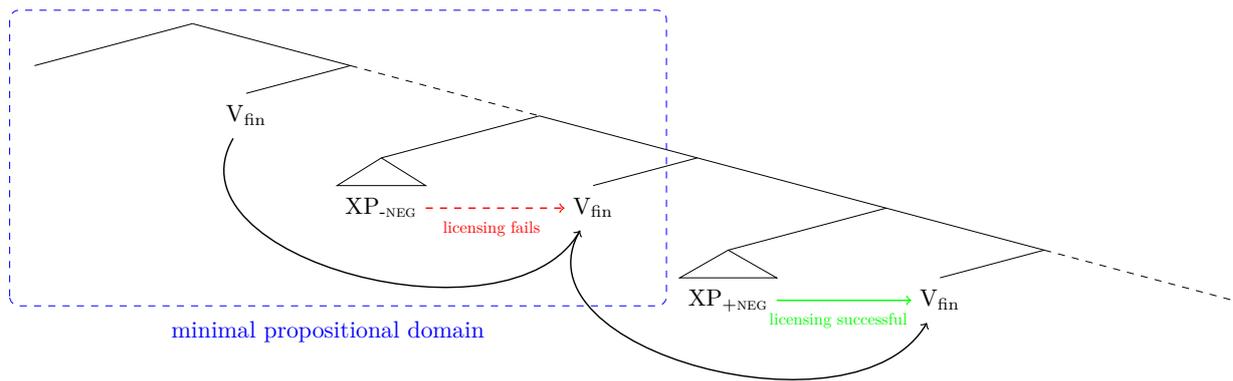


Figure 5: Immediate licensing of successively lowered verbal NPIs

Previous Research:

- shows that non-licensed NPIs
- elicit prolonged reading times (RTs) (Vasishth et al., 2008; Parker and Phillips, submitted).
- yield N400 effects (Saddy et al., 2004).
- are interpreted as a violation of the semantic/pragmatic licensing requirements.
- elicit smaller RT effects if an NPI follows a non-c-commanding (intrusive) negation.

8.2 Method

8.2.1 Participants

We tested 41 participants (age 18–34 years, mean 23 year; 11 male). All participants were self-declared native speakers of German and right handed. Participants received a reimbursement of 5 € for participation.

8.2.2 Material

The material consisted of 32 experimental items interspersed with 35 fillers (20 from a different experiment) resulting in 67 stimuli per participant.

The items varied in a $2 \times 2 \times 2$ design with the factors MATRIX.VERB, ILLUSORY-NEG, and LICENSING.NEG. The finite matrix verb was either the modal NPI verb *brauchen* ‘to have to’, as in (33a) or the neutral verb *beschließen* ‘decide’, as in (33b). Both verbs take to-infinitival complements such as *zu verbieten* ‘to forbid’ and fit in the respective contexts.

- (33) Ein Autor hat wegen seines neuen Romans Ärger mit seinem Verlag. Er bespricht mit seinem Anwalt, ob er den Druck untersagen soll.
- a. +NPI (+ILLUSORY.NEG) (+LICENSER.NEG)
Letztendlich *braucht* der Autor den Roman (*nicht*) zu drucken unter Umständen (*nicht*) zu verbieten, um das mediale Interesse zu wecken.
 - b. -NPI (+ILLUSORY.NEG) (+LICENSER.NEG)
Letztendlich *beschließt* der Autor den Roman (*nicht*) zu drucken unter Umständen (*nicht*) zu verbieten, um das mediale Interesse zu wecken.
 - c. Hat der Autor mit seinem Anwalt gesprochen?
answer: Ja distractor: Nein

8.3 Predictions

Letztendlich *braucht* der Autor den Roman (*nicht*) |₁. zu drucken unter Umständen (*nicht*) |₂₋₄. zu verbieten, um das mediale Interesse zu wecken.

1. not licensed → longer reading times (+NPI -ILLUSORY.NEG)
2. not licensed → longer reading times (+NPI -ILLUSORY.NEG -LICENSER.NEG)
3. non licit → intermediate reading times (+NPI +ILLUSORY.NEG -LICENSER.NEG)
4. doubly negated → longer reading times (+ILLUSORY.NEG +LICENSER.NEG)

8.4 Results

Low embedded VP + Adverb: Results for this region are shown in figure 6.

- Interaction of MATRIX.VERB and ILLUSORY-NEG at the infinitive and the two following words: longer reading times if NPI licensing fails

High embedded VP: Results for this region are shown in figure 7.

- Interaction of MATRIX.VERB and ILLUSORY-NEG at the infinitive particle *zu* (spillover)
- Main effect of LICENSING.NEG at the infinitive, longer RTs for +LICENSER.NEG.

Spillover region Results for this region are shown in figure 8.

- For +NPI: main effect of LICENSING.NEG at the adjective *mediale*, longer RTs for -LICENSER.NEG
- At the clause final infinitive: 3-way interaction, shorter RTs for -NPI -ILLUSORY.NEG -LICENSER.NEG.

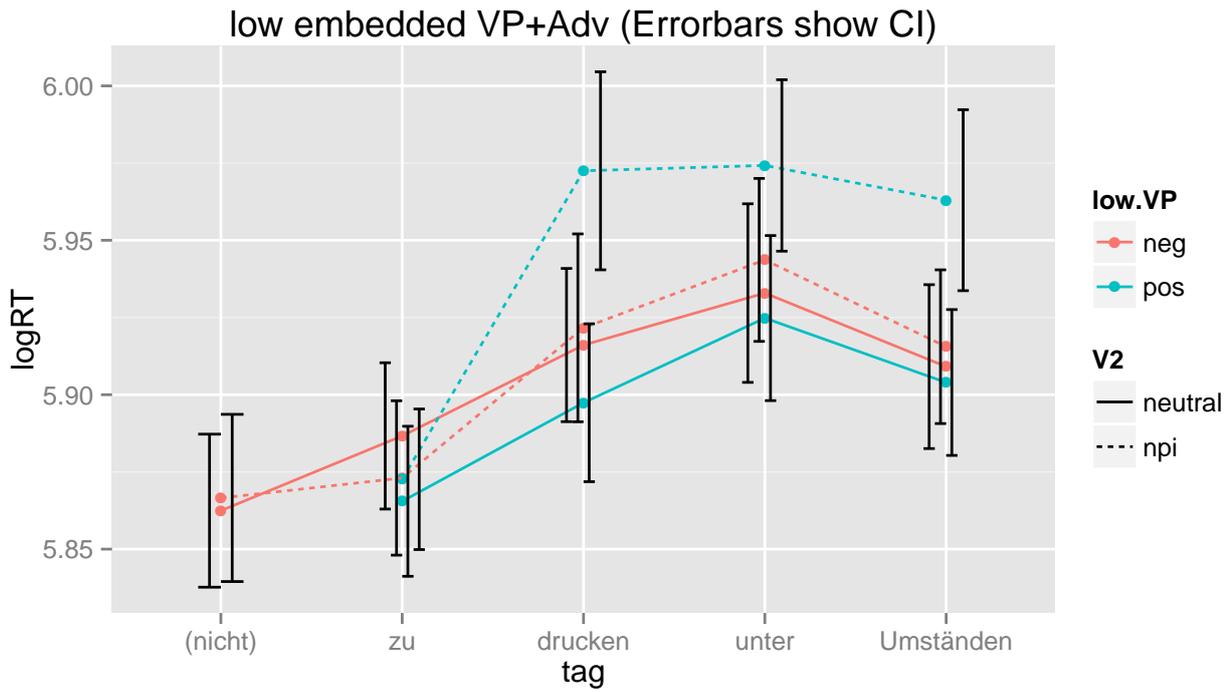


Figure 6: Mean reading times for the low VP + adverb region of experiment 1 (95% CI)

