

# BUILDING GRADABLE ADJECTIVAL PASSIVES\*

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## 1 Introduction

This paper offers a semantic analysis of German adjectival passives in comparison constructions; cf. the examples in (1) to (3). Although the occurrence of adjectival passives in comparatives and superlatives has been put forward as an argument in favor of an adjectival analysis (cf. e.g. Rapp, 1997, Kratzer, 2000, and Maienborn, 2007), no compositional analysis specifying how to build gradable adjectival passives has been offered to date.

- (1) Im Schatten ist die Haut geschützter.  
in.the shade is the skin protected+COMP  
'Your skin is more protected in the shade.'
- (2) Immerhin war mein Hirn angeschalteter als seins.  
anyway was my brain switched.on+COMP than his  
'At least, my brain was more switched on than his.'
- (3) Saint-Exupéry ist gelesener als J. D. Salinger.  
Saint-Exupéry is read+COMP than J. D. Salinger  
'Saint-Exupéry is more read than J. D. Salinger.'

The proposed analysis builds on a semantics of the adjectival passive under which it is a “flexible grammatical means of creating a potentially new *ad-hoc* property” (Maienborn, 2009:35), and upon a degree-based semantics of comparison (cf. e.g. von Stechow, 1984). Both building blocks are introduced in section 2, and then put together in section 3 to account for examples such as (1) and to capture the context dependency and *ad-hoc* flavor of (2) as well as the quantity reading of (3). A brief summary and concluding remarks are offered in section 4.

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## 2 Background

### 2.1 German adjectival passives

We follow Maienborn (2009) and Gese (2011) in that the property adjectival passives ascribe to the subject referent is context dependent (cf. Kratzer, 2000 and Gehrke, 2011 for a different view). The zero affix converting the verbal participle into an adjective introduces a free variable of type  $\langle s, \langle e, t \rangle \rangle$  into the composition, as in (4).

$$(4) \quad \llbracket \emptyset_{\text{Aff}} \rrbracket^g = \lambda P_{\langle v, \langle e, t \rangle \rangle} \cdot \lambda s_{\langle s \rangle} \cdot \lambda x_{\langle e \rangle} \cdot (g(C))(s)(x) \ \& \ \exists e [P(e)(x) \ \& \ \text{RESULT}(e)(s)]$$

If contextually licensed,  $C$  may be assigned an *ad-hoc* created property as its value (cf. Barsalou (1983, 1991) for further discussion of the notion of *ad-hoc* properties). Evidence for such an analysis comes from three sources, (i) from the context dependency of some adjectival passives, as illustrated already in (2) but also in (5) and (6) below; (ii) from adjectival passives with activity verbs and thus without a lexically provided result state, as in (9); and (iii) from adjectival passives with readings contradicting the lexically provided result state, as in (11). Let us take a closer look at the evidence.

(i) The *ad-hoc* nature and reliance on contextual information of some adjectival passives speaks in favor of an analysis that encodes context dependency as a core component of the semantic contribution of the affix. For instance, the sentence in (5) can even be truthfully uttered if my Japanese friend has never been to Sweden before. It merely asserts that he is pretty tough when it comes to drinking beer.

- (5) Ich hatte Sorge wie der Japaner das Oktoberfest finden würde,  
 I had worry how the Japanese the Oktoberfest find would  
 aber es stellte sich heraus, dass er schwedentrainiert war.  
 but it turned itself out that he Sweden.trained was  
 ‘I was worried about how the Japanese guy would like the Oktoberfest,  
 but it turned out that he was trained in Sweden.’  
 (Maienborn, 2009:42)

This interpretation does not follow directly from the linguistic material provided on the surface. The same holds for (6), which does not only mean that I had my car inspected for road safety but also that it passed the examination and thus has the *ad-hoc* property of being safe, reliable, and roadworthy.

