

Patrick Brandt, Petra B. Schumacher

# Too strong argument structures and (un-)prepared repair

The case of *zu*-excessives

**Abstract:** We present *zu*-excessive structures like *Otto ist zu schwer* ‘Otto is too heavy’ as instantiations of comparatives that have been reflexivized. Comparatives express asymmetric relations between distinguished referents, but reflexivization identifies argument places (or reduces two argument places to one), leading to a symmetric relation. Reflexivization is thus in conflict with the asymmetry property of comparatives and leads to an intermediate semantic representation that is contradictory. Two experiments substantiate that *zu*-excessives share this property with privative adjective and animal-for-statue constructions that similarly give rise to contradictory semantics. The processing of any of the constructions mentioned yields a positivity in the event-related-potential signature characteristic of conceptual reorganization; however, the observed positivity occurs earlier in the case of *zu*-excessives than in the other cases. We propose this difference is due to *zu* signalling the mandatory preparation for an ensuing repair rather than reflecting the repair operation itself that involves manipulating the standard of comparison, coded elsewhere in the string (if at all).

**Keywords:** compositionality, repair, standard, excessive, comprehension

## 1 Hidden meaning and compositionality

Over the last few years, rule- and derivation-based conceptions of the syntax and semantics of the argument structure of natural languages have come under fire from approaches questioning the central role of compositionality, i.e. the idea that

---

**Acknowledgements:** This research was supported by a grant from the German Research Foundation (DFG) to PBS (SCHU 2517/6-1). We would also like to thank Eric Fuß for helpful discussion and Claudia Kilter, Hanna Weiland-Breckle and Filiz Özden for their assistance during data preparation and recording.

---

**Patrick Brandt**, Leibniz Institut für Deutsche Sprache, R5 6-13, 68161 Mannheim, Germany, e-mail: [brandt@ids-mannheim.de](mailto:brandt@ids-mannheim.de)

**Petra B. Schumacher**, Universität zu Köln, Institut für deutsche Sprache und Literatur I, Sprachwissenschaft, Albertus-Magnus-Platz, 50923 Cologne, Germany, e-mail: [petra.schumacher@uni-koeln.de](mailto:petra.schumacher@uni-koeln.de)

<https://doi.org/10.1515/9783110757255-002>

the meanings of complex expressions derive from the meanings of their parts and the way these parts are put together structurally. Construction grammar (Goldberg 1995) holds that the syntax-semantics interface really consists in a taxonomy of constructions, which are more or less complex meanings that are irreducibly linked to more or less complex syntactic structures. In contrast, compositional approaches hold that hidden meaning may be the result of interface operations that repair otherwise conflicting structures (Brandt 2016, 2019; Jackendoff 1997; Reinhart 2006). With this contribution, we want to shed more light on this debate by examining a particular case of hidden meaning – namely the excessive construction in German. Excessive constructions like (1) that are formed with the degree particle *zu* ('too') can occur without explicit information that is necessary for interpretation, such as being too heavy *for something*. This standard of comparison can be overtly realized (2) but can also remain unarticulated. In the latter case, the missing information must be recovered from context.

- (1) Otto ist zu schwer.  
 Otto is too heavy
- (2) Otto ist zu schwer für einen Jockey.  
 Otto is too heavy for a jockey

In the following, we propose an analysis of excessive constructions as comparatives, the two arguments of which are identified by reflexivization. This is in conflict with the asymmetry property of comparatives, reflected by the intuitive oddity of locutions like *Otto is heavier than himself*. The conflicting semantic information is repaired much akin to repair mechanisms described for so-called privative adjectives (as in *fake diamond*) that require the negation of properties of their head noun or material expressions that when combined with an animate noun give rise to a statue reading (as in *the stone lion*) and similarly necessitate the negation of certain properties of the head noun.

In section 2, we present these cases of syntax-semantics mismatches that strengthen the analysis of syntax-semantics interface repair operations before turning to a more in-depth discussion of excessive structures in section 3. Subsequently, we present a series of real-time comprehension experiments on excessive constructions in section 4, which reveal similar processing patterns as previously observed for constructions involving privative and material adjectives. These data show that processing excessive structures is computationally demanding (compared to structures containing the particle *so* 'so' that does not trigger repair mechanisms) and reflect a mechanism that has previously been

associated with updating processes following mismatches in argument structure. Section 5 indicates directions for future research.

## 2 Privative predicates and weakening

One of the most basic principles of syntactic-semantic composition is the head principle, stating that the syntactic head of a phrase determines the overall meaning of that phrase as much as it determines its overall category. The head primacy principle of Kamp & Partee (1995) guarantees that adjectival modification of nominals delivers nominals again which due to the modification have a more specific meaning.<sup>1</sup> For instance, [[German jockey]] denotes a subset of what [[jockey]] denotes, namely, the intersection of the sets denoting things that are German and things that are jockeys. Somewhat more involved than this simple case of so-called intersective modification, [[skillful Jockey]] denotes a subset of the things that are jockeys, where what this set contains exactly is also a matter of what the relevant standards regarding skillfulness in the domain of jockeys are. Regardless of the question of how such standards are determined (cf. below sections 3 and 5), the head primacy principle assures that a skillful jockey is a jockey just as much as a German jockey is a jockey. More abstractly, the principle guarantees that we can be sure to find the referent(s) (if any) of [[A N]] among the referents (if any) of [[N]] but do not have to look beyond the meaning of [[N]], which arguably is an important asset when the meaning of complex noun phrases is to be determined.