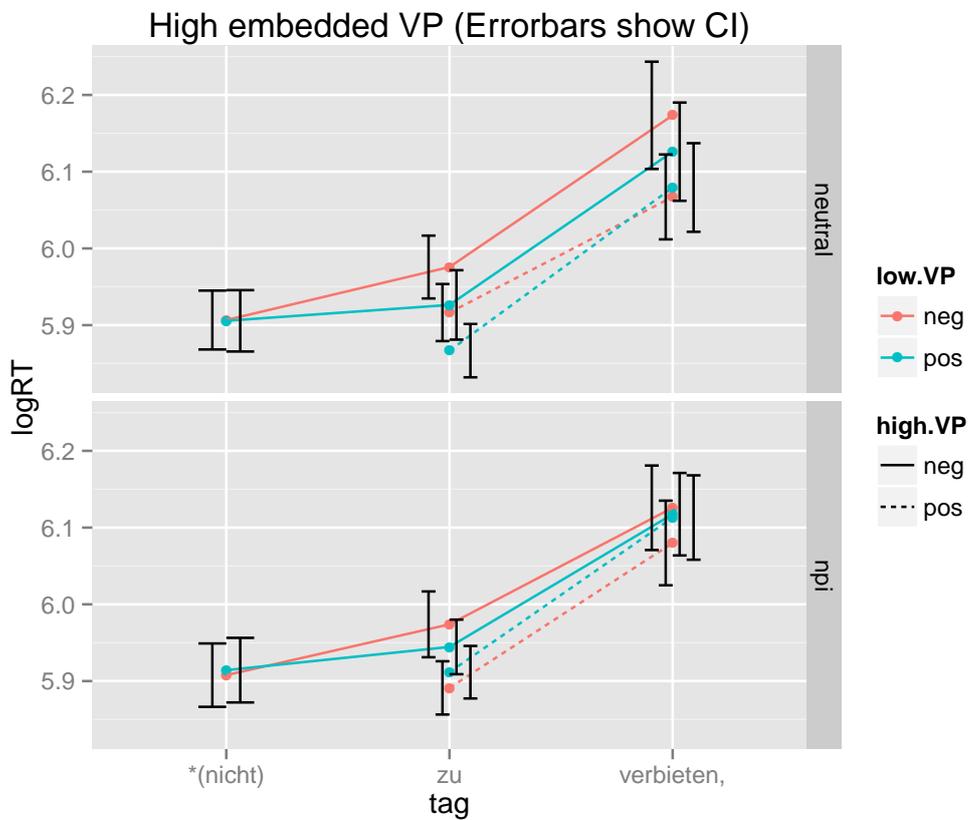


Figure 7: Mean reading times for the high VP region of experiment 1 (95% CI)

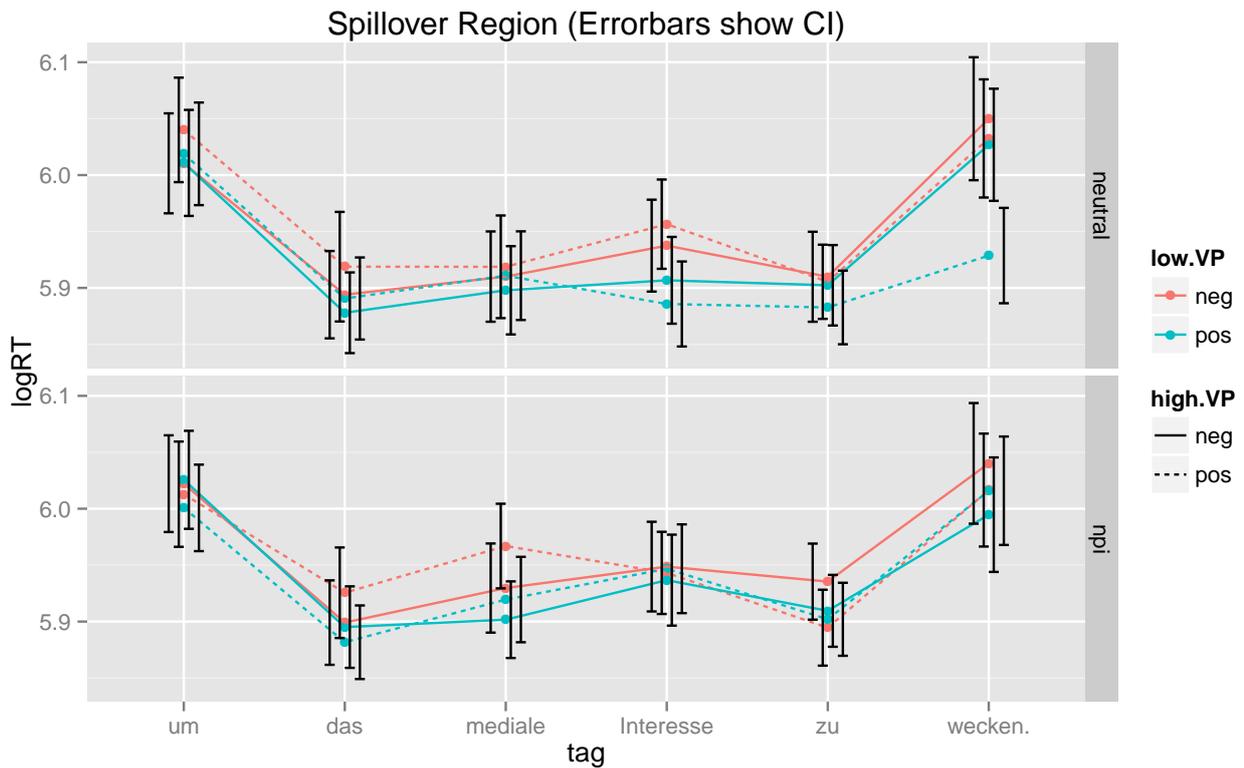


Figure 8: Mean reading times for the spillover region of experiment 1 (95% CI)

8.5 Discussion

- immediate effect of licensing at the first infinitive → first possible reconstruction site
- effect lasts until the next possible point of interpretation, second infinitive
- delayed effect for the licensing of the high infinitive
- Interpretative processes related to negation and licensing seem to last until the final element of the sentence.
- no late effect of MATRIX.VERB → as predicted, reanalysis affects parsing only locally because verb lowering is highly automatized and (almost) cost free