- (6) Mein Auto ist vom TÜV geprüft.  
 My car is by.the TÜV examined  
 ‘My car is certified by the vehicle inspection organisation TÜV.’  
 (Maienborn et al., 2012:25)

Note that the corresponding verbal passive in (7) does not allow for this context-dependent reading, and the continuation in (8) is thus fine. For (6), on the other hand, the continuation in (8) will result in a contradictory reading.

- (7) Mein Auto wurde vom TÜV geprüft.  
 my car became by TÜV examined  
 ‘My car was examined by the vehicle inspection organization TÜV.’
- (8) Leider ist die Inspektion negativ ausgefallen.  
 unfortunately is the inspection negatively out.turned  
 ‘Unfortunately, it did not pass the inspection.’

(ii) Support for a free variable analysis of the adjectival passive also comes from adjectival passives derived from verbs that do not lexically provide a result state. Take the activity verb *streicheln* (‘pet’) in (9), for instance, which is modelled after an example in Rapp (1996:243).

- (9) Anna hat ihre Nachbarspflichten erfüllt:  
 Anna has her neighbor.duties fulfilled  
 Der Briefkasten ist geleert, die Blumen sind gegossen und die Katze ist gestreichelt.  
 the mail.box is emptied the flowers are watered and the cat is petted  
 ‘Anna has fulfilled her neighborly duties:  
 The mailbox is emptied, the plants are watered and the cat petted.’  
 (Maienborn, 2009:42)

The semantic contribution of the participle cannot be defined solely on lexical grounds. Context provides what has been called a job-is-done interpretation (Kratzer, 2000:388), under which the petting of a neighbor’s cat is defined as one of the jobs I believe a good neighbor has to take care of. The sentence asserts that, by virtue of my neighbor living up to these expectations, the cat can now be said to have a certain property. (For further discussion of job-is-done readings and a pragmatic account of the distinction between resultant and target states, see Gese, to appear.)

(iii) Lastly, particularly strong evidence for a free variable account of adjectival passives comes from sentences such as (11), where a result state is provided in the lexicon by the verbal base but the participle nevertheless receives an interpretation which is incompatible with this lexically provided result state.

- (10) Im Kontext einer Kleinanzeige: „Das Spiel ist unbespielt und absolut neuwertig.“  
 (In a classified ad: “The board game hasn’t been played and its condition is like new.”)
- (11) Der Karton ist geöffnet, aber sorgfältig wieder zugeklebt.  
 the box is opened but carefully again together.taped  
 ‘The box of the board game is opened but carefully packed up again.’  
 (Maienborn, 2011:9)

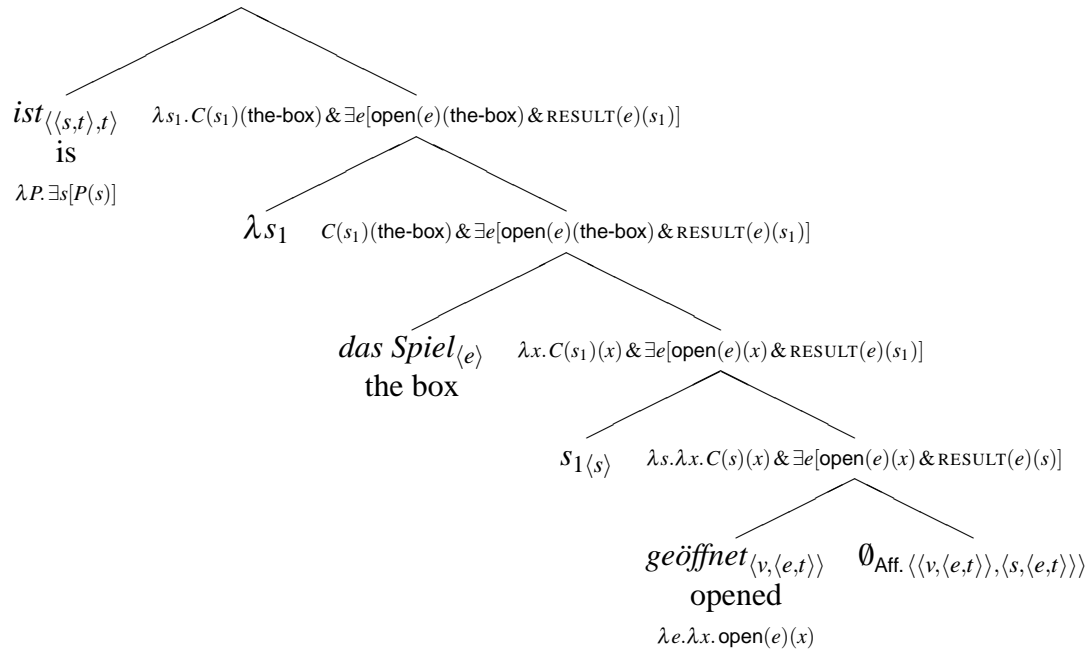
Here, *geöffnet* (‘opened’) again comes with a certain *ad-hoc* flavor: Rather than denoting the result state of being open, the participle describes a state of being without original tags and packaging. It is thus possible to explicitly contradict the lexically given result state by asserting that the board game is all packed up and its packaging has been taped back together.

