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Comparisons of equality with German so...wie, and the relationship between degrees and properties

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Abstract: We present a compositionally transparent, unified semantic analysis of two kinds of so...wie-equative constructions in German, namely degree equatives and property equatives in the domain of individuals or events. Unlike in English and many other European languages (Haspelmath & Buchholz 1998, Rett 2013), both equative types in German feature the parameter marker so, suggesting a unified analysis. We show that the parallel formal expression of German degree and property equatives is accompanied by a parallel syntactic distribution (in predicative, attributive, and adverbial position), and by identical semantic properties: Both equative types allow for scope ambiguities, show negative island effects out of context, and license the negative polarity item überhaupt ‘at all’ in the complement clause. As the same properties are also shared by German comparatives, we adopt the influential quantificational analysis of comparatives in Stechow (1984ab), Heim (1985, 2001, 2007), and Beck (2011), and treat both German equative types in a uniform manner as expressing universal quantification over sets of degrees or over sets of properties (of individuals or events). Conceptually, the uniform marking of degree-related and property-related meanings is expected given that the abstract semantic category degree (type $d$) can be reconstructed in terms of equivalence classes, i.e., ontologically simpler sets of individuals (type $\langle e,t \rangle$) or events (type $\langle v,t \rangle$). These are found in any language, showing that whether or not a language makes explicit reference to degrees (by means of gradable adjectives, degree question words, degree-only equatives) does not follow on general conceptual or semantic grounds, but is determined by the grammar of that language.

Keywords: Degree semantics, equatives, similatives, negative polarity, negative indefinites, German

1 Introduction

The central objective of this paper is a unified analysis of different kinds of equative constructions with the Parameter Marker (PM) so and the Standard Marker (SM) wie in German. In German, both markers occur across-the-board in the degree equative in (1), in the attributive adnominal property equative in (2), and in the adverbial property or manner equative in (3). Sentence (1) compares two degrees on the scale of natural numbers, here the number of goals that Nadine scored with the number of goals that Sigrid scored (and says they are equal). By contrast, (2) equates individual properties of the respective goals scored by Nadine and Sigrid, respectively. For this sentence to be true, these goals must have some property in common, say they were both headers. Finally, (3) equates the two events of Nadine and Sigrid playing soccer on the basis of salient event properties, here manners. Foreshadowing
our analysis, we are going to refer throughout to the scalar, degree-referring construction with so...wie in (1) as degree equative, and to all non-scalar uses of so...wie as property equatives, be they attributive as in (2), adverbial (or simulative) as in (3) or predicative (see below).

(1) Nadine hat auch so pm viele Tore geschossen wie sm Sigrid.  —German—
Nadine has also so many goals scored how Sigrid
‘Nadine scored as many goals as Sigrid.’

(2) Nadine hat auch so pm ein Tor geschossen wie sm Sigrid. (Nämlich ein Kopfballtor.)
Nadine has also so a goal scored how Sigrid namely a header-goal
‘Nadine scored the same kind of goal as Sigrid. (A header.)’

(3) Nadine hat so pm gespielt wie sm Sigrid. (Nämlich mutig und aggressiv.)
Nadine has so played how Sigrid namely courageously and aggressively
‘Nadine played in the same manner as Sigrid. (Courageously and aggressively.)’

In light of the formal parallels in the expression of degree equatives and property equatives in German, and in particular, the across-the-board occurrence of the PM so in (1) to (3), we will propose a unified compositional semantic analysis of degree equatives and property equatives in German. We will analyse the German PM so as underspecified regarding its semantic domain of application. Consequently, it can either select for degrees or else for individual or event properties as semantic arguments. Assuming that the consistent occurrence of the PM in the different subtypes of equatives is not a mere case of accidental homophony, this raises a number of questions about the relation of degrees and properties: What are the underlying commonalities of degrees and properties that would account for the across-the-board occurrence of so...wie? In how far can existing formal analyses of degree-based expressions be transferred to property-based expressions, or vice versa? And are the semantic objects that these constructions talk about indeed of a different nature, or are they the same at some more abstract level (that is, kinds, for instance, C. Anderson & Morzycki 2015, or based on a similarity function, Umbach 2014, Umbach & Gust 2014)?

The data from German also have implications for the cross-linguistic typology of parameter markers: Haspelmath & Buchholz (1998) observe that the PM in European languages generally is restricted to degree equatives, as in English (4). Building on these observations concerning the presence or absence of the PM, Rett (2013) argues for a non-uniform analysis of degree equatives like (4-a) and manner as-phrases like (4-b).

(4) a. John is as pm tall as sm Sue.  —English—
   b. John danced as sm Sue did.
   (Rett 2013, pp. 1-2, no. (1-b), (2-a))

According to Rett (2013), PMs such as the pre-adjectival as in (4-a) only have a degree semantics, which predicts their absence in the manner case. The verb-centered manner equative in (4-b), by contrast, expresses an equality of a certain event property – here presumably the manner of dancing – for which reason it does not license the degree PM as. Assuming that PMs make uniform reference to degrees across languages, Rett (2013) predicts that they will be illicit in natural language expressions equating individuals or events along some property dimension(s). This prediction is not borne out in German, as the data
in (1) to (3) illustrate, and German does not conform to the generalisation in Haspelmath & Buchholz (1998). Unlike in English, the German PM *so* occurs indiscriminately in degree- and property-equating sentences alike, together with the SM *wie*.

At a more general level, we hope that the paper will contribute to a deeper understanding of the grammar of degrees in relation to other parts of the grammar, such as the expression of properties by means of verbal predicates or adnominal modifiers. This investigation appears particularly relevant in the light of the growing body of cross-linguistic and diachronic research in semantics that suggests that the grammar of degree is derived: Whereas all natural languages have property-denoting expressions (that is, functions from individuals or eventualities into truth-values), they appear to systematically differ in whether gradable adjectives make direct reference to measurement degrees of basic type $d$ in the semantics. This is captured by Beck et al. (2009)’s Degree Semantics Parameter (see also Bochnak 2015, Bowler 2016, Hohaus 2018, Deal & Hohaus 2019, Hohaus & Bochnak 2020).

(5) **Degree Semantics Parameter [± DSP]** (Beck et al. 2009, p. 19, no. (62)):
A language {does/ does not} have gradable predicates (type $\langle d, \langle e, t \rangle \rangle$ and related), i.e., lexical items that introduce degree arguments.

From the perspective of language change, too, degree expressions appear to be frequently derived from other semantic domains, such as the temporal or the spatial domain (see, for instance, Traugott 1975; Stassen 1985; Hohaus 2012, 2018). In Samoan (Austronesian; Samoa), for instance, we find a directional particle *atu* turned comparative operator, as shown in (6).

(6) a. *Sa* alu atu Malia. 
   TAM(past,pfv) go away Mary
   ‘Mary went away.’

b. *E* umi atu Malia. 
   TAM tall more Mary
   ‘Mary is taller.’

Synchronically, too, languages can employ the same grammatical form for talking about measurement degrees and properties of eventualities or individuals (see Haspelmath & Buchholz 1998, Stassen 2001, C. Anderson & Morzycki 2015, Moltmann 2015, Wood 2016, Haspelmath 2017, Treis & Vanhove 2017, König & Umbach 2018). This can be seen in the English *how*-questions in (7). While (7-a) inquires after a measurement degree, here a cardinality, (7-b) is about manner and inquires after a property of the eventuality described.

(7) a. **How often did they vote down the deal?** – English –

b. **How did the media react?**

The formal parallelism in the expression of different equative constructions in German (1) to (3) constitutes another argument in favour of assuming a close relation between degree-referring expressions, on the one hand, and property-referring expressions, on the other (see also Lenerz & Lohnstein 2005, Umbach 2014, Umbach & Gust 2014, C. Anderson & Morzycki 2015, König & Umbach 2018 for observations along these lines). We therefore propose to extend the analysis of German *so...wie* in degree equatives with scalar degree predicates.
to the non-scalar case of property equatives. This requires abandoning the strong claim in Rett (2013) that PMs indiscriminately make reference to lexicalised degree arguments across languages. Instead, we will analyse so...wie as quantifying over degrees (type d) or properties (of individuals, type ⟨e, t⟩, or of eventualties, type ⟨v, t⟩). While these semantic objects are of distinct semantic types, conceptually they are systematically related via the possibility of reconstructing degrees from equivalence classes of individuals or events, or vice versa. This uniform analysis of degree and property equatives in German is not only empirically supported by parallels in form, but also by other semantic and distributional properties shared by degree and property equatives. The quantificational analysis in turn is additionally motivated by the features that degree equatives share with comparatives (Cresswell 1976; Rullmann 1995; Meier 2000, 2003; Beck 2011; Rett 2013, 2015a). The latter are standardly analysed as quantifying over degrees (von Stechow 1984a; Heim 1985, 2001; Beck 2011).