9 Experiment 2: Diagnosing intervention effects for verbal NPIs (acceptability judgments)

9.1 Rationale

A note on intervention effects

- In a licensing configuration, quantificational operators may intervene and block the licensing relation (Richter and Radó, 2014).
- Intervention effects in NPI-licensing configurations resemble intervention effect in *wh*-questions (Guerzoni, 2006).
- Therefore interveners function as diagnostic for the *licensing path*

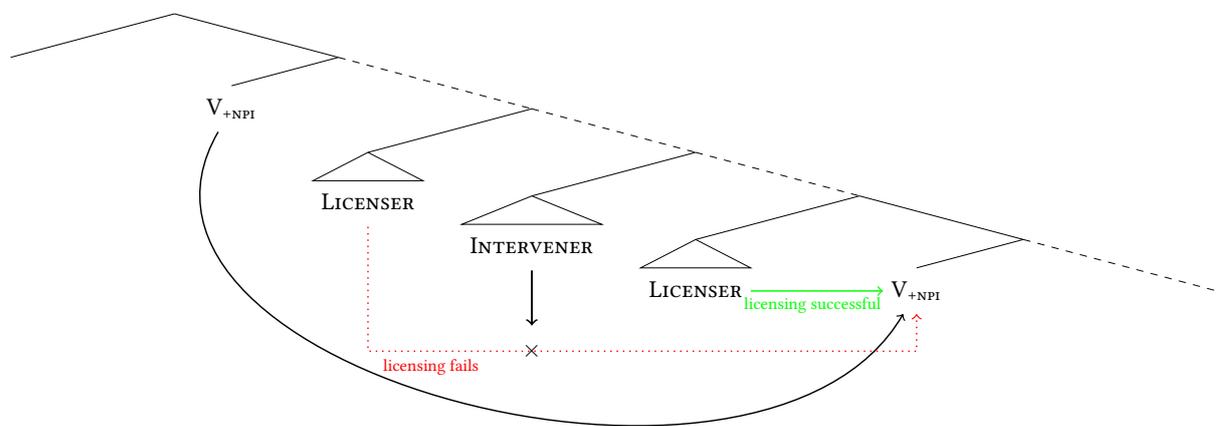


Figure 9: Schema of intervention configuration for NPI-licensing

9.2 Method

9.2.1 Participants

We tested 31 participants. We excluded one participant because the experimenter heard a foreign accent although the participant told that he was a German native speaker. Subsequently 30 participants (age 19–48 years, mean 24 year; 5 male; 1 left handed) entered the analysis. All participants were self declared native speakers of German. Participants received a reimbursement of 5 € for participation.

9.2.2 Material

The material consisted of 24 experimental items interspersed with 38 fillers (28 from a different experiment) resulting in 62 stimuli per participant.

Each experimental item consisted of 2 context sentences, as in (34) followed by the target clause. The items varied in 5 conditions according to a $2 \times 2 + 1$, shown in (34a) to (34e) and contained one of 12 different verbal NPis, such as *beirren lassen*. The first factor was LICENSER in which we varied the position of the NPI licenser. The licenser was either placed directly in front of the non finite verb (VP) such as the negation *nicht* ‘not’ in (34a) and (34b), or included in the subject DP such as the quantifier *wenige* ‘few’ in (34c) and (34d). The second factor was INTERVENER in which the object DP either contained a quantifying expression such as *zahlreichen* ‘numerous’ as in (34b) and (34d), or a non quantifying adjective as in (34a) and (34c). The control condition, as shown in (34e) also exhibited a high licenser and an intervener but the verb was not an NPI although it was very similar in meaning.

- (34) Seit einiger Zeit finden sich auf Zigarettenschachteln Warnhinweise. Diese sollen die Konsumenten auf die Gefahren aufmerksam machen.
- a. LOW.LICENSER -INTERVENER
Dennoch lassen sich die meisten Raucher von häufigen Warnungen nicht beirren.
 - b. LOW.LICENSER +INTERVENER
Dennoch lassen sich die meisten Raucher von zahlreichen Warnungen nicht beirren.
 - c. HIGH.LICENSER -INTERVENER
Dennoch lassen sich nur wenige Raucher von häufigen Warnungen beirren.
 - d. HIGH.LICENSER +INTERVENER
Dennoch lassen sich nur wenige Raucher von zahlreichen Warnungen beirren.
 - e. CONTROL (HIGH.LICENSER +INTERVENER)
Dennoch lassen sich nur wenige Raucher von zahlreichen Warnungen beeinflussen.

9.2.3 Procedure

The procedure was a rating task with one reference sentence (anchor) and an open scale, similar to the *thermometer judgment* (Featherston, 2008; Featherston, 2009) which itself is a further development of *magnitude estimation* (Bard et al., 1996). The current task design was as follows: We presented the participants a single reference sentence in (35). The reference sentence was a declarative sentence that consisted of a main and an embedded clause. The embedded clauses was centrally embedded into

the main clauses, which is possible in German but usually dispreferred in contrast to the variant with the embedded clause following the main clause. This reference sentence was associated with a score of 0. We asked participants to judge the acceptability of the target sentences in comparison to the reference sentence. We described it as the target sentence could be *better* or *worse*, *easier* or *harder to understand*. We stated explicitly that we are not asking for prescriptive rule or “good” writing style. We provided also some examples with respective proposals for scores.

(35) Die Angestellten haben, dass der Chef Probleme hat, nicht sofort
the employees have that the boss problems has not immediately
bemerkt. (0)
noticed

‘The employees have not immediately noticed that the boss had problems.’

If a target sentence was *worse* than the reference sentence, participants should associate a negative score. If the target sentence was better than the reference sentence they should assign a positive score. The range of the positive and negative number was open, but only integers were allowed.

The procedure was programmed in the python experiment suite *PsychoPy* (Peirce, 2007) and run on a MAC in a psycholinguistic lab.

The experimental stimuli have been randomized according to the Latin square design, such that each participant saw one of the 24 items in exactly one of the 5 experimental conditions. The total list of stimuli (experimental items plus fillers) were automatically randomized by the experiment software.