Let us take a closer look at how the free variable analysis of adjectival passives can account for the fact that (11) does not express a contradiction, and at the analysis at work: Interpretation of the sentence proceeds as sketched in (13) and results in (12a). In the context of (10), the free

variable introduced by the affix is assigned the value in (12b), a relation that holds of a state and an individual if the latter is in a state of being without its original tags and packaging, rather than, say, having an open lid. Under this assignment, the sentence is true if and only if the box containing the board game lacks its original packaging as a result of an event of opening it.

- (12) a.  $\exists s [(g(C))(s)(\text{the-box}) \ \& \ \exists e [\text{open}(e)(\text{the-box}) \ \& \ \text{RESULT}(e)(s)]]$   
 b.  $g(C) = \lambda s_{\langle s \rangle} . \lambda x_{\langle e \rangle} . \text{without-original-tags-and-packaging}(s)(x)$

- (13)  $\exists s [C(s)(\text{the-box}) \ \& \ \exists e [\text{open}(e)(\text{the-box}) \ \& \ \text{RESULT}(e)(s)]]$



Note that this interpretative flexibility is a unique feature of the adjectival passive. Genuine adjectives, for instance, do not exhibit the same degree of dependency on context and world knowledge. In the above context, the sentence in (14) is thus contradictory.

- (14) # Der Karton ist offen, aber sorgfältig zugeklebt.  
 the box is open but carefully together.taped  
 ‘The box is open but carefully packed up.’

Before we move on, let us briefly comment on a simplification of the analysis of adjectival passives that we have been making so far for expository reasons. Notice that under the account presented above, the adjectival affix introduces existential quantification over events. However, this cannot be quite right as it would — in the case of (5), for instance — still require that an event of training my Japanese friend in Sweden actually took place. For discussion of a more refined view of the semantic contribution of the affix with respect to the event argument of the participle, the reader is referred to Gese (2011).

## 2.2 The syntax and semantics of comparison constructions

The second building block of the proposed analysis is the semantics of comparison constructions as proposed in von Stechow (1984) and as discussed more recently in Beck (2011). Among its

key features are that comparison employs degrees in the semantics and that a number of operators quantify over degrees; cf. the lexical entry for a comparative operator in (15). This semantics is enriched by states here.