Against the background of the head primacy principle, so-called privative adjectives – among them English *fake*, *false*, or *forged* as well as German *falsch*, *gefälscht*, *unecht* – present a puzzle in that interpreting noun phrases that contain privative adjectives involves moving outside the denotation of the noun that functions as the phrasal head indeed. A *fake diamond* is not a diamond and *forged evidence* is not evidence, crucially, even if the denotata of the complex noun phrases bear obvious traits of the denotata of the nominal heads of the construction. The meaning of noun phrases that involve modification by privative adjectives appears to be characterized by an extra operation that is not overtly coded in syntax. The case of privative adjectives suggests itself for

---

<sup>1</sup> Kamp and Partee's (1995: 161) "Head Primacy Principle" is given in (i):

(i) The Head primacy principle (HPP): In a modifier-head structure, the head is interpreted relative to the context of the whole constituent, and the modifier is interpreted relative to the local context created from the former context by the interpretation of the head.

an analysis in terms of a repair mechanism to resolve conflicting information; quite intuitively, privative predicates give rise to a contradiction that is due to the predication of both the presence and the absence of a certain property (being a diamond, constituting evidence) of one and the same referent and thus violate the basic semantic requirement of non-contradictoriness. The derivation of the hidden quantificational meaning in terms of redressing an intermediate contradictory and hence semantically “illegal” meaning representation can be sketched as in (3).

- (3) This is a fake diamond.  
 This is a diamond and this is not a diamond.  
 In some sense this is a diamond and in some sense it is not.

In (3), the “in some sense it is not” is really the negative (absent property) meaning mentioned above that is moved from the level of ordinary objects to a higher structural level that achieves the encoding and quantification of indexical information, i.e. the “coordinates” with respect to which propositional meanings are evaluated such as times, possible worlds and thresholds (viz. standards of comparison) as laid out in Brandt (2016, 2019). Privative predicates are genuinely contradiction-inducing according to this analysis, and the hidden quantificational meaning of the structures involving them is the effect of redressing the interpretive problem that this poses.

Experimentally investigating modification by means of privative adjectives in an event-related potential (ERP) study,<sup>2</sup> Schumacher et al. (2018) find in association with the processing of this particular type of construction a positive ERP component that is also characteristic of certain types of referential shift or reconceptualization (Schumacher 2013, 2014), which is attributed to the updating of mental representations due to syntax-semantics mismatches. Specifically, reading *a fake diamond* vs. *an impure diamond* yielded late positive-going ERP effects relative to the onset of the adjective and the noun, with an onset latency around 600–700 ms each. Schumacher et al. (2018) submit that the observed positivities for the privative construction reflect the repair mechanism sketched above that redresses a semantic contradiction which arises from the negation

---

<sup>2</sup> ERPs reflect the neuronal activity triggered by cognitive, sensory and motor events. They provide a high temporal resolution of the underlying activity and help to tease apart discrete processes as they are for instance involved in the resolution of syntax-semantics mismatches. Importantly, the underlying processes are identified by contrasting the relative difference of the ERP signal between a critical construction and a minimally differing control construction.

encoded lexically for the privative adjective. Support for the idea that suspending the local realization of certain meaning aspects leads to processing difficulties reflected in a Late Positivity comes from Schumacher's (2013) investigation of the productive animal-for-stature alternation, shown in (4a), compared to the unproblematic combination of material adjective and artefact in (4b).

- (4) a. The wooden dove was on the table.  
 b. The wooden trunk was next to the bed.

Quite obviously, the interpretation of animal-for-stature constructions involves negating or ignoring certain properties of the head noun (like animacy), such that it fits the semantics of the modifying adjective. In particular, the semantic features of the noun (here being animate) are too strong to be combinable with the adjective (that requires an artifact-denoting entity) without giving rise to contradiction.<sup>3</sup> To note, animal-for-stature constructions and constructions involving nouns modified by privative adjectives bear one and the same ERP signature characterized by a Late Positivity. Other types of adjective-noun combinations that do not involve contradictory meanings do not show such processing costs, e.g. the signature produced by processing adjectives with a highlighting function (*echter Diamant* 'real diamond') that might be expected to require pragmatic adjustments during the highlighting of a particular property of the head noun does not significantly differ from that of ordinary adjectives (*weißer Diamant* 'white diamond') that were used in a control condition.

The next section presents a parallel case that involves a functional formative for which we argue that it triggers a contradiction. By "functional formative" we refer to a bound or free morpheme that serves to relate content elements structurally or marks certain paradigmatic grammatical operations like comparison, pluralization or reflexivization.

### 3 The formative *zu*

The grammatical formative *zu* 'too' shows a wide range of functions; from the categorial perspective, it includes at least the word classes preposition, adjective, adverb, infinitive marker and degree particle. Especially in the latter two quasi-

---

<sup>3</sup> Partee (2010) presents an analysis according to which privative adjectives suspend the head primacy principle such that the nominal head is interpreted with respect to the adjective. Furthermore, she submits that the head noun receives a weaker interpretation in the scope of privative adjectives.

inflectional uses, *zu* appears to systematically bring about modal interpretations, cf. Holl (2010) and references therein for infinitival *zu*, as well as the remarks around (2) above. We focus here on *zu* in its use as a degree particle in so-called excessive constructions like (5).