9.3 Predictions

- The intervention effect should only affect the HIGH.LICENSER condition
- Therefore equally high ratings for the CONTROL condition, the LOW.LICENSER conditions and the HIGH.LICENSER -INTERVENER condition
- Lower acceptability ratings for the HIGH.LICENSER +INTERVENER condition

9.4 Results

- Main effects and interaction for INTERVENER and LICENSER
- lower acceptability ratings for +INTERVENER
- intervention effect significantly more prominent in the HIGH.LICENSER condition
- CONTROL surprisingly bad, most likely due to implausibility

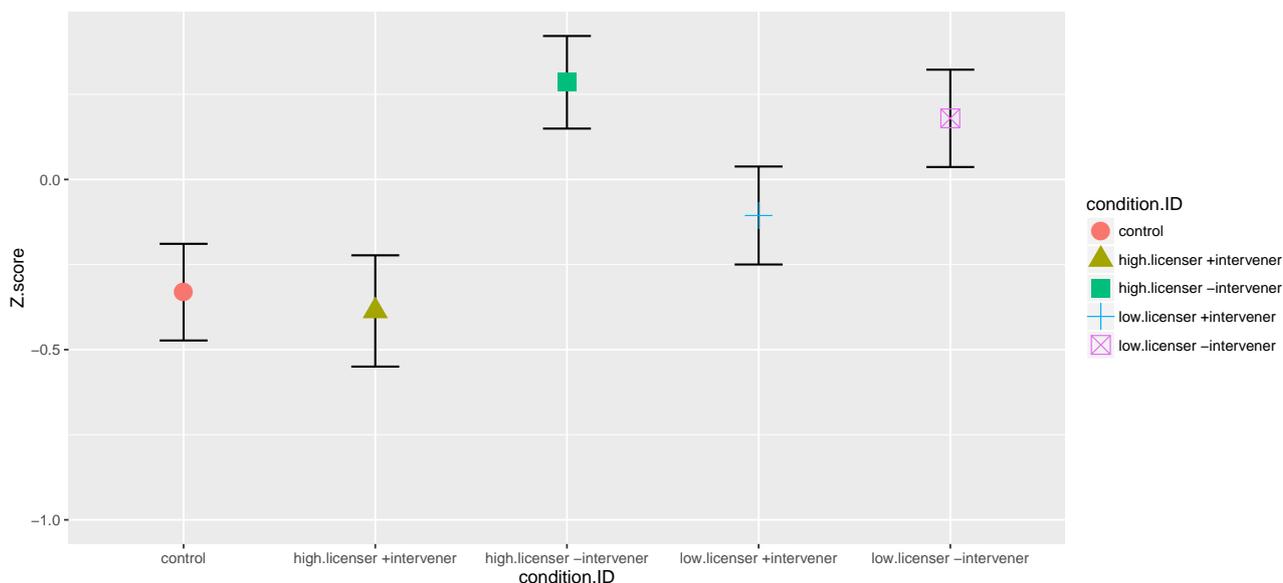


Figure 10: Mean acceptability judgments of experiment 2 (95% CIs)

9.5 Discussion

- Predicted intervention effect could be detected
- Intervener lead to decrease in acceptability also without crossing licenser
- CONTROL did not work

10 Experiment 3: Processing of intervention effects for verbal NPIs (self-paced reading)

10.1 Method

10.1.1 Participants

We want to test 48 participants. This experiment was conducted in a session with another experiment. Participants received 8 € for the whole session.

10.1.2 Material

The material consisted of 24 experimental items interspersed with 40 fillers (24 from a different experiment) resulting in 64 stimuli per participant.

The experiment material was similar to the one used in the acceptability judgment above. Significant changes are that we added a 5 word spillover region, after the non-finite verbal element to detect potential spillover effects. Due to the mode we

also added a subsequent question with to possible answers to diagnose whether participant were paying attention to the task. Some items had to be minimally adjusted to exhibit the same length in number of words. In contrast to the acceptability judgments we did not include a control condition but varied the items in a strict 2×2 design with the factors LICENSOR and INTERVENER. The first factor was LICENSOR in which we varied the position of the NPI licensor. The licensor was either placed directly in front of the non finite verb (VP) such as the negation *nicht* ‘not’ in (36a) and (36b), or included in the subject DP such as the quantifier *wenige* ‘few’ in (36c) and (36d). The second factor was INTERVENER in which the object DP either contained a quantifying expression such as *zahlreichen* ‘nournerous’ as in (36b) and (36d), or a non quantifying adjective as in (36a) and (36c).

- (36) Seit einiger Zeit finden sich auf Zigarettenschachteln Warnhinweise. Diese sollen die Konsumenten auf die Gefahren aufmerksam machen.
- a. LOW.NEG–INTERVENER
Dennoch lassen sich die meisten Raucher von häufigen Warnungen nicht beirren und missachten die gesundheitlichen Risiken.
 - b. LOW.NEG+INTERVENER
Dennoch lassen sich die meisten Raucher von zahlreichen Warnungen nicht beirren und missachten die gesundheitlichen Risiken.
 - c. HIGH.NEG–INTERVENER
Dennoch lassen sich nur wenige Raucher von häufigen Warnungen beirren und missachten die gesundheitlichen Risiken.
 - d. HIGH.NEG+INTERVENER
Dennoch lassen sich nur wenige Raucher von zahlreichen Warnungen beirren und missachten die gesundheitlichen Risiken.
 - e. Gibt es Warnhinweise für Raucher?
answer: Ja distractor: Nein

10.2 Predictions

- no differences in the LOW.LICENSER conditions → properly licensed
- in the HIGH.LICENSER condition: longer reading times for +INTERVENER → blocking of NPI licensing
- Intervention effect expected from the quantifier *zahlreiche* onwards

10.3 Results

- At the intervention inducing element *zahlreiche*: interaction of LICENSER and INTERVENER, longer RTs in the HIGH.LICENSER +INTERVENER condition

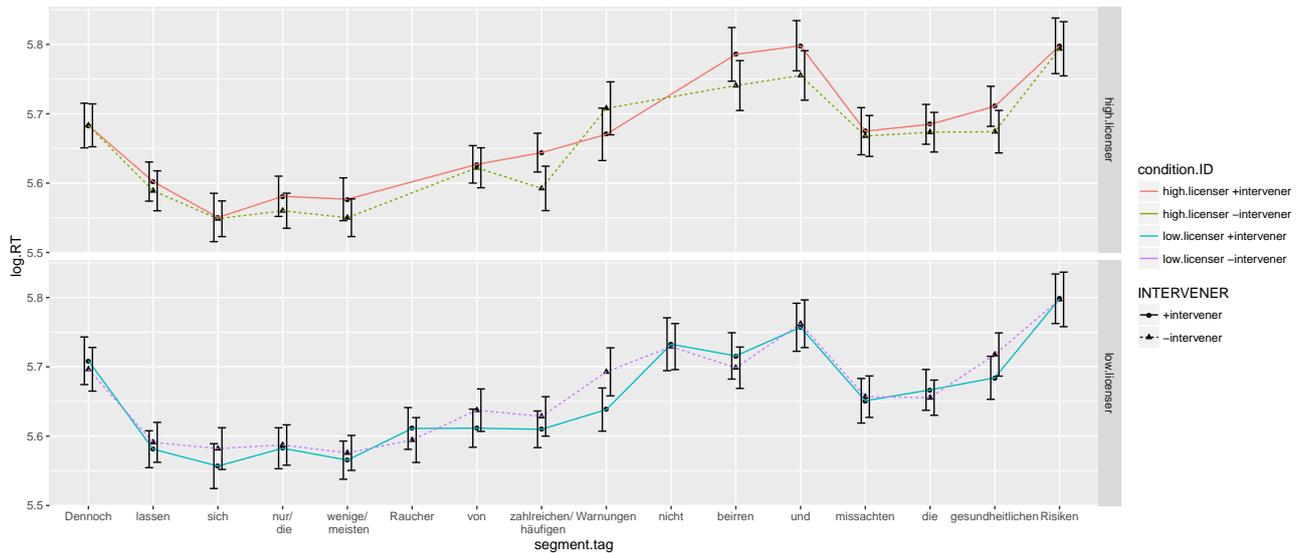


Figure 11: Mean reading times of experiment 3, self-paced reading (95% CIs)