- (15) a.  $\llbracket -er \rrbracket = \lambda d_{\langle d \rangle} . \lambda D_{\langle d,t \rangle} . \text{MAX}(D) > d$   
 b.  $\llbracket \text{MAX} \rrbracket = \lambda D_{\langle d,t \rangle} . \iota d [D(d) \ \& \ \forall d' [D(d') \rightarrow d' \leq d]]$

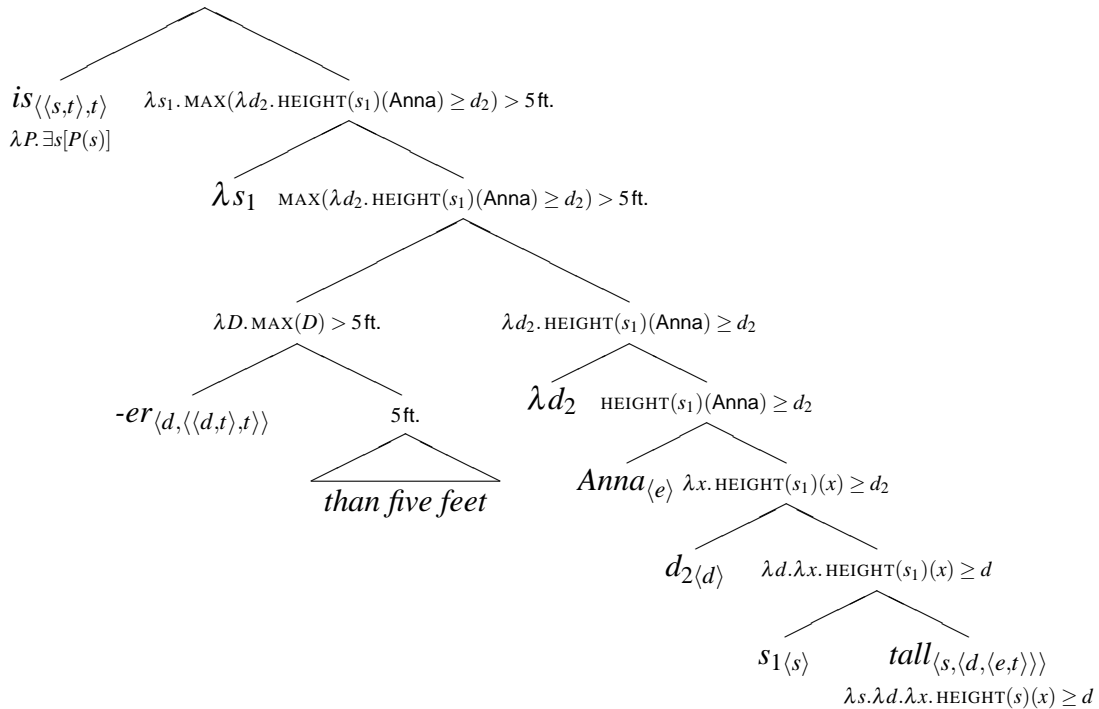
Gradable adjectives introduce degree arguments and are assumed to be of type  $\langle s, \langle d, \langle e, t \rangle \rangle \rangle$ , as in (16). HEIGHT is a measure function; HEIGHT(*s*)(*x*) returns the maximal degree to which an individual *x* is tall in its state *s*.

- (16)  $\llbracket tall \rrbracket = \lambda s_{\langle s \rangle} . \lambda d_{\langle d \rangle} . \lambda x_{\langle e \rangle} . \text{HEIGHT}(s)(x) \geq d$

In the unmarked form, the degree argument introduced by the adjective is existentially quantified over by a silent Positive operator. A comparison with a degree such as (17) has the Logical Form in (18), with the Degree Phrase — consisting of the comparative operator and its complement, the *than*-constituent — having undergone Quantifier Raising.

- (17) *Anna is taller than five feet.*

- (18)  $\exists s [\text{MAX}(\lambda d_2 . \text{HEIGHT}(s)(\text{Anna}) \geq d_2) > 5 \text{ft.}]$



The sentence is then interpreted as in (19). It is true if and only if there is a state *s* such that the maximal degree to which Anna is tall in *s* exceeds five feet.

- (19)  $\exists s [\text{MAX}(\lambda d . \text{HEIGHT}(s)(\text{Anna}) \geq d) > 5 \text{ft.}]$

However, not all adjectives are gradable (cf. also Bierwisch, 1984, 1987). True non-gradable adjectives such as *geological* are assumed to be of type  $\langle s, \langle e, t \rangle \rangle$ . They thus differ in type from

relative gradable adjectives such *tall* and absolute gradable adjectives such as *clean* (cf. Kennedy, 2007). We propose that this distinction in semantic types is also present in adjectival passives.