- (5) Otto ist zu schwer.  
 Otto is too heavy

Excessive constructions are a kind of comparative structure; *zu* ‘too’ appears to fill the same structural position as the comparative morpheme *-er* (already Bresnan 1973 for English *too*). One of the basic traits of comparatives is that they are asymmetric: if *x* is *A-er* than *y*, then it follows that *y* is not *A-er* than *x*. This asymmetry entails that comparatives are genuinely two-place constructions syntactically and semantically that call for two well-distinguishable individuals. In particular, on the “A not A” approach to comparatives going back to Ross (1969) and Lewis (1972) (cf. as well Klein 1980 and Schwarzschild 2008, among many others), a comparative codes the predication of a gradable predicate of the first individual and the negation of that gradable predicate of the second individual, such that (6a) becomes (6b), where “d” is short for a certain degree of instantiation of the relevant property.

- (6) a. Otto is heavier than Ede.  
 b. Otto is d-heavy and Ede is not d-heavy.

(6) entails that Ede is less heavy than Otto; in fact, negation comes out meaning ‘less’ in gradable domains, such that *not heavy* conveys the same as *less than heavy*.<sup>4</sup> Now, however, excessive structures allow for only one ordinary individual argument in their structure, at least superficially. If the semantics associated with the two argument places of regular comparatives are predicated of one single individual, that individual will end up being ascribed contradictory properties, namely, being both d-heavy and not d-heavy at the same time. Indeed, we can observe that structures belonging to the comparative realm behave corruptly if semantically only one individual is available. For example, all of the following sentences with positive or superlative adjectival predicates are true and rather acceptable when addressing one’s only son:

---

<sup>4</sup> Jespersen (1924: 325) writes concerning the matter: “*Not* means ‘less than’, or in other words ‘between the terms qualified and nothing’. Thus *not good* means ‘inferior’, but does not comprise ‘excellent’.”

- (7) You are my big son.  
 You are my little son.  
 You are my biggest son.  
 You are my smallest son.

In contrast, the corresponding pairs of *bona fide* comparative structures are rather odd, indicating that regular comparatives strictly require the semantic presence of at least two distinguishable individuals.

- (8) # You are my bigger/smaller son.

We submit that excessive structures are reflexivized comparatives (Brandt 2016, 2019), i.e. that the structure underlying them codes that “something is more A than itself”. Let us briefly illustrate how this intuitively odd semantics reduces to a contradiction similar to what we observe with privative predicates or animal-for-statue constructions as discussed in the last section.

Under the “A not A” approach to the semantics of comparatives just mentioned, *x is A-er than y* yields (9).

- (9) *x is A and y is not A*

For example, *Otto is heavier than Ede* corresponds to a situation in which Otto is d-heavy and Ede is not d-heavy. Assuming now that excessive structures are reflexivized comparatives and further assuming that reflexivization corresponds to the identification of the two argument places of a transitive structure (cf. Steinbach 2001 for German), we have:

- (10) *x is A and y is not A* (regular comparative semantics)  
*x = y* (reflexivization)  
*x is A and x is not A* (resulting contradiction)

The first line expresses the asymmetry of the two arguments related in a comparative with respect to the instantiation of a certain property: the degree to which *x* instantiates the property in question is higher than the degree to which *y* instantiates the property. The second line represents the result of reflexivization that we take here to correspond to the identification of the argument places. Alternatively, reflexivization would reduce one argument place by “bundling” the properties associated with the respective semantic roles (Reinhart & Siloni 2005). Either way, one argument will end up being ascribed a certain property as well as

its negation, as expressed in the plain contradiction in the third line in (10).<sup>5</sup> Let us now see how the underlying contradictoriness of the excessive structure could be the reason for the modal interpretation not transparently marked but intuitively present in excessive structures; a comparative structure that contains an existential modal in the *than*-clause acting as the standard of comparison thus gives a fair paraphrase of the *zu*-excessive as in (11).

- (11) Otto is too heavy.  
 'Otto is heavier than he may be (regarding a certain standard).'

The norm or standard relevant for the interpretation of the excessive depends on or presupposes a purpose or comparison class, much like a regular comparative construction depends on a standard of comparison, coded in the *than* clause in English or the *als* clause in German. Indeed, the purpose clause or phrase coding the comparison class in *zu*-excessives appears to fill the same slot that the standard of comparison in regular comparatives fills. In the absence of an agentive verbal predicate, it is thus impossible to add a purpose clause to a regular adjectival comparative construction, contrast the excessive in (12a) and the comparative in (12b).

- (12) a. Otto is too big to be a jockey / for a jockey.  
 b. \*Otto is bigger (than Ede) (in order) to be a basketball player / for a basketball player.

Suggestively from a syntactic point of view, it is possible to code the purpose clause in an excessive structure specifically with typically comparative means in German, namely, as an *als* clause that is ordinarily used to mark the standard of comparison.<sup>6</sup>

- (13) Otto ist zu gross als dass er Jockey sein könnte.  
 Otto is too big as that he jockey be could  
 'Otto is too big to be a jockey.'

<sup>5</sup> Indeed, reflexivization is a suspicious operation independently also in the ordinary individual domain to the extent that one individual (or two individuals that are identical to each other) come to realize differing semantic role information, in particular, properties of the agent as well as the patient role that are more often than not taken to be incompatible. A way out of the dilemma consists in assuming that patient arguments are in fact not restricted at all or so weakly so that their semantics includes (is entailed by) agentive semantics as well; already when we say that patients are non-agents (the result of) reflexivization becomes problematic.