We will develop our proposal in the following steps: In section 2, we will briefly sketch the arguments for a non-uniform analysis of degree and property equatives in English, and show why these arguments do not carry over to German. In section 3, we introduce the standard analysis of degree equatives as quantificational operators over sets of degrees. We do so via comparison of equatives with comparatives, which have received more attention in the literature, and are also analysed as quantifiers over degrees. We then go on to discuss the merits of the quantificational analysis, as well as two long-standing puzzles for it, namely the unexpected inability of German degree equatives to license Negative Polarity Items (NPIs) and the interpretation of negative indefinites (NIs) in the complement clause. We suggest that the former puzzle will benefit from a broader diachronic perspective (and from looking at other NPIs), while the latter can be solved by considering the grammar of implicatures in interaction with a decompositional semantics for NIs. Section 4 then extends the quantificational analysis to property-equating occurrences of German so...wie with non-scalar predicates: We first spell out the details of the proposal, and then show that it accounts for all the relevant properties that degree-equatives and property-equatives share. Section 5 takes a step back to reflect on the relation between degrees and properties, and the difference between German and English. Section 6 concludes by circling back to the question about the nature of degrees and their relation to other semantic objects.

2 The Interpretation of PMs in English versus German

Drawing on Haspelmath & Buchholz (1998)’s typological survey of constructions expressing equality and similarity in the languages of Europe1, Rett (2013) makes a forceful argument to the effect that languages differ systematically in the expression of degree-related equatives on the one hand, and verb-related manner equatives (or similatives) and other instances of property equatives on the other. She proposes a strict degree-based semantics for parameter markers (PM) in equatives, such as the pre-adjectival as in (4-a) (the second as being the homophonic standard marker (SM) with a different semantic function). By contrast, there is no such PM preceding the verb in the manner-equating similative in (4-b). Crucially,

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1 Haspelmath & Buchholz (1998)’s survey is based on 47 languages from across Eurasia (including German!) as well as Mandarin Chinese (Sino-Tibetan), Hebrew (Afro-Asiatic), Hindi (Indo-European) and Persian (Indo-European). Other typological studies that also discuss the equative construction include Ultan (1972), Henkelmann (2006), Treis & Vanhove (2017), and Haspelmath (2017).
for Rett (2013), the absence of the PM in the property-equating (4-b) is indicative of the absence of a lexicalised degree-argument in the underlying semantic representation.

(4)  
   a.  *John is as tall as Sue.  – English –  
   b.  *John ∅ danced as Sue did.

Conversely, the presence of the PM is indicative of the presence of such a lexicalised degree-argument in the semantics (Rett 2013, p. 1103): PMs are predicted to be restricted to occur only with gradable expressions, and to be incompatible with non-gradable adjectives like English *amphibian in (8).

(8)  *Fred the frog is as amphibian as Todd the toad.  
     (Rett 2013, p. 1109, no. (24-a))

The degree-based analysis of PMs also makes some strong predictions for the expression of verbal and adnominal property equatives: Firstly, since such expressions relate properties (including manners), and not degrees, they must not feature a PM. This prediction is born out in English; the sentences in (9) are ungrammatical. Secondly, in languages that tolerate pre-verbal PMs with degree achievements and intensity-scale verbs, the presence of the PM is predicted to force a degree comparison and disallow a property comparison.

(9)  
   a.  *John as danced as Sue danced.  
       (Rett 2013, p. 1125, no. (69-a))  
   b.  *John read as a book as Sue did.  
       Intended: ‘John read such a book as Sue did.’

None of these predictions are borne out in German, where the PM is *so* and the SM *wie*, as is illustrated in (10): Unlike in English, the PM occurs in property and degree equatives alike. The German counterpart of (8) in (11) is thus grammatical and allows for a property reading. Under this reading, what is at stake are the salient defining characteristics of amphibians, for instance, absorbing water through the skin.² The PM also occurs in adverbial and adnominal positions under a property-equative construal, compare English (9) and German (12).

(10)  Nadine ist *soₚₘ* groß *wieₜₘ* Anna.  – German –  
     Nadine is so tall how Anna  
     ‘Nadine is as tall as Anna.’

² Another example of a property comparison with an absolute adjective, *tot* ‘dead’, is in (i). However, property-readings are not equally plausible for all absolute adjectives, and the example with *ultraviolett* ‘ultra-violet’ in (ii) is unacceptable. Here, it is not clear which properties of being ultra-violet could undergo a comparison.

(i)  *Nach der Schlacht war ein Soldat so tot wie der andere: Erschossen.  
     After the battle was a soldier so dead how the other shot  
     ‘After the battle, one soldier was as dead as the other: Shot.’

(ii)  #*Das Licht dieses Lasers ist so ultraviolett wie das dieser Quarzlampen.  
     The light of this laser is so ultraviolet how that of this quartz lamp  
     ‘The light of this laser is as ultraviolet as that of this quartz lamp.’
The German PM *so* is thus not indicative of a degree argument in the semantic representation in the same way than many of its European counterparts. In principle, German equatives with the PM can receive either a degree- or a property-equating interpretation. The available readings are conditioned by the syntactic complement of the PM, and whether it makes available a degree argument or not: Neither *amphibisch* ‘amphibian’ in (11), *tanz* ‘to dance’ nor *Buch* ‘book’ in (12) have a degreeful semantics, and the resulting interpretation of the equative is based on properties.³

A degree-based interpretation is then unavailable, as is also evidenced by the unacceptability of degree-based factorial phrases like *doppelt* ‘twice’ (Seuren 1984, von Stechow 1984a, Bierwisch 1988) in (13). Even if the comparison is based on the fact that both Sandra and Michael like to speed, the sentence in (13-b) cannot be interpreted as Sandra driving twice as fast as Michael.

In certain adnominal cases, the syntactic position of the PM disambiguates between the two interpretations. Compare (14) and (15), for instance, which differ in the relative order of the quantity adjective *viele* ‘many’ and the PM.

³ Absolute adjectives may however also allow for coercion into relative interpretations (see Sapir 1944, Unger 1975, Lewis 1979, and more recently, Burnett 2013, 2017). As a consequence, the example in (ii) and in (11) and (i) in footnote 2 thus potentially allow for degree readings as well, as pointed out by a reviewer. What is crucial for the present discussion is that the German PM is grammatical under a property interpretation in those examples.
b. #Nämlich vier Stück!
   namely four pieces
   ‘Namely four.’

(15) Nadine hat [[so viele] Tore] geschossen wie Sigrid.
Nadine has so many goals scored how Sigrid
‘Nadine scored as many goals as Sigrid.’

   a. #Nämlich Kopfballtore.
      namely headers
      ‘Namely headers.’

   b. Nämlich vier Stück!
      namely four pieces
      ‘Namely four.’

Moreover, only the degree equative in (15) allows for modification by a factorial phrase. In the case of (14), the result is unacceptable, as is shown in (16).

(16) a. *viele doppelt so Tore wie
    many twice so goals how
    Intended: ‘twice as many goals as’

   b. doppelt so viele Tore wie
      twice so many goals how
      ‘twice as many goals as’

For adjectives other than viele ‘many’, disambiguation by word order is ruled out. In this case, an adnominal PM is ambiguous between a degree- and a property-reading, as is illustrated in (17), where the PM can be either interpreted within the adjective phrase, that is [[PM adjective] noun], resulting in a degree reading, or at a higher syntactic position, that is, [PM [adjective noun]], resulting in a property reading.

(17) Ingrid sammelt auch so große Gemälde wie Eva.
Nadine collects also so big paintings how Eva
‘Ingrid also collects such big paintings as Eva.’

   a. Nämlich alte flämische Meister.
      namely old Flemish master
      ‘Namely old Flemish Masters.’

   b. Gemälde ab einer Höhe von 90 Zentimeter.
      paintings from a height of 90 centimetres
      ‘Paintings with a height 90 centimetres or more.’