- at the object noun: main effects of LICENSER and INTERVENER, longer RTs for HIGH.LICENSER and -INTERVENER
- at the verb and spillover: main effect of LICENSER, longer RTs for HIGH.LICENSER

10.4 Discussion

- immediate, temporally restricted effect of intervention
- at the object an advantage of intervention? More likely discourse integration of the -INTERVENER definite noun phrases
- from the object noun to the spillover a distance-licensing effect (longer RTs for HIGH.LICENSER)
- reconstruction of the finite verb (part of NPI) and subsequent checking for licensing started already at the object noun, before the non-finite verb was reached.

11 Experiment 4: Reconstruction of nominal NPIs (acceptability judgments)

11.1 Rationale

- It is widely accepted that displaced DPs reconstruct into their base position.
- Aim: show that NPI-licensing applies after reconstruction of DPs parallel to verbal NPIs

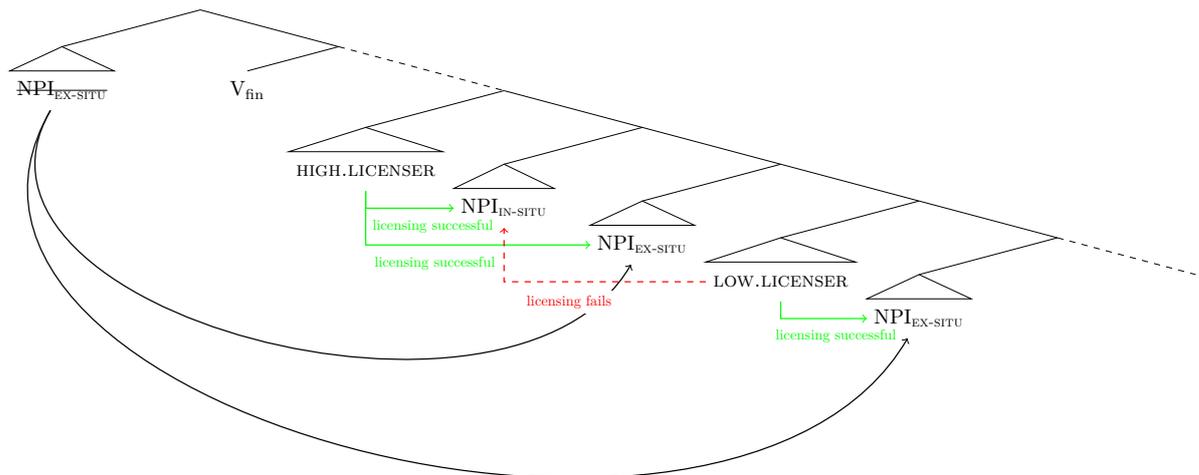


Figure 12: Schema of NPI-licensing with reconstructed DPs

11.2 Method

11.2.1 Participants

We tested 30 participants (age 18–40 years, mean 23 year; 3 male; 1 left handed). All participants were self declared native speakers of German. Participants received a reimbursement of 3 € for participation.

11.2.2 Material

The material consisted of 24 experimental items interspersed with 38 fillers (28 from a different experiment) resulting in 62 stimuli per participant.

Each experimental item consisted of 2 context sentences, as in (37) followed by the target clause. The items varied in 5 conditions according to a $2 \times 2 + 1$, shown in (37) with one of 6 different NPIs. The first factor was LICENSER in which we varied the position of the NPI licensor. The licensor was either placed directly in front of the non finite verb (VP) such as the negation *nicht* ‘not’ in (37c) and (37d), or included

in the post-subject adverbial such as *in keiner Stadt* ‘in no town’ in (37c) and (37d). The second factor was POSITION, the position in which the object DP that contained the NPI such as *(k)einen Geringeren als den Bürgermeister* ‘(no) less than the mayor’ occurred. Either IN-SITU in its base position as in (37a) and (37c) or EX-SITU where the object is fronted to the prefield as in (37b) and (37d). The control condition, shown in (37e) also exhibited a low licenser and an in-situ object but the object DP did not contain an NPI although it was very similar in meaning.

- (37) Die Krebshilfe sucht nun stellvertretende Repräsentanten in verschiedenen Städten. Die oberste Schirmherrin kümmert sich darum.
- a. IN-SITU HIGH.LICENSER
Sicherlich hat die Schirmherrin in keiner Stadt einen Geringeren als den Bürgermeister zu ihrem Stellvertreter ernannt.
 - b. EX-SITU HIGH.LICENSER
Einen Geringeren als den Bürgermeister hat die Schirmherrin in keiner Stadt zu ihrem Stellvertreter ernannt.
 - c. IN-SITU LOW.LICENSER
Sicherlich hat die Schirmherrin in dieser Stadt einen Geringeren als den Bürgermeister nicht zu ihrem Stellvertreter ernannt.
 - d. EX-SITU LOW.LICENSER
Einen Geringeren als den Bürgermeister hat die Schirmherrin in dieser Stadt nicht zu ihrem Stellvertreter ernannt.
 - e. CONTROL (IN-SITU LOW.LICENSER)
Sicherlich hat die Schirmherrin in dieser Stadt einen anderen als den Bürgermeister nicht zu ihrem Stellvertreter ernannt.

11.3 Predictions

- CONTROL and HIGH.LICENSER IN-SITU should be equally acceptable → no licensing necessary and surface licensing
- HIGH.LICENSER EX-SITU should also get high acceptability rating → reconstruction below the licenser
- LOW.LICENSER IN-SITU should get low acceptability rating → no proper licensing at the surface
- LOW.LICENSER EX-SITU should be more grammatical because reconstruction below the licenser maybe possible