### 3 Analysis

While preserving Maienborn (2007, 2009)'s original idea of the German adjectival passive as a means of expressing an *ad-hoc* property, our analysis acknowledges that these properties may be gradable and thus relations of type  $\langle s, \langle d, \langle e, t \rangle \rangle \rangle$ ; cf. the affix in (20). We thus carry the dichotomy between gradability and non-gradability that we find with genuine adjectives over to adjectival participles.

$$(20) \quad \llbracket \emptyset_{\text{Aff.2}} \rrbracket^g = \lambda P_{\langle e, \langle v, t \rangle \rangle} \cdot \lambda d_{\langle d \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \lambda s_{\langle s \rangle} \cdot (g(C))(d)(x)(s) \ \& \ \exists e [P(x)(e) \ \& \ \text{RESULT}(s)(e)]$$

Under this account, adjectival passives are predicted to participate in the entire array of degree constructions and not only the comparative. Although we focus on the comparative here, this is indeed what we find. Consider for instance the superlative in (21) and the examples with the degree modifiers *sehr* ('very') and *halb* ('half') in (22) and (23). (See also Gese and Hohaus (2012) for further examples.)

- (21) Der Malariaimpfstoff wird speziell für Kleinkinder entwickelt,  
 the malaria.vaccine will specially for small.children developed  
 da diese am gefährdetsten sind.  
 because these threatened+SUP are  
 'We are currently developing a special Malaria vaccine for younger children  
 as they are the most prone to infection.'
- (22) Die Anleger sind sehr verunsichert.  
 the investor are very unsettled  
 'Investors are currently feeling very insecure.'
- (23) So, der Rasen ist schon halb gemäht!  
 well the lawn is already half mowed  
 'Well, half of the lawn is already mowed!'

Suitable assignments for the free variable of type  $\langle d, \langle e, \langle s, t \rangle \rangle \rangle$  introduced by (20) are (i) properties of degrees already lexically provided, e.g. in the case of degree achievements in the sense of Dowty (1979); (ii) gradable *ad-hoc* properties, if pragmatically licensed; and (iii) a particular kind of gradable *ad-hoc* property which is systematically available, that of quantity. We will discuss these different types of variable assignments in turn.

#### 3.1 Lexically provided gradable properties

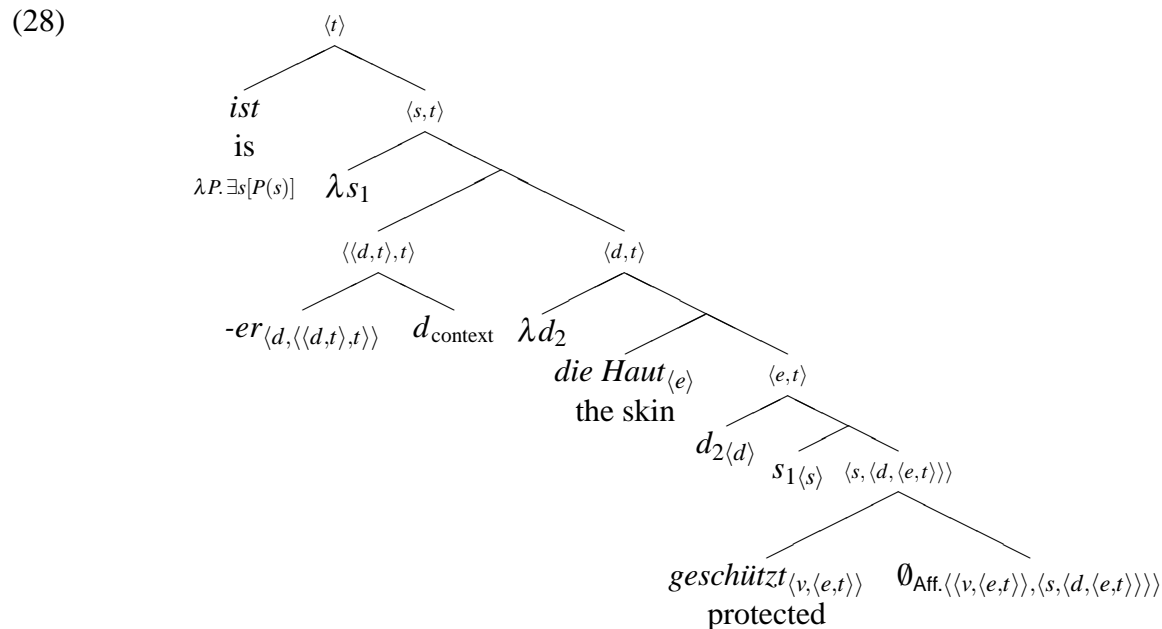
If the verb underlying the adjectival passive lexically provides a degree relation, this relation is the preferred assignment for the free variable introduced by the affix. In the case of our example in (1), repeated as (24) below, the verb describes an event of an individual being protected up to a certain degree.