<sup>6</sup> Eric Fuß (p.c.) has reminded us of this supportive fact.

Other properties of purpose clauses in excessives like the licensing of negative polarity items similarly point to the kinship between purpose clauses in *zu*-excessives and *than*-clauses in regular comparative structures (pace Bylinina 2014: chapter 3). In light of these facts, we suggest that excessive structures are fundamentally two place relations like other comparatives, the difference being that in excessives, the second argument place is not filled by the *than* clause as in a regular comparative but by the purpose clause instead. At a more general level, both types of clause play the central role in determining the standard relevant for the comparison. We will therefore henceforth collectively refer to them as “standardizers”.<sup>7</sup> Less surprisingly given the common function as standardizer, we propose that in the excessive construction, the purpose clause substitutes for the ‘regular comparative’ standard of comparison, essentially. More precisely, the negative predication that is the hallmark of the standard of comparison in the regular comparative under the “A not A” approach is “moved” to the purpose clause that comes with excessive structures (even if it remains silent) in reaction to the intermediately derived contradiction. The negative meaning “not: P(x)” (Otto is not d-heavy) is ignored with regard to the main predication (i.e. in terms of the regular standard of comparison as coded by a *than*-clause) and realized with regard to the predicate provided by the purpose clause. The syntax derives a structure that as such would receive a contradictory semantic representation; the interface reacts by suspending the interpretation of the offending negation, effectively “moving” it to the purpose clause that takes the place of the standard. The basic derivation is sketched with a concrete example in (14), where “d” stands for “degree” again.

- (14) a. Otto is too heavy (to be a jockey).  
 b. Otto is d-heavy and Otto is not d-heavy (and Otto is a Jockey)  
 c. Otto is d-heavy (and Otto is d-heavy) and Otto is not a Jockey

---

<sup>7</sup> This perspective may help solve a long-standing puzzle in the realm of comparatives, namely, the fact that so-called absolute comparatives appear to code a meaning that is weaker than the meaning coded by the positive counterparts. Thus, *jüngerer Professor* ‘younger professor’ does not entail that the professor in question is young. If the standardizer is not articulated but implicitly corresponding to something like “someone is less heavy”, then the absolute comparative comes out meaning “more A than not A”, i.e., in the case at hand, “younger than not young (or less than young)”, which is pretty much what the absolute comparative seems to mean. See footnote 4 above.

We contend that the last line corresponds to the basic semantics of the excessive construction.<sup>8</sup> More elaborately, Brandt (2016, 2019) assumes that the infinitival purpose clause codes possibility (Otto is possibly a Jockey),<sup>9</sup> which becomes impossibility after accommodation of the negative meaning. More superficial pragmatic mechanisms drawing on rhetorical relations ensure that Otto's weight is taken to be the reason for this impossibility (Asher 2007), entailing that if Otto had a different weight, it might be possible for him to be a jockey. What is crucial for our purposes is that the state of affairs coded in the purpose clause is essential for constructing the "original" standard of comparison as much as its manipulation by means of the repair proposed here leads to a new standard of comparison (which can be modelled as a world where the requirements regarding the weight of jockeys are different). The standard of comparison or purpose clause, collected here under "standardizer" thus mark the beginning and the end result of the syntactic-semantic derivation of the excessive structure which eventually receives an interpretation along the lines of (15).

---

**8** An anonymous reviewer suggested that the locution expressed by "Otto is not a jockey" does not belong to semantics proper but has the status of an implicature. Flanked by a small survey conducted with native speakers, the authors' intuitions with respect to German reveal that cancellation is hard already in the case of expressing the standard by means of a prepositional phrase (a), harder in the case of infinitival expression of the standard (b) and quite impossible in the case of introducing the standard by a finite sentence (c); special marking by discourse particles like *doch* ('still'/'anyway') is needed in any case:

- (i) (a) Otto ist zu schwer für einen Jockey, ?#aber er ist doch ein Jockey.
- (b) Otto ist zu schwer, um Jockey zu sein, #aber er ist doch ein Jockey.
- (c) Otto ist zu schwer, als dass er Jockey sein könnte, #aber er ist doch ein Jockey.

It has been argued prominently that patterns originating as implicatures may get hard-wired and become presuppositions (non-negatable entailments), compare for instance Levinson's (2000) analysis of Principle B effects. More generally, there is an acknowledged path of grammaticalization from particularized to generalized implicatures up to conventionalized implicatures and presuppositions, such that there "soft presuppositions" and "hard implicatures" arise (Romoli & Schwarz 2015). On our analysis, the target of the "movement" of the negation is not *a priori* determined but a matter of the structural options available. In comparatives, the "second" argument place is predestined to host it as it is the "negatively defined" argument place to start, cf. as well the discussion around (10) above. In sum, we do not agree that the less than crystal-clear status of the standardizer with respect to the notoriously problematic semantics-pragmatics divide is challenging specifically for our approach.

**9** Cf. for discussion of the modal interpretation of infinitives in terms of anchoring propositional meanings to possible worlds Reis (2003).

(15) Otto has a certain weight, and (therefore) he is not a jockey.