11.4 Results

- main effects and interaction for LICENSER and POSITION

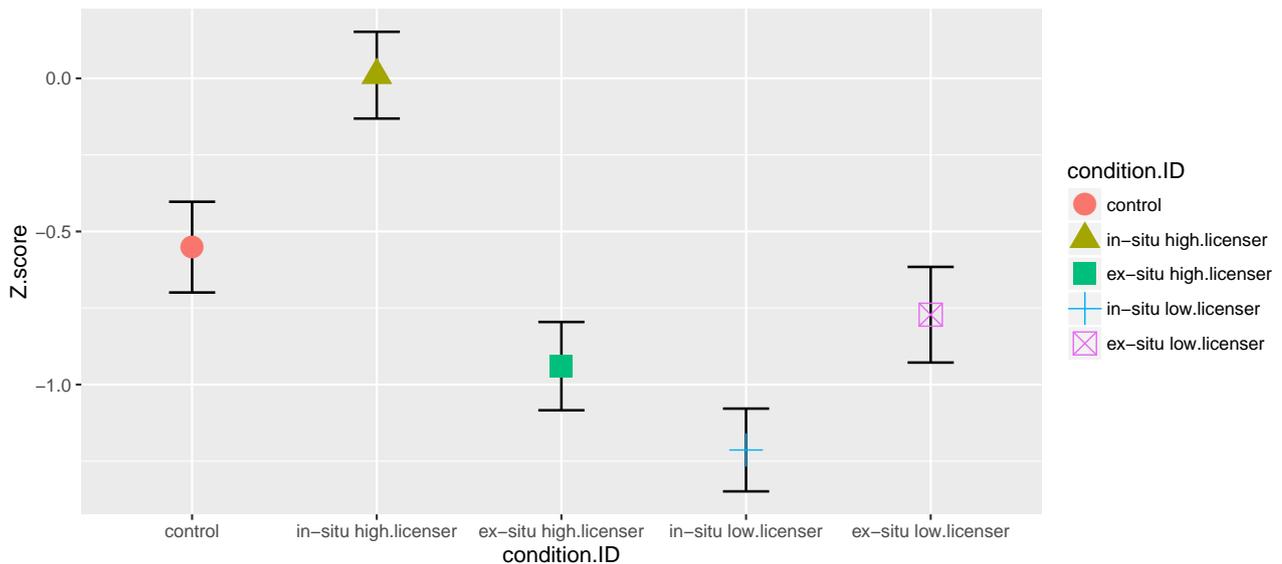


Figure 13: Mean acceptability judgments of experiment 4 (95% CIs)

- lowest ratings for the clear ungrammatical LOW.LICENSER IN-SITU
- lowered acceptability ratings for EX-SITU
- relatively high acceptability for CONTROL (diagnosing the lack of NPI licensing)

11.5 Discussion

- Intended (lack of) NPI licensing was diagnosed
- reconstruction of the topicalized object NPIs
 - decreased acceptability for the grammatical HIGH.LICENSER EX-SITU condition
 - improved acceptability for the LOW.LICENSER EX-SITU condition, indicating that it is reconstructed below the negation

12 Experiment 5: Reconstruction of nominal NPIs (self-paced reading)

12.1 Method

12.1.1 Participants

We want to test 48 participants. This experiment was conducted in a session with another experiment. Participants received 8 € for the whole session.

12.1.2 Material

The material consisted of 24 experimental items interspersed with 40 fillers (24 from a different experiment) resulting in 64 stimuli per participant.

The experiment material was similar to the one used in the acceptability judgment above. Significant changes are that we added a 5 word spillover region, after the non-finite verbal element to detect potential spillover effects. Due to the mode we also added a subsequent question with two possible answers to diagnose whether participants were paying attention to the task. In contrast to the acceptability judgments we did not include a control condition but varied the items in a strict 2×2 design with the factors LICENSER and POSITION. The first factor was LICENSER in which we varied the position of the NPI licensor. The licensor was either placed directly in front of the non-finite verb (VP) such as the negation *nicht* ‘not’ in (38c) and (38d), or included in the post-subject adverbial such as *in keiner Stadt* ‘in no town’ in (38c) and (38d). The second factor was POSITION, the position in which the object DP that contained the NPI such as *(k)einen Geringeren als den Bürgermeister* ‘(no) less than the mayor’ occurred. Either IN-SITU in its base position as in (38a) and (38c) or EX-SITU where the object is fronted to the prefield as in (38b) and (38d).

- (38) Die Krebshilfe sucht nun stellvertretende Repräsentanten in verschiedenen Städten. Die oberste Schirmherrin kümmert sich darum.
- a. IN-SITUHIGH.LICENSER
Sicherlich hat die Schirmherrin in keiner Stadt einen Geringeren als den Bürgermeister zu ihrem Stellvertreter ernannt, auch wenn die Zeitungen das schreiben.
 - b. EX-SITUHIGH.LICENSER
Einen Geringeren als den Bürgermeister hat die Schirmherrin in keiner Stadt zu ihrem Stellvertreter ernannt, auch wenn die Zeitungen das schreiben.
 - c. IN-SITULOW.LICENSER
Sicherlich hat die Schirmherrin in dieser Stadt einen Geringeren als den Bürgermeister nicht zu ihrem Stellvertreter ernannt, auch wenn die Zeitungen das schreiben.
 - d. EX-SITULOW.LICENSER
Einen Geringeren als den Bürgermeister hat die Schirmherrin in dieser Stadt nicht zu ihrem Stellvertreter ernannt, auch wenn die Zeitungen das schreiben.
 - e. Welche Organisation sucht Stellvertreter?
answer: Krebshilfe *distractor:* Rotes Kreuz

12.2 Predictions

- longer RTs in the EX-SITU conditions due to topicalization (cf. Matzke et al., 2002; Weskott, 2003; Pablos, 2006; Freitag and Repp, 2015)
- longer RTs for the LOW.LICENSER IN-SITU condition after the negation → failed licensing
- longer RTs for the EX-SITU condition before the non-finite verb, at the selected adverbial *zu ihrem Stellvertreter* → integration of the fronted element
- possibly longer RTs in the LOW.LICENSER EX-SITU because of a more costly integration below the negation