- (24) Im Schatten ist die Haut geschützt.  
 in.the shade is the skin protected+COMP  
 ‘Your skin is more protected in the shade.’

We envision a decomposition of *schützen* (‘protect’) into a BECOME component and a gradable adjective in its positive form, as in (25) to (27).

- (25) *schützen* (‘protect’):  
 $\lambda e_{\langle v \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{BECOME}_e (\lambda s_{\langle s \rangle} \cdot [(\text{POS}(\text{adj}(s)))(x)])$
- (26) degree relation at the core:  
 $\lambda s_{\langle s \rangle} \cdot \lambda d_{\langle d \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{PROTECTION}(s)(x) \geq d$
- (27) Positive operator (simplified):  
 $\lambda R_{\langle d, \langle e, t \rangle \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \exists d [R(d)(x)]$

Disregarding the Prepositional Phrase *im Schatten* (‘in the shade’) for now, interpretation of the example proceeds as sketched in (28) and yields the truth conditions in (29). The sentence is true if and only if there is a state  $s$  such that the maximal degree to which the skin is protected in  $s$  exceeds the contextually provided degree of protection, say the degree to which the skin is protected when exposed to the full sun, with  $s$  being the result of an event of protecting the skin to a certain degree.



- (29)  $\exists s [\text{MAX}(\lambda d_2 \cdot (g(C))(s)(d_2)(\text{the-skin}) \ \& \ \exists e [\text{BECOME}(e)(\lambda s \cdot \exists d [\text{PROTECTION}(s)(\text{the-skin}) \geq d]) \ \& \ \text{RESULT}(e)(s)])] > d_{\text{context}}]$   
 with  $g(C) = \lambda s_{\langle s \rangle} \cdot \lambda d_{\langle d \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{PROTECTION}(s)(x) \geq d$

In the case of degree achievements such as *vergrößern* (‘enlarge’) or *weiten* (‘widen’), the lexically provided relation involves a difference degree (cf. also Hay et al., 1999, Kearns, 2007, and Kennedy and Levin, 2008). This relation, too, can serve as a value for the free variable introduced by the adjectival null affix. Consider the example in (30), where comparison is between the respective differences in size (either absolute or relative) of the two ventricles.

- (30) Die eine Herzkammer ist vergrößerter als die andere.  
 the one ventricle is enlarged+COMP than the other  
 ‘One ventricle is more enlarged than the other.’

The semantics of *vergrößern* (‘enlarge’) is specified in (31) below. The degree relation at its core relates an individual to the difference degrees in size between a state and its pre-state.