Unlike in English, the PM in German can also occur with degree achievements as well as with what Rett (2013) refers to as intensity verbs, building on Umbach (2011). While the examples in (18) and (19) have a degree reading, they crucially also allow for a manner interpretation, that is, the presence of the PM does not block a property-based interpretation: In the case of (18), the PM with the degree achievement verb abkühlen ‘to cool down’ is compatible with a continuation that brings out the degree comparison (18-b), as well as with a continuation that brings out the property comparison (18-a).
(18) Wir haben die Pizza so abgekühlt wie die Lasagne.
‘We cooled down the pizza to the same temperature than the lasagna.’
‘We cooled down the pizza in the same manner that we did the lasagna.’

(a) Nämlich durch Pusten. [property]
namely through blow
‘Namely through blowing on it.’

(b) Nämlich auf 21 Grad Raumtemperatur. [degree]
namely to 21 degree celsius room temperature
‘Namely to 21 degree celsius room temperature.’

In the case of (19), the PM occurs before the verb rasen ‘to speed’, which Umbach (2011) and Rett (2013) take to encode not only a manner of motion but also a certain degree of intensity, here of speed. The sentence is ambiguous between an interpretation as a property equative and an interpretation as a degree equative. Again, the presence of the PM does not block the property-equating manner interpretation of (19), as is evidenced by the felicitous continuation in (19).

(19) Anna ist so gerast wie Joseph.
‘Anna was speeding, and was doing so in the same manner as Joseph.’

(a) Nämlich rücksichtslos und in Schlangenlinien. [property]
namely recklessly and in curves
‘Namely recklessly and in curves.’

(b) Nämlich 140 Kilometer pro Stunde! [degree]
namely 140 kilometers per hour
‘Namely, 140 km/hr!’

Lastly, unlike its English counterpart as, German so may have a predicative use, under which it receives a property interpretation, as is illustrated in (20).

(20) a. *Donald is as (as Boris).

b. Donald ist so (wie Boris).
‘Donald is {like this/ like Boris}.’

Summarising the descriptive discussion so far, German is an interesting exception to the cross-linguistically observed correlation between the presence of the PM and degree semantics that Rett (2013) puts forward: While in English, the presence or absence of the PM seems to govern the available interpretation, the PM in German may occur with degreeful and degreeless expressions alike, and German so...wie is genuinely ambiguous between an interpretation as degree equative and an interpretation as property equative. If the PM occurs before a degreeful predicate, a degree interpretation will be available. In Table 1, we summarise the interpretative possibilities available for so...wie in German as opposed to as...as in English, where English is representative of a language that conforms to the
typological generalisations in Rett (2013).

| PM + adjective/adverb | degree only | property, degree |
|------------------------|-------------|------------------|
| PM + indefinite NP     | *           | property, degree |
| PM + verb              | *           | property, degree |
| bare predicative PM    | *           | property only    |

Table 1: The distribution and interpretation of PMs in English and German

We hope that this section has thus shown that the German data merit a thorough language-internal description and analysis. Given that German degree and property-equatives are built in the same manner with the PM-SM pair *so...wie*, they should thus receive a uniform analysis, to which we turn in the next two sections.

### 3 Background

Our strategy will be to approach the semantics of German *so...wie* from its degree-based use, where it is one in a set of systematically related comparison constructions, which also comprise the comparative in (21) and the superlative in (22).

(10)  *Nadine ist so groß wie Anna.*  
Nadine is so tall how Anna  
‘Nadine is as tall as Anna.’

(21)  *Polina ist größer als Anna.*  
Polina is taller than Anna  
‘Polina is taller than Anna.’

(22)  *Nadine ist am größten.*  
Nadine is at+the tallest  
‘Nadine is tallest.’

In this section, we introduce the standard quantificational analysis of comparison constructions, under which both the comparative and the equative are treated as generalised quantifiers over degrees. We will then show that such an analysis is also attractive for German, as comparatives and equatives share a number of core properties. However, we will also discuss two ways in which equatives have been observed to behave differently from comparatives, namely with respect to the acceptability of NIs and NPIs in the comparative clause.

#### 3.1 Quantificational degree operators

The core ingredients of the analysis of the comparison constructions above – following the strong and productive research tradition in von Stechow (1984a,b), Heim (1985, 2001), and Beck (2011) – are (i) a new semantic type *d* for degrees, abstract entities on scales, which (ii) are introduced into the semantics by gradable predicates like (23), which express relations

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4 We would like to acknowledge here the feedback that we have received from one of our reviewers.
between degrees and individuals, and (iii) a set of operators which bind these degrees by quantifying over them, among them the comparative, the equative, the superlative (and a covert Positive operator, which is not of too much concern here). An attractive and simple analysis of the comparative operator in this tradition is in (24) from Heim (2007), where its semantics is parallel to that of the quantificational determiner every, but differs in the semantic type of its arguments (and relies on the proper subset relation, rather than the subset-or-equal relation). A standard argument for such a quantificational analysis comes from scope ambiguities, which we review in section 3.2.

(23) \[
\text{\[ } \text{\textit{groß} ('tall')} \text{\]} = \lambda d. \lambda x_e. \text{HEIGHT}(x) \geq d
\]

(24) \[
\text{\[ } \text{\textit{-er}} \text{\]} = \lambda D'_{(d,t)}. \lambda D_{(d,t)} \cdot \{ d : D'(d) = 1 \} \subset \{ d : D(d) = 1 \}
\]

Under this analysis, the comparative relates two sets of degrees, both of which are created in the syntax by A-bar movement and lambda abstraction: In the case of our example in (21), the comparative relates the set of Polina’s and Anna’s respective height degrees, (25).

(21) \text{\textit{\text{Polina ist größer als Anna <groß ist>.}}}
\text{\textit{Polina is taller than Anna is <tall>.}}

(25)\text{\textit{set of P’s height degrees}}
\text{\textit{\{d: HEIGHT(P)\geq d\}}}
\text{\textit{set of A’s height degrees}}
\text{\textit{\{d: HEIGHT(A)\geq d\}}}

The set of height degrees that constitute the comparison standard (Anna’s height degrees, in our example) is standardly assumed to be derived by covert wh-movement of the comparative operator within the comparative clause (see in particular Bresnan 1973 and Chomsky 1977 for English), while the second set of height degrees (Polina’s, in the example) is a result of Quantifier Raising of the Degree Phrase headed by the comparative operator, as sketched in (26-a). From this Logical Form (LF), we derive the truth conditions in (26-b). The sentence is true if the set of degrees to which Anna is tall is a proper subset of the set of degrees to

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5 There are a number of different compositional approaches to how degrees enter the grammar. Under the most prominent alternative to the semantics of gradable adjectives (Bartsch & Vennemann 1972; Kennedy & McNally 1999, 2005; Svenonius & Kennedy 2006), gradable adjectives denote measure functions of type \((e, d)\), rather than relations of type \((d, (e, t))\). For our plot, nothing hinges on the choice between the two semantic types, though.

6 See Beck (2011) as well as Holhaus (2015) for overviews. For a quantificational semantics of the Positive, see also von Stechow (2009). For the quantificational analysis of the comparative, see Heim (2001) and Stateva (2002), among many others. For the superlative, see in particular Szabolcsi (1986), Heim (1999) and Sharvit & Stateva (2000, 2002). See Heim (1985) and Kennedy (1997) for a non-quantificational semantics for degree operators.

7 Under a variant of this analysis, the comparative relates the two maxima of the set of degrees it takes as an argument: \[ \text{\textit{-er}} \text{\]} = \lambda D'_{(d,t)} \cdot \lambda D_{(d,t)} \cdot \text{MAX}(D) > \text{MAX}(D'). \] See also Lechner (to appear, draft p. 7, fn. 8) for a brief discussion.
which Polina is tall, that is, if Polina’s height exceeds Anna’s height.

(26) a. Logical Form:
\[
\begin{align*}
[D_{degP} \cdot \text{er} \ [d,t] \ \lambda 1 \ [\text{Anna} \ [t_1, d \ \text{tall}]]] \ [\lambda 2 \ [\text{Polina} \ [t_2, d \ \text{tall}]]]
\end{align*}
\]

b. Interpretation of the comparative:
\[
\begin{align*}
[D_{degP} \cdot \text{er} \ [d,t] \ \lambda 2 \ [\text{Polina} \ [t_2, d \ \text{tall}]]] = [\lambda d. \ \text{HEIGHT}(P) \geq d] \\
[D_{degP} \cdot \text{er} \ [d,t] \ \lambda 1 \ [\text{Anna} \ [t_1, d \ \text{tall}]]] = [\lambda d. \ \text{HEIGHT}(A) \geq d] \\
\end{align*}
\]
\[
(21) = 1 \iff \{d : \ \text{HEIGHT}(A) \geq d\} \subseteq \{d : \ \text{HEIGHT}(P) \geq d\}
\]

Let’s turn now to the equative construction, which also expresses a relation between degrees, namely degrees of height in the case of (10). Under the quantificational approach, the equative then differs from the comparative only in the relation it expresses between the two degree sets, as in (27) (and in the complementiser that we see at the surface, in that the wh-expression is overt only in the equative, at least in Standard High German). The example from (10) is structurally entirely parallel to the comparative at Logical Form, its interpretation is in (28-b). The sentence is true if and only if the set of degrees to which Anna is tall is a subset of or equal to the set of degrees to which Nadine is tall (see in particular Cresswell 1976, as well as Rullmann 1995; Meier 2000, 2003; Beck 2011 and, more recently, Rett 2013, 2015a).