Turning again to the empirical side of our investigation, the next section presents evidence from an ERP study that processing excessive structures may give rise to a positivity in a similar way as in the case of animal-for-statue alternations or privative predicates. This suggests that the three constructions may indeed be unified by a derivation in terms of redressing a contradictory meaning representation.

## 4 Processing of excessives

In two ERP studies, we compared excessive structures containing the particle *zu* 'too' (16a) to equative structures containing the particle *so* 'so' (16b), the latter not giving rise to a contradiction at the syntax-semantics interface by hypothesis. In light of the link to the processing of privative predicates and animal-for-statue alternations, we predicted a positive-going potential for the (a) over the (b) structures. We further tested whether context exerts a facilitating advantage in providing a standard for comparison. To this end, we compared excessive and control structures without context (experiment 1) to those preceded by a context sentence (experiment 2).

- (16) a. (Jockeys dürfen höchstens 55 kg wiegen.) Peter ist zu schwer für einen guten Jockey.  
 (jockeys may after most 55 kg weigh) Peter is too heavy for a good jockey  
 '(Jockeys may weight at most 55 kg.) Peter is too heavy to be a good jockey.'  
 '(Jockeys may weight at most 55 kg.) Peter is too heavy to be a good jockey.'
- b. (Ringer müssen mindestens 70 kg wiegen.) Simon ist so schwer wie ein echter Ringer.  
 (wrestlers must at.least 70 kg weigh) Simon is as heavy as a real wrestler  
 '(Wrestlers must weigh at least 70 kg.) Simon is as heavy as a real wrestler.'

## 4.1 Participants

Forty-eight monolingual native speakers of German, all of whom were students at the University of Cologne, participated in the investigation. All participants were right-handed and reported normal or corrected-to-normal vision and no history of neurological disorder. Twenty-four participants were recorded in each experiment. In experiment 1 (no context), data from 20 participants were included in the analysis after artifact screening (18 women, 2 men; mean age: 23.2 years; range: 19–31 years). In experiment 2 (prior context), we were able to analyze data from 22 participants (10 men and 12 women; mean age: 23.3 years; range: 19–30 years of age).

## 4.2 Materials

Forty pairs of stimuli were constructed that included either an excessive *zu* or an equative/positive *so* before an adjective. They were interspersed with 400 fillers in experiment 1 and 160 fillers in experiment 2. All items were pseudo-randomized and presented in three different orders across participants. To assure that participants attended to the stimuli, each test item was followed by a word recognition task (50 % with a correct word probe and 50 % with an incorrect word probe).

## 4.3 Procedure

After giving written informed consent, the participants were prepared for the recording of the electroencephalogram (EEG). They were then seated in front of a computer monitor in a sound-proof booth and performed a practice session to get accustomed to the experimental setup and task before the experimental session started. The written experimental items were presented word by word in the middle of the monitor in off-white letters against a black background. Each trial started with a fixation star that was displayed for 500 ms in the center of the screen and followed by a 150 ms blank screen. Each word was displayed for 450 ms with a 150 ms blank screen between words. Each experimental item ended with a 1000 ms blank screen, followed by three question marks that served as signals for the upcoming word recognition task and the presentation of a probe word. The maximum response time to the word recognition task was set to 3000 ms. Participants were asked to decide whether the probe word had

occurred in the previous stimulus or not. They used a gamepad controller to mark their response. True and false answer buttons were counterbalanced across participants.

#### 4.4 EEG recording

The EEG was recorded from 24 Ag/AgCl scalp electrodes (ground: AFz), which were referenced to the left mastoid and re-referenced offline to linked mastoids. To monitor for artifacts due to blinks and other ocular movements, two sets of electrode pairs were placed around the participants' eyes. Electrode impedances were kept below 5 k $\Omega$  and all channels were amplified with a *BrainAmp* DC amplifier (Munich, Germany) and digitized at 500 Hz.

#### 4.5 EEG preprocessing

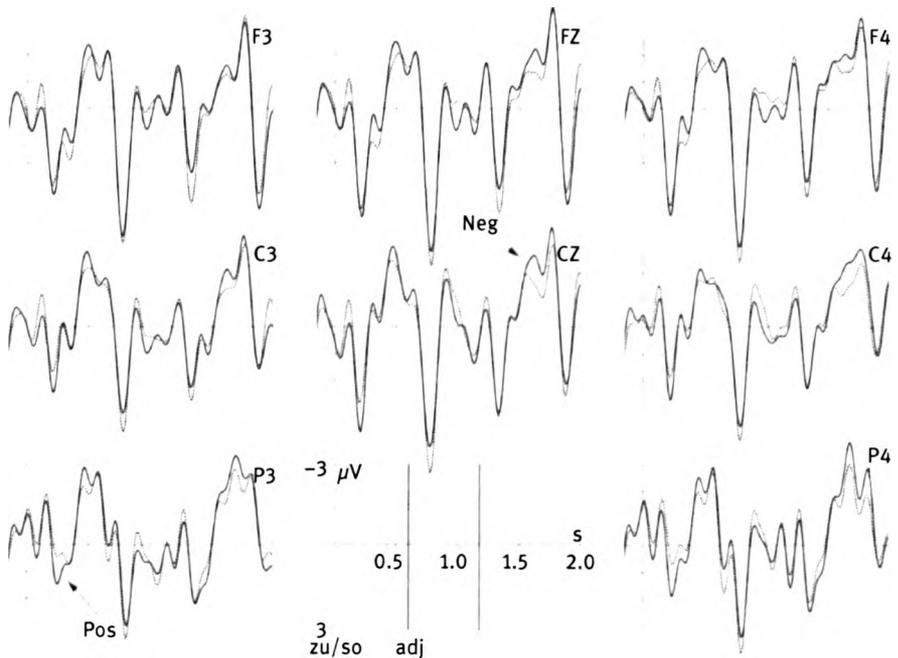
After recording, the EEG data were filtered offline with a 0.3–20 Hz band pass filter to correct for slow signal drifts prior to the target words. Automatic ( $\pm 40$   $\mu$ V for the eye electrodes) and manual rejections were performed to exclude trials containing artifacts from ocular movements or amplifier saturation. Trials with time-outs and incorrect responses in the behavioral task were also removed prior to statistical testing. Average ERPs were time-locked to particle onset and computed from 200 ms before until 2000 ms after the onset of the particle.