12.3 Results

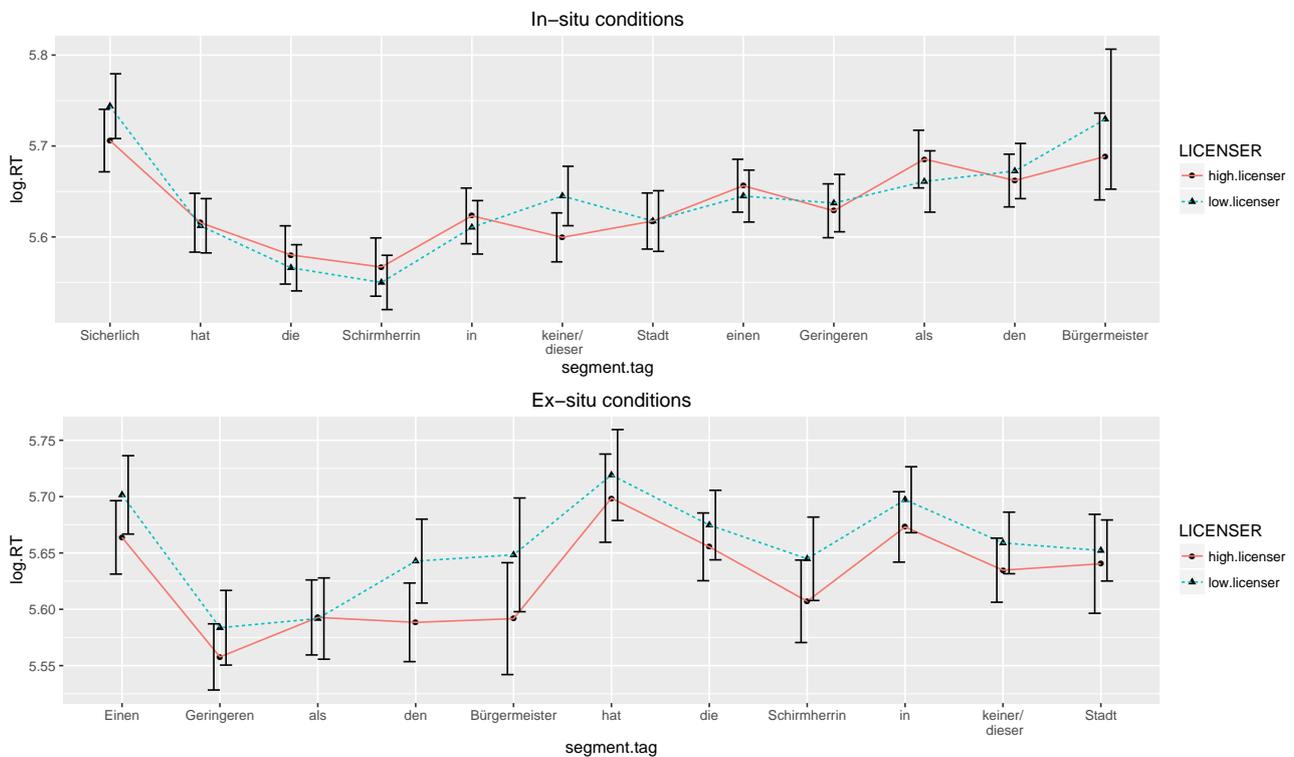


Figure 14: Mean reading times of the pretarget region of experiment 5, self-paced reading (95% CIs)

- finite verb, subject DP, event internal adverbial: main effect of POSITION, longer RTs for EX-SITU
- NPI-object: main effects of POSITION and LICENSER, shorter RTs for EX-SITU and HIGH.LICENSER

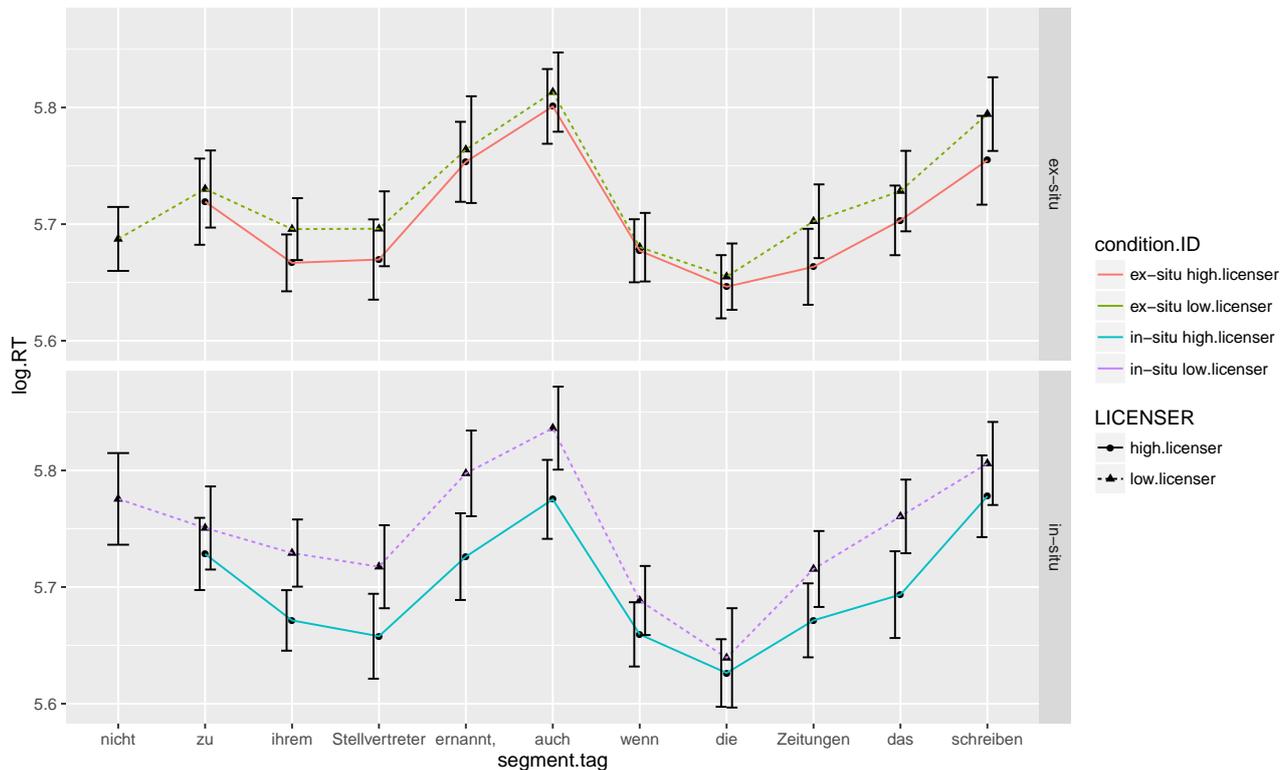


Figure 15: Mean reading times of the target region of experiment 5, self-paced reading (95% CIs)

- determiner and noun of the selected adverbial: main effect of LICENSER, longer RTs for LOW.LICENSER
- finite verb: main effect of POSITION, longer RTs for the EX-SITU conditions

12.4 Discussion

- increased processing load for displaced elements (EX-SITU)
- integration and licensing is harder in the LOW.LICENSER condition → longer RTs for LOW.LICENSER
- retrieval of the topicalized element → longer RTs for EX-SITU

13 Insights about the parsing process

The verb's reconstruction in syntactic processing

- According to the grammar, the C-position which hosts the finite verb is a functional position. The position in which the verb as a lexical item is interpreted is elsewhere, namely in VP.
- If so, the verb in C is not semantically interpreted before it is lowered into the reconstruction position. [V2 cannot be misunderstood as a head-initial VP!]
- Kimball's (1973) principle of EARLY CLOSURE determines that a phrase is closed as soon as possible, i.e., unless the next node parsed is an immediate constituent of the phrase.
- Assuming EC as a guideline of parsimony (minimal assumptions about upcoming input), the verb will be reconstructed as soon as a grammatically licit structure is possible.
- Unlike in Kimball's system, however, EC cannot stop the integration of further constituents. The structure reached by EC will converge but it can nevertheless still be extended.
- Integration of further constituents into the current phrase marker is known as LATE CLOSURE since Frazier, (1978)
- It follows that both EC and LC are at work: The verb's lowering to a minimally converging position by EC can be followed by further integration via LC and following further EC-style lowering of the verb.
- As one can verify, expansion along these lines does not lead to a garden path.