(10) Nadine ist so groß wie Anna.
Nadine is so tall how Anna tall is
‘Nadine is as tall as Anna.’

(27) \[
[D_{degP} \cdot \text{so} \ [d,t] \ \lambda D'(d') = 1 \] \subseteq \{d : D(d) = 1\}
\]

(28) a. Logical Form:
\[
[D_{degP} \cdot \text{so} \ [d,t] \ \lambda 1 \ [\text{Anna} \ [t_1, d \ \text{tall}]]] \ [\lambda 2 \ [\text{Nadine} \ [t_2, d \ \text{tall}]]]
\]

b. Interpretation of the degree equative:
\[
(10) = 1 \iff \{d : \ \text{HEIGHT}(A) \geq d\} \subseteq \{d : \ \text{HEIGHT}(N) \geq d\}
\]

Under this analysis, the equative is asymmetrically entailed by the comparative (Horn 1972, pp. 51-52) and gives rise to the scalar implicature that \{d : \ \text{HEIGHT}(A) \geq d\} = \{d : \ \text{HEIGHT}(N) \geq d\}, that is, that Nadine is not taller than Anna and thus exactly as tall as her (see also Rett 2015a,b). As expected, this implicature can be cancelled, reinforced or suspended, as shown in (29).

(29) Nadine ist so groß wie Anna.
Nadine is so tall how Anna tall is
‘Nadine is as tall as Anna.’

a. Sie ist sogar noch größer.
she is even still taller
‘In fact, she is even taller.’
[cancellation]

b. Aber nicht größer!
but not taller
‘But she is not taller than her!’
[reinforcement]
c. Vielleicht sogar größer.
   maybe even taller
   ‘Maybe she’s even taller than her.’

Even if not without challenges (see, e.g., von Stechow 1984a, Schwarzschild & Wilkinson 2002, Rett 2010, Penka 2011), this analysis remains attractive as it provides us with a systematic view of the semantics of degree operators as generalized degree quantifiers, and captures the close relation between the comparative and the equative. This close relationship extends beyond the entailment relation, and we address the shared properties between the two constructions in the next section.

3.2 Shared properties of the comparative and the equative construction

In German, the degree equative and the comparative have the same syntactic distribution, and both crucially give rise to scope ambiguities, as shown in Table 2.

| Syntactic distribution          | Comparative | Equative |
|---------------------------------|-------------|----------|
| (predicative, attributive, adverbial) | ✓           | ✓        |
| Scope ambiguities w/ modals     | ✓           | ✓        |
| Negative Island Effect          | ✓           | ✓        |

Table 2: Shared properties of the comparative and the (degree) equative construction

In addition, the presence of contextually unrestricted negation in the comparative clause leads to unacceptability in both the comparative as well as the degree equative construction, the so-called Negative Island Effect (NIE).

**Syntactic distribution.** The analysis sketched in the previous section is easily compatible with the different syntactic and semantic environments in which both the comparative and the degree equative can occur, be it predicatively as in the examples in (10) and (21) above, attributively as in (30), or adverbially as in (31).

(30) Attributive comparatives and equatives
   a. Sabine hat ein schnelleres Auto gekauft [als Martin].
      Sabine has a faster car bought than Martin
      ‘Sabine bought a faster car than Martin.’
   b. Sabine hat ein so teures Auto gekauft [wie Martin].
      Sabine has a so expensive car bought how Martin
      ‘Sabine bought a car as expensive as Martin’s.’

(31) Adverbial comparatives and equatives
   a. Sabine ist schneller gelaufen [als Martin].
      Sabine is faster run than Martin
      ‘Sabine ran faster than Martin.’
b. *Sabine ist so schnell gelaufen [wie Martin].
‘Sabine ran as fast as Martin.’

This shared syntactic distribution not only constitutes an argument for a unified semantics of the two constructions. In the attributive and adverbial case, these data also constitute an important argument for the scopal mobility of the DegP: Following Beck, Hohaus & Tiemann (2012), Tiemann, Hohaus & Beck (2012), and Hohaus, Tiemann & Beck (2014), we assume here a reduction analysis of the comparison standard in German, that is, we propose that the bracketed constituents in (30) and (31) are underlingly clausal. They can also be overtly clausal, as illustrated below.

(32) *Sabine hat ein schnelleres Auto gekauft [als Martin es hat].
‘Sabine bought a faster car than Martin.’

(33) *Die Zugbrücke war leider nicht so lang [wie der Burggraben breit war].
‘Unfortunately, the drawbridge was not as long as the moat wide.’

Returning now to the question of movement: With instances of such reduced comparative clauses in comparative and equative constructions (attributive and adverbial alike), movement of the DegP (= Quantifier Raising under the standard analysis) is required in order to create an appropriate antecedent that can license ellipsis under identity (see, inter alia, Bresnan 1973; von Stechow 1984a; Heim 1985; Lerner & Pinkal 1995; Lechner 2001, 2004, to appear; Bacskai-Atkari 2014). As sketched in (34) for the attributive case and in (35) for the adverbial case (along with the resulting truth conditions), movement of the DegP leaves behind a trace in the argument position of the gradable adjective/ adverb in the matrix clause. The resulting constituent is identical to the constituent in the comparative clause, which then gets elided (indicated by <> below).

---

8 Note, however, that the interpretation of attributive and adverbial comparatives under a direct, phrasal analysis would also require movement, see Tiemann, Hohaus & Beck (2012) and Berezovskaya & Hohaus (2015), for instance. Nothing hinges on the choice between a direct and a reduction analysis here.

9 German comparatives allow for genuinely phrasal comparison standards only when the comparison is with a measurement degree, as in (i), which would require a different operator than the clausal operator we have been assuming so far. In German, equatives do not allow for the comparison standard to be a measurement degree, see (ii), unlike their English counterpart in the translation.

(i) *Das Gebäude war mehr [als [drei Stockwerke]] hoch.
‘The building was more than three stories high.’

(ii) *Die Wellen reichten so hoch [wie [zehn Meter]].
‘The waves reached as high as ten meters.’

The difference might ultimately boil down to the selection restrictions in the complement of the comparative clause: The preposition als ‘than’ appears to select for both a phrasal, degree-denoting complement as well as for a degree relative clause, whereas wie ‘how’ must select a degree relative clause, and are hence always clausal (see also footnote 26 below).
Movement, ellipsis and the comparative clause in the attributive case:

‘Sabine bought a more expensive car than Martin did.’

\[\text{DegP Op} \lambda_1 \text{Martin} \prec \lambda_2 \text{Sabine} \]

\[\{d' : \text{Martin bought a } d'-\text{expensive car} \} \subset \{d : \text{Sabine bought a } d-\text{expensive car}\}\]

Movement, ellipsis and the comparative clause in the adverbial case:

‘Sabine ran faster than Martin did.’

\[\text{DegP Op} \lambda_1 \text{Martin} \prec \lambda_2 \text{Sabine} \]

\[\{d' : \text{Martin ran } d'-\text{fast} \} \subset \{d : \text{Sabine ran } d-\text{fast}\}\]

This scopal mobility also shows up in scope ambiguities, to which we turn next.

Scope ambiguities. Scope ambiguities have featured prominently in the analysis of comparison constructions (see Rullmann 1995; Kennedy 1997; Heim 1999, 2001, 2006; Stateva 2002; Schwarzschild & Wilkinson 2002; Beck et al. 2009; Beck 2011, 2012; Breakstone et al. 2011). The core reasoning is simple: If the degree operator receives a quantificational analysis, Quantifier Raising of the DegP may give rise to scope ambiguities with certain quantifiers, even if not every structural ambiguity yields a truth-conditional ambiguity (Heim 2001, see in particular). We will first discuss some of the classic examples of scope ambiguities between the comparative and a deontic possibility modal, and then go on to show that similar ambiguities also arise with the degree equatives in German. Heim (2001, p. 224 no. (28))’s infamous comparative scope example can also be constructed in German, in (36).