- (31) a. *vergrößern* (‘enlarge’):  
 $\lambda e_{\langle v \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{BECOME}(e)(\lambda s_{\langle s \rangle} \cdot [(\text{POS}(\text{adj}(s)))(x)])$   
 b. degree relation at the core:  
 $\lambda s_{\langle s \rangle} \cdot \lambda d'_{\langle d \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{SIZE}(s)(x) \geq \text{SIZE}(\text{pre}(s))(x) + d'$

The sentence is true if and only if there is a state  $s$  such that the maximal degree to which the first ventricle is larger in  $s$  than in the state preceding  $s$  exceeds the maximal degree to which the second ventricle is larger in  $s$  than in its pre-state, with  $s$  being a result of an event of becoming larger to some degree.

- (32)  $\exists s [\text{MAX}(\lambda d' \cdot (g(C))(s)(d')(\text{ventr.1}) \ \& \ \exists e [\llbracket \text{vergrößern} \rrbracket](e)(\text{ventr.1}) \ \& \ \text{RESULT}(e)(s))] > \text{MAX}(\lambda d' \cdot (g(C))(s)(d')(\text{ventr.2}) \ \& \ \exists e [\llbracket \text{vergrößern} \rrbracket](e')(\text{ventr.2}) \ \& \ \text{RESULT}(e)(s))]$   
 with  $g(C) = \lambda s_{\langle s \rangle} \cdot \lambda d'_{\langle d \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{SIZE}(s)(x) \geq \text{SIZE}(\text{pre}(s))(x) + d'$

The interpretation in (32) is based on a direct analysis of the *than*-constituent and on the three-place comparative operator in (33), modelled after a suggestion in Bhatt and Takahashi (to appear:4).

- (33)  $\llbracket -er_{3\text{place}} \rrbracket = \lambda y_{\langle e \rangle} \cdot \lambda R_{\langle d, \langle e, t \rangle \rangle} \cdot \lambda x_{\langle e \rangle} \cdot \text{MAX}(\lambda d \cdot R(d)(x)) > \text{MAX}(\lambda d' \cdot R(d')(y))$

Adjectival passives of degree achievements thus allow for the exciting possibility of building a comparative on the differential degree argument of another comparative, an option that is unavailable with other gradable adjectives.

### 3.2 Gradable *Ad-Hoc* properties and quantity interpretations

We now turn to those cases in which the underlying verb does not lexically provide a degree relation. Under the analysis proposed here, we expect even those adjectival passives to be gradable which are derived from verbs whose lexically provided result state describes a non-gradable property: Context might nevertheless provide a degree relation as the value for the free variable introduced by the affix. This expectation is borne out. Consider the example in (2), repeated as (34) below, in which the participle *angeschaltet* (‘switched on’) receives a contextually provided *ad-hoc* interpretation as “alert” or “receptive”.

- (34) Immerhin war mein Hirn angeschalteter als seins.  
 anyway was my brain on.switched+COMP than his  
 ‘At least, my brain was more switched on than his.’

The verb *anschalten* (‘switch on’) does not provide a degree relation lexically, cf. (35). Yet, gradability can be introduced into the composition by the adjectival affix in (20) and a contextually provided variable assignment such as (36).



- (35) *anschalten* ('switch on'):  
 $\lambda e_{\langle v \rangle} . \lambda x_{\langle e \rangle} . \text{BECOME}(e)(\lambda s_{\langle s \rangle} . \text{on}(s)(x))$
- (36)  $g(C) = \lambda d_{\langle d \rangle} . \lambda x_{\langle e \rangle} . \lambda s_{\langle s \rangle} . \text{ALERTNESS}(s)(x) \geq d$

A particular type of gradable relation appears to be systematically available as a value for the free variable introduced by the affix in (20) in those cases where the verb does not provide a degree relation. It features most prominently with activity verbs such as *lesen* ('read'), as in (3) from the introduction, repeated as (37) below.

- (37) Saint-Exupéry ist gelesener als J. D. Salinger.  
 Saint-Exupéry is read+COMP than J. D. Salinger  
 'Saint-Exupéry is more read than J. D. Salinger.'