An example

- (39)
- | | | |
|----|---|----|
| a. | Fritz | |
| b. | Fritz hat | |
| c. | Fritz hat ein Buch hat | EC |
| d. | Fritz hat ein Buch hat verloren | LC |
| e. | Fritz hat ein Buch hat verloren hat | EC |

Interpretation can stop at (39c) and we arrive at the meaning POSSESS (bill, a book). However, unlike in Kimball's original theory, (39c) is not necessarily semantically closed and removed from the syntactic work space. If a new verb is in the input, it will be attached by LC. This verb may reattach the DP *ein Buch* as its direct object.

- (40) a. [VP [DP ein Buch] hat]
 b. [VP [VP [DP ein Buch] verloren] hat]

The object relation of the verb in (40a) does not change; the object is simply changed from a DP to a VP of which DP remains part.

Semantics: another example

We predict that by virtue of recursive V-lowering, phrase structure unfolds without gardenpath-like disruptions while semantic interpretation may change continuously and perhaps dramatically.

This can be seen in the following observed example:

- (41) a. Der junge Mann
 b. Der junge Mann trug
 c. Der junge Mann ~~trug~~ ein grünes Kleid trug EC
 d. Der junge Mann ~~trug~~ ein grünes Kleid trug durch den Laden LC
 e. Der junge Mann ~~trug~~ ein grünes Kleid ~~trug~~ durch den Laden trug EC

At (41c), the interpretation is that the young man wore a green female dress. This meaning can be abandoned without a garden path-like restructuring and be remodeled after further attachment of a directional PP. By repeated lowering of the verb *tragen*, the verb's meaning changes from WEAR to CARRY, and the meaning of the resulting clause will be that the young man carried a green female dress across the shop.

14 Conclusion

1. V2 in German (and in related V2-languages) is actually “Features2”; the verb uniformly reconstructs into its base position.
2. Syntactic processing - at least from the side of on-line comprehension - follows competence grammar closely by reconstructing the verb in V2.
3. The parser's reconstruction differs from the one in the competence grammar only by the fact that it is an incremental top-down process which is governed by EC (“Simplicity”) and LC (“Local Integration”).

References

- Bard, Ellen Gurman, Dan Robertson, and Antonella Sorace (1996). "Magnitude Estimation of Linguistic Acceptability". In: *Language* 72.1, pp. 32–68.
- Bierwisch, Manfred (1983). "How On-line is Language Processing?" In: *The Process of Language Understanding*. Ed. by Giovanni B. Flores d'Arcais and Robert J. Jarvella. Chichester: John Wiley & Sons, pp. 113–168.
- Bott, Oliver and Fabian Schlotterbeck (2015). "The Processing Domain of Scope Interaction". In: *Journal of Semantics* 32.1, pp. 39–92.
- Cable, Seth (2004). "Predicate clefts and base-generation: Evidence from Yiddish and Brazilian Portuguese". Manuscript MIT.
- de Swart, Peter and Geertje van Bergen (2016). *Effects of verbal information in the V2-position during parsing: What eye movements reveal about prediction (and integration)*. Talk at the workshop „Verb second in grammar and processing: its causes and its consequences“ at the 38. Annual Conference of the German Linguistics Society (DGFS).
- Featherston, Samuel (2008). "Thermometer Judgments as Linguistic Evidence". In: *Was ist linguistische Evidenz?* Ed. by Claudia Maria Riehl and Astrid Rothe. Aachen: Shaker Verlag, pp. 96–90.
- (2009). "A Scale for Measuring Well-Formedness: Why Syntax Needs Boiling and Freezing Points". In: *The Fruits of Empirical Linguistics. Volume 1: Process*. Ed. by Sam Featherston and Susanne Winkler. Vol. 101. Studies in Generative Grammar. Berlin: Mouton de Gruyter, pp. 47–74.
- Fleischer, Jürg (2008). "Zur topikalisierenden Infinitivverdopplung in deutschen Dialekten: *Trinken trinkt er nicht, aber rauchen raucht er* (mit einem Exkurs zum Jiddischen)". In: *Dialektgeographie der Zukunft: Akten des 2. Kongresses der Internationalen Gesellschaft für Dialektologie des Deutschen (IGDD) am Institut für Germanistik der Universität Wien, 20. bis 23. September 2006*. Ed. by Peter Ernst and Franz Patocka. Zeitschrift für Dialektologie und Linguistik Beihefte 135. Stuttgart: Steiner, pp. 243–268.
- Frazier, Lyn (1978). "On Comprehending Sentences: Syntactic Parsing Strategies". PhD thesis. Storrs, CT: University of Connecticut.
- Freitag, Constantin and Sophie Repp (2015). "Filler complexity in filler-gap dependencies: wh-extraction vs. topicalization". Poster presented at the 28th Annual CUNY Conference on Human Sentence Processing, University of Southern California, Los Angeles.
- Guerzoni, Elena (2006). "Intervention effects on NPIs and feature movement: towards a unified account of intervention". In: *Natural Language Semantics* 14.4, pp. 359–398.
- Kimball, John (1973). "Seven Principles of Surface Structure Parsing in Natural Language". In: *Cognition* 2.1, pp. 15–47.

- Kremers, Joost (2009). “A prosodic approach to particle verbs”. In: *Linguistische Berichte* 217, pp. 81–96.
- Matzke, Mike, Heinke Mai, Wido Nager, Jascha Rüsseler, and Thomas Münte (2002). “The costs of freedom: an ERP – study of non-canonical sentences”. In: *Clinical Neurophysiology* 113.6, pp. 844–852.
- Pablos, Leticia (2006). “Pre-Verbal Structure Building in Romance Languages and Basque”. PhD thesis. College Park: University of Maryland.
- Parker, Dan and Colin Phillips (submitted). “Negative Polarity Illusions and the Format of Hierarchical Encodings in Memory”. submitted.
- Peirce, Jonathan W. (2007). “PsychoPy—Psychophysics software in Python”. In: *Journal of Neuroscience Methods* 162.1–2, pp. 8–13.
- Richter, Frank and Janina Radó (2014). “Negative Polarity in German: Some Experimental Results”. In: *Journal of Semantics* 31.1, pp. 43–65.
- Saddy, Douglas, Heiner Drenhaus, and Stefan Frisch (2004). “Processing Polarity Items: Contrastive Licensing Costs”. In: *Brain and Language* 90.1–3. Third International Conference on the Mental Lexicon, pp. 495–502.
- Scheepers, Christoph, Barbara Hemforth, and Lars Konieczny (2000). “Linking Syntactic Functions with Thematic Roles: Psych-Verbs and the Resolution of Subject-Object Ambiguity”. In: *German Sentence Processing*. Ed. by Barbara Hemforth and Lars Konieczny. Dordrecht: Kluwer, pp. 95–135.
- Vasishth, Shravan, Sven Brüssow, Richard L. Lewis, and Heiner Drenhaus (2008). “Processing Polarity: How the Ungrammatical Intrudes on the Grammatical”. In: *Cognitive Science* 32.4, pp. 685–712.
- Weskott, Thomas (2003). “The Left Periphery of German Verb-Second Sentences and Its Interpretation in Context”. PhD thesis. Universität Leipzig.