#### 4.6 Data analysis

Statistical analyses were carried out on the basis of the mean amplitude values per condition in time windows determined by visual inspection. A repeated measures analysis of variance (ANOVA) was performed with the factors CONDITION (excessive vs. control) and the topographical factor REGION OF INTEREST (ROI, with two levels: anterior vs. posterior). The channels were grouped by their anterior-posterior distribution across the scalp and entered the analysis as anterior (F3, F4, F7, F8, Fz, FC1, FC2, FC5, FC6, FCz, C3, C4, Cz) or posterior sites (T7, T8, CP1, CP2, CP5, CP6, CPz, P3, P4, P7, P8, Pz, POz). The analyses were carried out using the *ez*-package (Lawrence 2013) in R (R Core Team 2015).

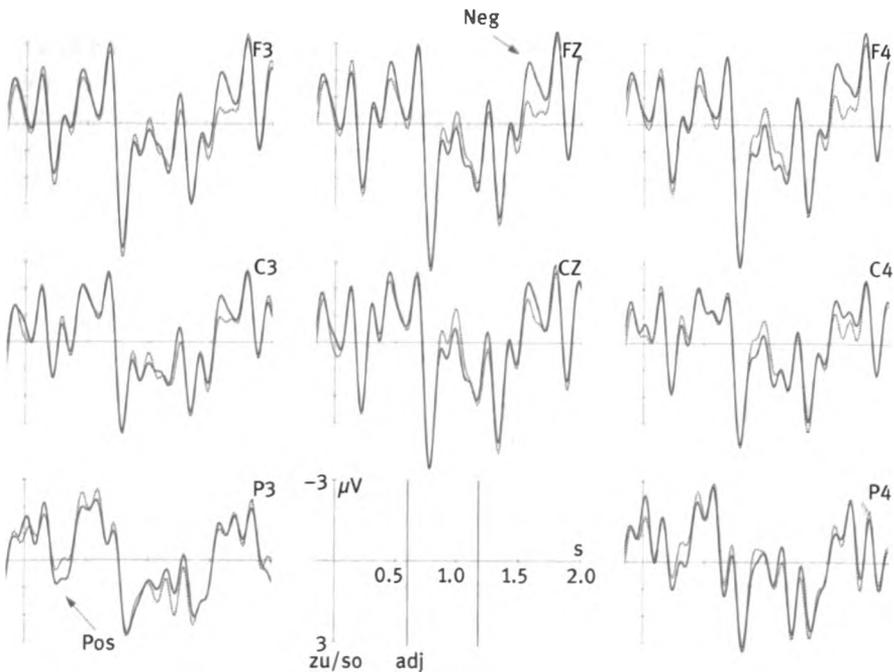
## 4.7 Results

For experiment 1 (no context), Figure 1 presents the averaged ERPs for excessive structures (solid line) compared to the *so*-control structures (dotted line). The plotted ERPs span from the onset of the particle (onset at 0 ms) across the adjective (onset at 600 ms) and the spill over region representing the beginning of the purpose clause (onset at 1200 ms, as indicated by vertical bars in the figure's scale). The ERPs show an early positivity between 150–300 ms following the particle *zu* and a later negative deflection between 1550–1700 ms (350–500 ms after onset of spill over segment). No other differences reached statistical significance. The analysis of variance in the window from 150–300 ms registered an interaction of CONDITION  $\times$  ROI ( $F(1,19)=7.13, p<0.02$ ), which when resolved by region showed an effect over posterior electrode sites ( $F(1,19)=6.30, p<0.03$ ). It further revealed a main effect of CONDITION between 1550–1700 ms ( $F(1,19)=6.85, p<0.02$ ).



**Figure 1:** Effects of excessives in experiment 1 (solid line; the dotted line represents the control condition): Posterior positivity (between 150–300 ms) time-locked to particle onset and negativity relative to onset of spill over segment (350–500 ms).

For experiment 2 (prior context), the averaged ERPs for excessive structures (solid line) and the *so*-control construction (dotted line) following supporting context sentences are illustrated in Figure 2. The plot shows the same range as in experiment 1. The figure indicates again an early positivity between 200–350 ms relative to the onset of the excessive particle *zu* and a negative deflection further downstream between 1550–1700 ms (350–500 ms after onset of spill over segment). The ANOVA for the window from 200–350 ms revealed an interaction of CONDITION x ROI ( $F(1,21)=11.76, p<0.01$ ). The resolution of this interaction showed a marginal difference in the posterior ROI ( $F(1,21)=4.18, p<0.054$ ). The analysis of the window from 1550–1700 ms brought forth an interaction of CONDITION x ROI ( $F(1,21)=17.13, p<0.01$ ), which was reflected in an effect of CONDITION over the anterior electrodes ( $F(1,21)=9.46, p<0.01$ ).