(36) a. Context: My draft is 20 pages long.

b. *Der fertige Aufsatz darf genau fünf Seiten länger sein (als der Entwurf).*

‘The final paper may exactly five pages longer be than the draft.’

If the DegP has narrow scope with respect to the modal, the paper is 25 pages in some

\[^{10}\text{In the attributive case, the interpretation of the indefinite noun phrase in the matrix and in the complement clause pose an interesting compositional challenge that we set aside in (34) – like most of the literature, as far as we are aware: Interpreting both indefinites within their respective clauses as existential quantifiers (i.e., below lambda abstraction over degrees) would yield the interpretation that the most expensive car that Sabine bought is more expensive than the most expensive car among the (one or more) cares bought by Martin. To see this, consider for instance the interpretation we would derive for the comparative clause, namely } \{d' : \exists y [y \text{ is a car & Martin bought } y & \text{price}(y) \geq d']\}. \text{ This set will contain as its maximal degree the price of the most expensive car that Martin bought. While this reading is available, it is not the prominent reading of (32). Intuitively, we would also like to allow for the following interpretation, where the restrictor of the indefinites is outside of the degree sets, and which compares the prices of two specific cars: } [\text{Sabine bought a more expensive car than Martin did}] = 1 \text{ iff } \exists x [x \text{ is a car & Martin bought } x & \exists y [y \text{ is a car & Sabine bought } y & \{d' : \text{price}(x) \geq d'\} \subset \{d : \text{price}(y) \geq d\}]]. \text{ We are going to set the details of the technical implementation aside, but see Reinhart (1998) and G. Jäger (2007) for related relevant discussion. We have immensely benefitted from the discussion with one of our reviewers here.}
\]
accessible world, (37), though it could also be shorter or longer in other accessible worlds, as the potential continuation indicates. The reading is thus not very informative.

(37) modal ≫ DegP:

a. In some world \( w \) deontically accessible from the actual world:
\[
\{ d : \text{LENGTH}(\text{the.draft}, w_{\@}) + 5 \text{ pp.} \geq d \} = \{ d : \text{LENGTH}(\text{the.paper}, w) \geq d \}
\]

‘In some deontically accessible world, the finished essay has exactly 25 pages (= the length of the current draft plus five pages).’

b. Aber selbst zehn Seiten mehr (als was du jetzt hast) sind noch okay.
but even ten pages more than what you now have are still okay
(Fünf Seiten weniger übrigens auch.)
five pages less incidentally also
‘But even ten pages more (than what you have now) will still be okay.
(As will be five pages less, by the way.)’

If the DegP scopes high, by contrast, we are collecting into a set all the different page lengths such that there is a world in which the essay reaches that length, as shown in (38). The comparison thus ends up being with the longest possible paper, meaning that the allowed essay may not exceed 25 pages in length. For us, this is the prominent reading.

(38) DegP ≫ modal:

a. \[
\{ d : \text{LENGTH}(\text{the.draft}, w_{\@}) + 5 \text{ pp.} \} = \\
\{ d : \exists w [\text{ACC}(w, w_{\@}) \& \text{LENGTH}(\text{the.paper}, w) \geq d] \}
\]

‘The essay with the longest permitted length (that is, at the upper limit) has 25 pages (= the length of the current draft plus five pages).’

b. Aber eben auf keinen Fall länger!
but DISC on no case longer
‘But crucially not longer!’
Turning now to the degree equative, we find similar ambiguities. However, when we set the exactly-implicature aside, truth-conditional distinct readings only appear with *genauso* ‘exactly so’ (see also Heim 2001 for English). Below, we provide relevant examples from German. Traditionally, this ambiguity has been thought of as resulting from the scope of the DegP (but see below).

(39) a. **Context:** You just submitted your B.A. thesis and proudly show it to me. I inquire after its length and you tell me that it’s 60 pages. I’m currently writing my B.Ed. thesis and I tell you...

   b. *dass meine Zulassungsarbeit genauso lang sein darf wie es deine that my B.Ed.thesis exactly so long be may how it your Bachelorarbeit ist.*

   ‘That my B.Ed. thesis is allowed to be as long as your B.A. thesis.’

When the DegP takes scope below the modal, we derive the reading that sixty pages is one of the permitted lengths for the thesis, as in (40). Continuations like (40-b) are not contradictory, but are only compatible with this scope configuration.

(40) **modal ≫ DegP:**

   a. In some world *w* deontically accessible from the actual world:

   \[ \{ d : \text{LENGTH}(\text{your.thesis}, \text{w}_d) \geq d \} = \{ d : \text{LENGTH}(\text{my.thesis}, \text{w}) \geq d \} \]

   b. *Aber fünf Seiten kürzer (als was du eingereicht hast) wären auch but five pages shorter than what you submitted would be also schon okay (und bis zu 70 Seiten sind auch noch erlaubt).*  

   ‘But five pages less (than what you submitted) would also already be enough (and up to ten pages more would also still be permitted).’

Yet again, the wide scope reading in (41) is more informative and thus more prominent in many examples, although they also allow for the reading in (40).

(41) **DegP ≫ modal:**

   a. \[ \{ d : \text{LENGTH}(\text{your.thesis}, \text{w}_d) \geq d \} = \{ d : \exists w [\text{ACC}(w, \text{w}_d) \& \text{LENGTH}(\text{my.thesis}, w) \geq d] \} \]

   b. *Und keine Seite weniger oder mehr!*  

   ‘But also not a single page less or more!’

These upper-limit readings also occur naturally. Consider (42) and (43): The intended reading of (42) is about the maximum amount of money teachers in training are legally allowed to make from a side job relative to the stipend they receive; the dieting advice in (43) plausibly makes reference to the maximum daily calorie intake.

(42) a. **Legal advice for teachers in training on sideling:**

   Katrin Mingels, ‘Unterhaltsbeihilfe: Was Referendare verdienen’, *Staufenbiel Magazin*, (url: http://tiny.cc/sbiel, accessed November 4, 2019).

(43) **Legal advice for teachers in training on dieting:**

   Katrin Mingels, ‘Unterhaltsbeihilfe: Was Referendare verdienen’, *Staufenbiel Magazin*, (url: http://tiny.cc/sbiel, accessed November 4, 2019).
b. *Peter ist älter [als Maria nicht].
   Peter is older than Mary not
   ‘Peter is older than Mary isn’t.’

b. *Peter ist so alt [wie Maria nicht].
   Peter is so old how Mary not
   ‘Peter is as old as Mary isn’t.’
   \{d' : \text{AGE}(\text{Mary}) < d'\} \subseteq \{d : \text{AGE}(\text{Peter}) \geq d\}

In terms of the set-based approach which we have been pursuing so far, the explanation for the unacceptability of (44) lies in the type of set the \textit{wie}-constituent denotes. (See in particular Rullmann (1995) as well as Fox & Hackl (2006), Eckardt (2009), Hofstetter (2012),

\footnote{We would like to thank one of our reviewers for discussion of this point.}
\footnote{Negative indefinites in degree equatives, however, do not give rise to NIEs in German. We will address this puzzle in subsection 3.4 below.}
and Crnič & Fox (2019) for discussion.) Imagine that Mary is 33 years old. Then the set of degrees to which Mary is not old would be the set of all age degrees from 34 years to infinity. This set can never be a subset or equal to the set of degrees to which Peter is old, which has a natural upper bound. The Negative Island Effect thus is another case where a logical contradiction results in ungrammaticality; see Gajewski (2002, 2008) for a systematic description (and Dowty 1979; Barwise & Cooper 1981; Chierchia 2004, 2013; Abrusán 2014).

The effect does not arise if the extraction site is syntactically located above the negation (and the negation more narrowly targets the verb), as in (45). The sentence is natural if uttered by a frustrated teacher at some point during the term. Here, the denotation of the comparison clause is a finite set, the set of cardinality degrees \(d\) such that Peter attended (= didn’t miss) \(d\)-many days of school, \(\{d : \text{CARD}(\text{days of school that Peter attended}) \geq d\}\). Hofstetter (2012) discusses parallel data for English comparatives. In (46), we are talking about how good it would be not to tell someone as the standard of comparison, and about how boring it would be not to exist, both perfectly well-behaved sets.

\[
\text{(45)} \quad \text{Peter hat jetzt so viele Tage gefehlt [wie er <Tage> nicht gefehlt hat].}
\]

Peter has now so many days missed how he days not missed has ‘Peter has now missed as many days of class as he hasn’t missed.’

\[
\text{(46) a. I suppose it’s better than not telling him.}
\]

\[
\text{b. There is nothing more boring than not existing.}
\]

(Hofstetter 2012, p.108-109, no.(3/7-e), (3/8-f))

We additionally discuss in section 4 whether and how context may obviate NIEs.