Intuitively, the example in (37) compares how often A. de Saint-Exupéry has been read to how often J. D. Salinger has been read, i.e. it compares the number of having-been-read states of one author to that of the other. In what follows, we will refer to this reading as the quantity or amount interpretation. Further examples of quantity readings with activity verbs are provided in (38) to (40), with the latter being a variant of the example in (9) above.

- (38) Hyeyoon Park ist noch preisgekrönter als Vilde Frang.  
 Hyeyoon Park is even price.crowned+COMP than Vilde Frang  
 'Hyeyoon Park is even more decorated with awards and prices than Vilde Frang.'
- (39) Der Stadtring ist befahrener als die Autobahn.  
 the city.bypass is driven.on+COMP than the highway  
 'The city bypass is more frequented than the highway.'
- (40) Anna hat ihre Nachbarspflichten mehr als erfüllt:  
 Anna has her neighbor.duties more than fulfilled  
 Die Blumen sind ausreichend gegossen und die Katze ist gestreichelter als ihr lieb ist.  
 the flowers are sufficiently watered and the cat is petted+COMP than her liking is  
 'Anna has more than fulfilled her neighborly duties:  
 The plants have been sufficiently watered and the cat is petted more than it prefers.'

Contra Kratzer (2000:398), adjectival passives derived from activity verbs are gradable after all, and our analysis predicts them to be so, context permitting. The quantity reading of e.g. (37) can easily be accounted for by assuming the variable assignment in (41).

- (41)  $g(C) = \lambda d_{\langle d \rangle} . \lambda x_{\langle e \rangle} . \lambda s_{\langle s \rangle} . \text{read}(s)(x) \ \& \ |s| \geq d$

The cardinality of  $s$ , written as  $|s|$  above, is defined in terms of the set-theoretic notion of cardinality. It is a partial function that maps sums consisting of atomic states onto the number of those atomic states of which they consist, and is thus defined as  $|\{s' : \text{atomic}(s') \ \& \ s' \leq s\}|$ . States are countable because of their temporal boundedness. Existence of temporally bounded and thus countable states is also warranted by examples such as (42) below (but cf. also Engelberg, 2005:344).

- (42) Carol war gestern zweimal müde.  
 Carol was yesterday twice tired  
 ‘Yesterday, Carol was tired twice.’  
 (Maienborn, 2005:301)

Under an analysis of adjectival passives as a “flexible grammatical means of creating a potentially new *ad-hoc* property” (Maienborn, 2009:35) and given that quantity is probably the most basic measurable property, it is in fact not surprising that adjectival passives systematically allow assignments such as (41). Quantity interpretations seem to be systematically available in other areas of grammar as well. Thus, relative clauses such as (43a) and (43b) allow for both, an identity and an amount reading, as discussed by Grosu and Landman (1998).

- (43) a. It will take us the rest of our lives to drink the champagne that they spilled that evening.  
 b. We will never be able to recruit the soldiers that the Chinese paraded last May Day.  
 (Grosu and Landman, 1998:132)

An exploration of the exact relationship between these two constructions and their semantics is left for another occasion, however. Yet, given the considerable flexibility in the interpretation of adjectival passives, which motivated the free variable account argued for above in the first place, it is only natural that adjectival passives exploit this systematic possibility of natural language.

## 4 Concluding remarks

The paper combines an event semantics account of adjectival passives with a degree-based analysis of comparison constructions to provide a compositional way of building gradable adjectival passives. It relies on one simple ingredient, a second adjectival affix that introduces a free variable of type  $\langle d, \langle s, \langle e, t \rangle \rangle \rangle$  and makes this degree argument available for semantic composition. Extended this way, the free variable analysis of adjectival passives correctly predicts the availability of quantity interpretations on the one hand and of gradable adjectival passives derived from verbs without result states or from verbs with absolute results states on the other hand. We believe that the ease with which we were able to account for the variety of readings observed with adjectival passives in comparatives provides another argument in favor of the free variable analysis of the adjectival passive in German.

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