**Figure 2:** Effects of excessives in experiment 2 (solid line) vs. equative controls (dotted line): Posterior positivity (between 200–350 ms) time-locked to particle onset and anterior negativity relative to onset of spill over segment (350–500 ms).

The findings from the two experiments indicate that the processing of excessive structures is costly. In particular, encountering the excessive particle immediately exerts computational demands, reflected in a positive ERP signature. This positivity occurs very early and given the parallel construction of the experimental material, it can only be triggered by the occurrence of the particle *zu* 'too', which signals to the reader the presence of an excessive structure and hence the upcoming need to redress a literally coded contradictory meaning along the lines of the repair sketched above. Intuitively, the repair consists in manipulating the standard of comparison, the coding of which is a matter of heated discussion in the current syntax-semantics-pragmatics literature (cf. Bylinina 2014, for a recent overview and discussion). Our results so far suggest that when a standardizer is encountered (i.e. the first segment following the adjective in our experimental material, like *für* 'for' in the example stimulus above), its processing exerts additional costs reflected in a negative deflection. However, the contextual manipulation in our experimental setup was not aimed at differentiating among standardizers; as a consequence, eventual processing differences between different types of standardizers could not be interpreted systematically as a function of differences regarding the presentation and construction of the standard of comparison. As this appears to be a promising strategy to approach empirically the question of how standards of comparison are actually built up, we discuss in the next section potentially important differences in the test material as leading to distinct predictions regarding processing.

## 5 (Un-)prepared repair

We have seen experimental evidence suggesting that the degree particle *zu* acts as a kind of warning sign, indicating that a repair operation will have to be carried out promptly that involves manipulation of the standard of comparison – given its promptness, the observed positivity does not seem to reflect the repair operation itself (as the standard to be manipulated is not coded by *zu*), but rather flags the problem and in its train the preparation for the repair, so to speak. There is some agreement that construing a standard involves at least a person acting as a “judge” regarding the instantiation by an object of some gradable property that is often relative to a comparison class as well as to a purpose (Bylinina 2014). These ingredients may be distributed over the linguistic expression in different ways, such that properly controlling for how it is contributed might help improve our understanding not only of the linguistic coding of standards of comparison but also more general properties of the relation between

syntax, semantics, and processing. Crucially, constructions with privative adjectives also registered an early sign of a repair: the positivity emerged as early as on the privative adjective. This indicates that the repair is already lexically encoded in the privative adjective, respectively the degree particle.

In light of what we know about incremental language processing, we might expect that from a processing perspective, getting relevant information about the to-be-manipulated standard of comparison in advance of the actual manipulation is preferable to getting it late – technically under the analysis here entertained, the problem is that there is a meaning component that cannot be directly accommodated locally and has to be accommodated on the standardizer. We would expect that it matters whether the standard of comparison has been established when the problem occurs so that it can be promptly redressed, rather than that the interface has to “wait” for the information that is needed for the repair and keep the problematic material active in the meantime. Most tellingly in this regard, the experimental material contained (some) examples where the standardizer appears before the critical excessive particle *zu* and (many) examples where it occurred after *zu*. Future experiments should care about a differentiation between and a balanced distribution of “standard first” and “standard last” examples, provisionally exemplified in the used test sentences in (17) (repeated from above) and (18) respectively.

- (17) a. (Jockeys dürfen höchstens 55 kg wiegen.) Peter ist zu schwer für einen guten Jockey.  
 (jockeys may at.most 55 kg weigh) Peter is too heavy for a good jockey  
 ‘(Jockeys may weigh at most 55kg.) Peter is too heavy to be a good jockey.’
- b. (Ringer müssen mindestens 70 kg wiegen.) Simon ist so schwer wie ein echter Ringer.  
 (wrestlers must at.least 70 kg weigh) Simon is as heavy as a real wrestler  
 ‘(Wrestlers must weigh at least 70 kg.) Simon is as heavy as a real wrestler.’
- (18) a. Die Schwimmer gingen wieder nach Hause. Das Wasser war zu kalt für einen Wettkampf.  
 the swimmers went again to home the water was too cold for a competition  
 ‘The swimmers went home again. The water was too cold for a competition.’

- b. Die Schwimmer gingen wieder nach Hause. Das Wasser war so kalt dass es beinahe froz.  
 the swimmers went again to home the water was so cold that it nearly froze  
 ‘The swimmers went home again. The water was so cold that it nearly froze.’

Clearly, (17) and (18) are not quite minimal pairs – while a judge remains implicit in both examples, the standardizer in (17) is a prepositional phrase denoting a comparison class, but a prepositional phrase denoting a purpose in (18); a putatively relevant cutoff point is given in (17), but not in (18). Obviously, comparison classes as well as purposes may be coded by other categories (like adverbs or infinitival clauses), as well as remain implicit or be deduced from independently present material in other functions, and so on. Teasing apart and systematizing the relevant distinctions and properly testing them experimentally surely makes for a noble and time-consuming task. One of our aims here has been to suggest that it may be worthwhile as well.