### 3.3 Interim summary

In this section, we have reviewed an analysis of the degree equative construction as quantifying over set of degrees (Cresswell 1976; Rullmann 1995; Meier 2000, 2003; Beck 2011; Rett 2015a). Motivation for this analysis derives from elegance of theory, as it provides a conceptually attractive view of the relationship between different comparison operators. The analysis of comparatives and equatives as structurally parallel is however not only attractive from a conceptual perspective, but it also seems warranted by the many properties the two constructions have in common, summarised in Table 3, repeated from above.

|                           | Comparative | Equative |
|---------------------------|-------------|----------|
| Syntactic distribution    | ✓           | ✓        |
| (predicative, attributive, adverbial) |             |          |
| Scope ambiguities         | ✓           | ✓        |
| Negative Island Effects   | ✓           | ✓        |

Table 3: The comparative and the (degree) equative construction

Despite the many merits of this analysis, which make it the standard analysis of degree equatives, German presents it with two puzzles: Firstly, even though both degree operators create a downward-entailing environment for their first argument, only the comparative has been said to license Negative Polarity Items in the comparative clause in German (Seuren
1984, von Stechow 1984a, Krifka 1991). Secondly, negative indefinites (NIs) are ungrammatical in the complement clause of a comparative but acceptable in an equative, in which case they give rise to a seemingly unpredicted reading (von Stechow 1984b, Penka 2011).

3.4 Two puzzles for the semantics of degree equatives in German

In this section, we briefly review the two puzzles that German equatives posit with respect to Negative Polarity Items and negative indefinites. We conclude that neither is sufficient for discarding the quantificational analysis of so...wie: In the case of NPI licensing, we show that there are naturally occurring, acceptable examples with the NPI *jemals ‘ever’. Diachronic data additionally complicate the picture, and cast doubt on the generalisation that NPIs are not licensed in the complement clause of the German degree equative. We also show that equatives do actually license the NPI *überhaupt ‘at all, even’. The NIs puzzle, we suggest, can be solved by giving the negation extra-wide scope over the exhaustivity operator that generates the scalar implicature.

**Monotonicity and Negative Polarity Items.** Under the assumption that NPIs are licensed in downward-entailing environments (Fauconnier 1975, 1979; Ladusaw 1979, 1980), the standard quantificational analysis predicts that both comparatives and equatives should license NPIs in the comparative clause (Hoeksema 1983; Seuren 1984; von Stechow 1984a; among many others). While this prediction is borne out for the German NPI *jemals ‘ever’) in the complement clause of the comparative (47), it is standardly assumed to fail for the equative (48) (Seuren 1984, von Stechow 1984a and Krifka 1991).

(47)  
\[
\begin{align*}
a. & \quad \text{Luise war glücklicher, [als sie es jemals zuvor war].} \\
& \quad \text{Luise was happier than she it ever before was} \\
& \quad \text{‘Luise was happier than ever before.’}
\end{align*}
\]
\[
\begin{align*}
b. & \quad \text{Luise war glücklicher, [als jemals zuvor].} \\
& \quad \text{Luise was happier than ever before} \\
& \quad \text{‘Luise was happier than ever before.’}
\end{align*}
\]

(48)  
\[
\begin{align*}
a. & \quad *\text{Luise war so glücklich [wie jemals zuvor].} \\
& \quad \text{Luise was so happy how ever before} \\
& \quad \text{‘Luise was as happy as ever.’}
\end{align*}
\]
\[
\begin{align*}
b. & \quad *\text{Der Jemen ist so schön, [wie ich jemals gedacht habe].} \\
& \quad \text{the Yemen is so beautiful how I ever thought have} \\
& \quad \text{‘The Yemen is as beautiful as I thought.’}
\end{align*}
\]

(Krifka 1991, p. 155, no. (18))

This observation is all the more surprising as the English equative appears to license NPIs in the *as*-constituent (Seuren 1984; Krifka 1991; Rett 2010; Rett 2013, pp. 1109-1110), as does its Dutch equivalent, see (49) and (50).

(49)  
\[
\begin{align*}
a. & \quad \text{Paris is as quiet [as ever].} \\
& \quad \text{b. Two glasses was as much [as I cared to drink].} \\
& \quad \text{c. That was as much [as he was willing to lift a finger to do].}
\end{align*}
\]

(50)  
\[
\begin{align*}
a. & \quad \text{Two glasses was as much [as I cared to drink].} \\
& \quad \text{b. That was as much [as he was willing to lift a finger to do].}
\end{align*}
\]
d. *Jim is as competent [as anybody here could possibly be].*  
(Seuren 1984, p. 114, no. (20))

(50) *Jeu bent nog steeds zo hopeloos [als ooit tevoren].*  
you are still constantly so hopeless than ever before  
‘You are still as hopeless as ever.’

In response to this puzzle, we would like to suggest that it is better thought of as a puzzle for the semantics of German *jemals* (*ever*) than as a general puzzle for the German degree equative construction (see also Igel 2018): Firstly, this particular NPI used to be licensed in the degree equative in earlier stages of German, and secondly, we actually do find some naturally occurring examples in contemporary German (that we also find acceptable). A corpus search of the COSMAS HIST corpus (which contains texts from 1700 to 1918 and 66,582,941 words) reveals further examples where the degree equative licenses the NPI *jemals* (*ever*), independent of the complementiser employed throughout its development. A search reveals 33 relevant hits from before 1900, of which we present four in (51) and (52) below. Note however that the authors find these examples unacceptable or, at best, highly marked.

(51) a. *Er hatte es nun so gut auf der Welt [als jemals],.*  
he had it now so good on the world than ever  
“He now had as good a life as ever.”

b. *So schieden sie so vergnügt von einander*  
so departed they so happy from another  
[als sie es jemals gewesen waren],…  
than they it ever been was  
“When they parted from each other,  
they were as happy as they had ever been.”

(52) a. *Sie sah dabei so gesund und verständig aus [wie jemals],…*  
she saw there.at so healthy and wise out how ever  
“She looked as healthy and wise as ever.”

b. *Der Vater wirkte so rüstig [wie jemals in seinem Amt].*  
the father appeared so active how ever in his office  
“The father appeared to be as active as ever in his job.”

There are, however, also naturally occurring, and quite acceptable examples from contemporary German that feature *jemals* ‘ever’, some of which we report in (53) to (57).

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13 Open Movie Subtitles Corpus (URL: http://opus.lingfil.uu.se/OpenSubtitles2016.php, accessed July 27, 2016). See also Pierre Lison & Jörg Tiedemann (2016), “Extracting Large Parallel Corpora.” Proceedings of the 10th International Conference on Language Resources and Evaluation.

14 In Middle High German and Early New High German, the equative relied on *als* (*than*) as a complementiser (Eggs 2006; A. Jäger 2010, 2016). The choice of complementiser does however not affect NPI licensing, as we can see in (51) to (52).

15 Friedrich Heinrich Jacobi, Woldemar (1779), COSMAS id. HK3.G81.00001.

16 Christoph M. Wieland, Die Abenteuer des Don Sylvio von Rossalva (1772), COSMAS id. HK3.D56.00001.

17 Gottfried Keller, Züricher Novellen (1860-1877), COSMAS id. HK3/G85.00001.

18 Louise von François, Stufenjahre eines Glücklichen (1877), COSMAS id. HK4/F15.00001.
Es wäre indessen verfehlt, etwa die ganze englische Jugend anzuprangern.

Im Gegenteil, ihre große Mehrheit ist so normal. 

Und die ganze Englische Jugend war normal wie die junge sogar wurde.

Die beste Jugend, die es gab, 19

Bist du bereit? „So bereit wie ich jemals sein werde,““, 20

Die Gestaltung von Hochzeitseinladungen ist ganz klar eine Frage des Geschmacks und die Möglichkeiten dazu wohl so vielfältig wie jemals zuvor. 21

Adapted from Doreen Winking, „Hochzeitseinladungen: Tipps für die Karten,“ 22

While we will not pursue an analysis of these data here, it thus seems that jemals ‘ever’ is not the best candidate for testing the predictions of the quantificational analysis of degree operators in German. We show next that the quantificational analysis does indeed make correct predictions for another German NPI, namely the domain-widening überhaupt ‘at all, even’ (Anderssen 2006, Richter & Soehn 2006), which is licensed by negation and in questions, as shown in (58), but crucially also in the restrictor argument of a universal quantifier...
quantifier, as shown in (59).

(58)  a.  *Ich erkenne dieses Land überhaupt *(nicht) wieder.
I recognise this country at.all not again
‘I do not recognise this country at all.’

b.  *Erkennst du dieses Land überhaupt noch wieder?
recognises you this country at.all again
‘Do you still recognise this country at all?’

(59)  a.  *[Wenn ich überhaupt komme], dann erst um 20 Uhr.
if I at.all come than first at 20 clock
‘If I come at all, I come around eight o’clock.’

b.  *Die Schule freut sich über [jeden, der überhaupt noch kommen will].
the school rejoices REFL over every the at.all still come want
‘The school is pleased about everybody who still wants to come at all.’

Crucially, the NPI überhaupt (‘at all, even’) is licensed in the comparative clause of both the comparative and the equative, as is shown in (60) and (61).

(60)  a.  *Es geht um mehr, [als du überhaupt verstehen kannst].
it goes about more than you at.all understand can
‘There is more at risk than you can even understand.’

b.  *Unter den Nutzern von Facebook sind mehr 18-jährige Männer
under the users of Facebook are more 18-year men
[als überhaupt auf der Welt existieren].
than at.all on the world exist
‘There are more 18-year old men on Facebook than there even are on the planet.’

(61)  a.  *Diese Erweiterung ist so gut vorbereitet, [wie es überhaupt möglich war].
this enlargement is so well prepared how it at.all possible was
‘The EU enlargement was prepared as well as was at all possible.’

b.  *Feuerbach geht so weit, [wie ein Theoretiker überhaupt gehen kann].
Feuerbach goes as far as a theoretician at.all go can
‘Feuerbach goes as far as a philosopher can even go.’

25  c.  *Sie ist so poetisch [wie man überhaupt sein kann].
she is so poetic how one even be can
‘She is as poetic as one can ever be.’

Although further research is needed to understand the differential behaviour of the two NPIs in German, the grammaticality of the examples in (61) supports the quantificational analysis of equatives. We turn next two the second piece of data that sets the German degree equative apart from its English counterpart.

24  Adapted from Manfred Götzke, „Kölner Gülen-Schule beklagt Abmeldewelle,“ Deutschlandfunk, August 30, 2016 (URL: http://tiny.cc/dlf-guelen, accessed December 8, 2019).

25  Adapted from Karl Marx & Friedrich Engels (1845-1946), „Die deutsche Ideologie: Thesen über Feuerbach,” p. 42.
Negative indefinites and Penka’s puzzle. As already discussed above, negation is unacceptable in the complement clause of English degree equatives (= the Negative Island Effect). However, von Stechow (1984b, p.187, no.(17)), Eckardt (2009) and Penka (2011, pp. 73-75) observe that this is not the case for negative indefinites in German: While they cause ungrammaticality in the complement clause of comparatives, they are – surprisingly – perfectly acceptable in equatives.\footnote{This pattern also holds when the standard is overtly clausal, as shown in (i) and (ii) below.}

(62) a. *Helena ist schöner [als keine andere Frau].
    Helena is beautifuler than no other woman
    ‘Helena is more beautiful than no other woman.’

b. Helena ist so schön [wie keine andere Frau].
    Helena is so beautiful how no other woman
    ‘Helena is more beautiful than any other woman.’ (!)

(Penka 2011, p. 73, no. (123))

As Penka (2011, p. 74) points out: “...under the standard analysis, which parallels that of comparatives, it is not possible to derive the correct interpretation for a sentence with a negative indefinite in the complement.” Note also that, in German, the correct interpretation is a proper comparative one in this case, as is indicated in the translation of (62-b). If we

\(\text{(i) a. } *\text{Theresa reiste mehr als keine andere Premierministerin es tat.} \)  
\(\text{Theresa travelled more than no other prime minister it did} \)  
\(\text{‘Theresa travelled more than no other prime minister did.’} \)

\(\text{b. } *\text{Diese Brücke ist länger als kein Burggraben breit ist.} \)  
\(\text{this bridge is longer than no moat wide is} \)  
\(\text{‘This bridge is longer than no moat is wide.’} \)

\(\text{(ii) a. } \text{Helena ist so schön wie es keine andere Frau ist.} \)  
\(\text{Helena is so beautiful how no other woman is} \)  
\(\text{(Lit.) ‘Helena is as beautiful as no other woman is.’} \)  
\(\text{‘Helena is more beautiful than every other woman.’} \)

\(\text{b. } \text{Diese Brücke ist so lang wie kein Burggraben breit ist.} \)  
\(\text{this bridge is so long how no moat wide is} \)  
\(\text{(Lit.) ‘This bridge is as long as no moat is wide.’} \)  
\(\text{‘This bridge is longer than every moat.’} \)

Jakub Dotlačil has pointed out to us that the effect in English might be tied to the syntactic realisation of the standard, in that the effect is more pronounced in clausal standards; see Bhatt & Takahashi (2007), who attribute the observation to Brame (1983). Following Tiemann, Hohaus & Beck 2012, we assume that the comparative clause in German equatives is always clausal, unlike in English (see also footnote 9 above), hence also the difference in binding the reflexive anaphora in (iii).

\(\text{(iii) a. } \text{No one is taller than her- or himself.} \)  
\(\text{(after Hankamer 1973, pp. 183-184)} \)

\(\text{b. } *\text{Niemand ist größer als sich (selbst).} \)  
\(\text{no one is taller than refl self} \)  
\(\text{Intended: ‘No one is taller than themself.’} \)

\(\text{c. } \text{Everyone is as tall as her- or himself.} \)

\(\text{d. } *\text{Jeder ist so groß wie sich (selbst).} \)  
\(\text{every is so tall how refl self} \)  
\(\text{Intended: ‘Everyone is as tall as themself.’} \)

We would also like to thank one of our reviewers for discussion of this point.
were to interpret the negation within the complement wh-clause, as in in (63), we would derive an infinite set, which cannot form a subset of Helena’s beauty degrees.

(63) \( \{d: \neg \exists x [\text{woman}(x) & x \neq H & \text{BEAUTY}(x) \geq d]\} \)

If negation were interpreted within the complement clause, (62-b) should thus exhibit a Negative Island Effect and be ungrammatical, contrary to fact. Conversely, if we were to allow for the quantifier to take scope over the equative operator, we would derive that there is no woman whom Helena equals or surpasses in beauty. In other words, under the wide scope interpretation of the negation, Helena should end up being the least beautiful woman in the domain of quantification. Intuitively, the sentence expresses the opposite, though.

We would like to suggest that the source of this puzzling behavior lies in the interpretation of negative indefinites in German: Under a decompositional approach to negative indefinites (see, e.g., Jacobs 1980, 1982; Kratzer 1995; Penka 2011, 2012), their interpretation involves two distinct operators at LF, a covert sentential negation operator and an existential quantifier. We suggest that in the case of the German equative, the negation operator can be realised with exceptionally high scope, out of the comparative clause. We suggest that in this case negation scopes over an exhaustivity (EXH) operator, as has been recently proposed in Chierchia, Fox & Spector (2012) and Fox & Spector (2018). The EXH-operator generates the exactly-implicature of the equative (see (27) and (28-b) above), while the existential is interpreted within the comparison clause. Scoping over EXH, the negation operator can target this exactly-implicature, thereby giving rise to the proper comparative greater than-interpretation that we actually observe.

To see how this proposal works in more detail, we will first take a step back and revisit the exactly-implicature that equatives give rise to. We will then discuss some of the examples from English in Chierchia, Fox & Spector (2012), in which the negation targets the scalar implicature, which can be derived by scoping it over the exhaustification operator that derives them. We will then turn to examples from German and show two things: Firstly, negative indefinites may also target scalar implicatures. Secondly, the exactly-implicature of the degree equative may be explicitly negated by other types of negation as well. We then spell out the analysis of Penka & von Stechow (2011)’s example – (62-b) above –, and discuss the repercussion of this analysis for the syntax of the negation operator that is involved in the interpretation of negative indefinites in German.