## References

- Asher, Nicholas. 2007. A large view of semantic content. *Pragmatics and Cognition* 15. 17–39.
- Brandt, Patrick. 2016. Fehlkonstruktion und Reparatur in der Bedeutungskomposition. *Linguistische Berichte* 248. 395–433.
- Brandt, Patrick. 2019. *Discomposition redressed. Hidden change, modality, and comparison in German*. Tübingen: Narr.
- Bresnan, Joan. 1973. Syntax of the comparative clause construction in English. *Linguistic Inquiry* 4(3). 275–343. <https://www.jstor.org/stable/4177775>.
- Bylinina, Lisa. 2014. The grammar of standards: Judge-dependence, purpose-relativity, and comparison classes in degree constructions. Utrecht: LOT.
- Carston, Robyn. 1997. Enrichment and loosening: Complementary processes in deriving the proposition expressed. *Linguistische Berichte* 8. 103–127.
- Dowty, David. 1991. Thematic proto-roles and argument selection. *Language* 67(3). 547–619. <https://doi.org/10.2307/415037>.
- Eisenberg, Peter. 2013. *Grundriss der deutschen Grammatik*. vol. 2: *Der Satz*. Stuttgart: Metzler.
- Goldberg, Adele. 1995. *Constructions. A construction grammar approach to argument structure*. Chicago, IL: University of Chicago Press.
- Holl, Daniel. 2010. *Modale Infinitive und dispositionelle Modalität im Deutschen*. Berlin: Akademie Verlag.
- Jackendoff, Ray. 1997. *The architecture of the language faculty*. Cambridge, MA: MIT Press.
- Jespersen, Otto. 1924. *The philosophy of grammar*. London: Allen and Unwin.

- Kamp, Hans & Barbara Partee. 1995. Prototype theory and compositionality. *Cognition* 57(2). 129–191. [https://doi.org/10.1016/0010-0277\(94\)00659-9](https://doi.org/10.1016/0010-0277(94)00659-9).
- Klein, Ewan. 1980. A semantics for positive and comparative adjectives. *Linguistics and Philosophy* 4(1). 1–45. <https://doi.org/10.1007/BF00351812>.
- Lawrence, Michael A. 2013. *ez: Easy Analysis and Visualization of Factorial Experiments. R Package Version 4.2-2*. Available at: <http://CRAN.R-project.org/package=ez>. (2021-04-13)
- Levinson, Steven C. 2000. *Presumptive Meaning*. Cambridge, MA: MIT Press.
- Lewis, David. 1972. General semantics. In Donald Davidson & Gilbert Harman (eds.), *Semantics of Natural Language*, 169–218. Dordrecht: Reidel.
- Miller, George A. 1956. The magical number seven plus or minus two: Some limits on our capacity for processing information. *The Psychological Review* 63(2), 81–97. <https://doi.org/10.1037/h0043158>.
- Partee, Barbara. 2010. Privative adjectives: Subjective plus coercion. In Rainer Bäuerle, Thomas Ede Zimmermann & Uwe Reyle (eds.), *Presuppositions and Discourse: Essays offered to Hans Kamp*, 273–285. Bingley, UK: Emerald.
- Primus, Beatrice. 1999. *Cases and thematic roles: Ergative, accusative and active*. Tübingen: Niemeyer.
- R Core Team 2015. *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing.
- Reinhart, Tanya. 2006. *Interface strategies*. Cambridge, MA: MIT Press.
- Reinhart, Tanya & Tali Siloni. 2005. The lexicon-syntax parameter: Reflexivization and other arity operations. *Linguistic Inquiry* 36(3), 389–436. <https://www.jstor.org/stable/4179330>.
- Reis, Marga. 2003. On the form and interpretation of German *wh*-infinitives. *Journal of Germanic Linguistics* 15(2). 155–201. <https://doi.org/10.1017/S147054270300028X>.
- Romoli, Jacopo & Florian Schwarz. 2015. An experimental comparison between presuppositions and indirect scalar implicatures. In Florian Schwarz (ed.), *Experimental perspectives on presuppositions*, 215–240. Dordrecht: Springer.
- Ross, John Robert. 1969. The deep structure of comparatives. Paper presented at The First and Last Annual Harvard Spring Semantics Festival.
- Schumacher, Petra B. 2013. When combinatorial processing results in reconceptualization: Towards a new approach of compositionality. *Frontiers in Psychology* 4. <https://doi.org/10.3389/fpsyg.2013.00677>
- Schumacher, Petra B. 2014. Content and context in incremental processing: “the ham sandwich” revisited. *Philosophical Studies* 168(1). 151–165. <https://doi.org/10.1007/s11098-013-0179-6>.
- Schumacher, Petra B., Patrick Brandt & Hannah Weiland-Breckle. 2018. Online processing of “real” and “fake”: The cost of being too strong. In Elena Castroviejo Miró, Louise McNally & Galit Weidmann Sassoon (eds.), *The semantics of gradability, vagueness, and scale structure: Experimental perspectives*, 93–111. Basel: Springer.
- Schwarzschild, Roger. 2008. The semantics of comparatives and other degree constructions. *Language and Linguistics Compass* 2(2). 308–331. <https://doi.org/10.1111/j.1749-818X.2007.00049.x>.
- Steinbach, Markus. 2002. *Middle Voice: A comparative study of the syntax-semantics interface of German*. Amsterdam: Benjamins.