Recall from subsection 2.1 that equatives such as Helena is as beautiful as Demeter (and its German equivalent) give rise to an exactly-implicature, namely that Helena’s beauty equals Demeter’s (and does not exceed it). We can compositionally derive these implicatures with the help of an exhaustivity operator at Logical Form (see, e.g., Chierchia, Fox & Spector 2012). For our purposes, we can define this operator as an alternative-evaluating exclusive operator, as in (64), modified from Beck (2016, p. 23, fn. 4), which takes scope over the prejacent proposition at Logical Form, (65).

\[ \phi_{\text{ord}}(w) = 1 \]

Assume that the relevant alternative set

\[ \phi_{\text{alt}} \]

For reasons of exposition, we use here a presuppositional exhaustivity operator, but see Krifka (1995), Fox (2007), Spector (2016) and Fox & Spector (2018). More specifically, unlike only, the exhaustification operator may in fact not presuppose that \( [\phi_{\text{ord}}(w) = 1, \text{but assert it. Also, only those propositions in } [\phi]_{\text{alt}} \text{ that are not entailed by } [\phi]_{\text{ord}} \text{ are excluded by exhaustification. Under these other definitions of the exhaustification operator, the analysis of the relevant example will be somewhat more complex and...} \]
contains only the comparative and the equative. The derivation of the exactly-implicature then schematically proceeds as in (66), where $A = \{d : \text{HEIGHT}(\text{Anna}) \geq d\}$ (the denotation of the comparison clause) and $N = \{d : \text{HEIGHT}(\text{Nadine}) \geq d\}$ (the set derived by Quantifier Raising of the DegP). Informally, the presence of the exhaustiveification operator makes the stronger comparative statement ($A$ a proper subset of $N$) come out false, resulting in the equality statement $A = N$. See (67) for the full derivation.

(64) \[ \text{EXH}(\phi) \text{ord}(w) = 1 \iff \forall q \in [\phi]_\text{alt} \land q \neq [\phi]_\text{ord} \to q(w) = 0 \]

(65) Exhausification at Logical Form:

\[ \text{EXH}([\lambda_0 [\text{DegP} s_\text{alt} [\lambda_1 \text{ Anna } t_{1,d} \text{ tall} w_{0,s} ]]] [\lambda_2 \text{ Nadine } t_{2,d} \text{ tall} w_{0,s} ]]) \]

(66) \[ \text{EXH}(A \subseteq N) = 1 \iff \neg(A \subseteq N) \text{ iff } A \not\subseteq N \]

\[ \text{EXH}(A \subseteq N) \text{ is defined iff } A \subseteq N \]

\[ \Rightarrow A = N \]

(67) \[ \text{ALT} = \{[\lambda w. \{d : \text{HEIGHT}_w(A) \geq d\} \subseteq \{d : \text{HEIGHT}_w(N) \geq d\}] ;
\]

\[ [\lambda w. \{d : \text{HEIGHT}_w(A) \geq d\} \subseteq \{d : \text{HEIGHT}_w(N) \geq d\}] \}

\[ \forall q \in \text{ALT} \land q \neq [\lambda w. \{d : \text{HEIGHT}_w(A) \geq d\} \subseteq \{d : \text{HEIGHT}_w(N) \geq d\}] \]

\[ q(w) = 0 \]

iff \[ \forall d : \text{HEIGHT}_w(A) \geq d \not\subseteq \{d : \text{HEIGHT}_w(N) \geq d\} \]

\[ \text{EXH}(\lambda w. \{d : \text{HEIGHT}_w(A) \geq d\} \subseteq \{d : \text{HEIGHT}_w(N) \geq d\}) \text{ is defined iff} \]

\[ \{d : \text{HEIGHT}_w(A) \geq d\} \subseteq \{d : \text{HEIGHT}_w(N) \geq d\} \]

\[ \Rightarrow \{d : \text{HEIGHT}_w(A) \geq d\} = \{d : \text{HEIGHT}_w(N) \geq d\} \]

Secondly, negation is sometimes able to scope above the EXH-operator and target its implicature, as has been observed for the English examples in (68).

(68) a. Joe didn’t see Mary or Sue; he saw both.

b. It is not just that you can write a reply. You must.

c. I don’t expect that some students will do well, I expect that all students will.

(Chierchia, Fox & Spector 2012, p. 2305, no. (16))

We would like to suggest that Penka (2011)’s puzzle is just another instance of negation taking wide scope over EXH, in this case the covert negation operator licensing the negative indefinite expression. This negation is known to give rise to split-scope readings in examples like (69), the prominent reading of which is that you are not required to wear a tie ($\neg \Rightarrow \text{MUST} \gg \exists$), but other readings are also possible (see Penka 2012; Zeijlstra 2013).

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require double exhaustification, that is, $\text{EXH}(\text{not}(\text{EXH}(p)))$. See sections 7.2 and 7.3 in Fox & Spector (2018) for a step-by-step derivation of the desired interpretation of (68-a) which is parallel to our example.
(69)  *Du musst keine Krawatte anziehen.*

you must no tie wear

‘It is not required that you wear a tie.’  
\[ \neg \gg MUST \gg \exists \]

‘There is no tie that you are required to wear.’  
\[ \neg \gg \exists \gg MUST \]

‘It is required that you don’t wear a tie.’  
\[ MUST \gg \neg \gg \exists \]

(Zeijlstra 2013, draft p.3, no.(5))

Crucially, the covert negation operator that licenses negative indefinites can also target scalar implicatures, in full parallel to the examples in (68). We provide an example in (70), modeled after a structurally parallel example in Kobele & Zimmermann (2012). Here, the negation operator associated with the negative indefinite object *keine Tulpen* ‘no tulips’ negates the ‘not all’-implicature that is triggered by the (focus-sensitive) EXH-operator targeting the at-issue constituent *auf EINIGEN Feldern* ‘on SOME fields’.\(^{28}\)

(70)  *Die Bauern pflanzen keine Tulpen [auf EINIGEN Feldern], sondern auf ALLEN.*

The farmers plant no tulips on some fields, but on all

‘The farmers didn’t plant tulips on SOME fields, but on ALL of them.’

Thirdly, overt sentential negation can also target the exactly-implicature generated by equative constructions. We show this for VP negation in (71), in which the exactly-implicature is cancelled by this overt sentential negation, that is \(\text{NOT(EXH}(D \subseteq H)) = D \subset H\), where \(D\) is the set of degrees to which Demeter is beautiful and \(H\) is the set of degrees to which Helena is beautiful. If (71) were only interpretable as Helena being less beautiful than Helena, that is \(\text{NOT}(D \subseteq H) = D \supset H\), the continuation should be contradictory, contrary to fact.

(71)  *Helena ist nicht so schön wie Demeter, sondern noch schöner.*

Helena is not as beautiful how Demeter but yet more beautiful

‘Helena is not only as beautiful as Demeter, but even more so.’

With these ingredients in place, let us turn back to our original example, with the negative indefinite in the comparative clause.

(72)  *Helena ist so schön [wie keine andere Frau].*

Helena is so beautiful how no other woman

‘Helena is more beautiful than any other woman.’ (!)

We derive the desired truth conditions for (72), if we interpret the existential within the comparative clause of the equative and then scope the negation above the exhaustification operator, as in (73). (We will discuss this exceptionally high syntactic position of negation further in a moment.) Remember from our discussion of scope ambiguities that an existential quantifier interpreted within the comparative clause will derive a maximum-degree set, here the set that collects all degrees \(d\) such that there is a woman in the domain of quantification that is \(d\) beautiful. Comparison will thus be with the most beautiful woman that is not Helena. We derive the core proposition \(p\) in (74). Interpreting the negation that licenses the negative indefinite above the exhaustification operator schematically proceeds as in (75), where \(H = \{d : \text{BEAUTY}(Helena) \geq d\}\) and \(W = \{d : \exists x [x \text{ is a woman} \& x \neq\)

\(^{28}\) The availability of this reading appears to be subject to inter-speaker variation: Of the eight native speakers consulted, two do not allow for this reading, including one of our reviewers.
Helena & BEAUTY(x) ≥ d].

(73) denotation of the complement clause:
{d : ∃x [x is a woman & x ≠ H & BEAUTY(x) ≥ d]}

(74) core proposition p:
λw. {d : ∃x [x is a woman & x ≠ H & BEAUTY_w(x) ≥ d]}
⊆ {d : BEAUTY_w(H) ≥ d}

(75) ¬(EXH(p)) = 1 iff ¬(W \not\subset H) iff W ⊂ H
¬(EXH(p)) is defined iff W ⊆ H

We derive the desired interpretation, under which Helena’s beauty exceeds that of the most beautiful woman in the domain of quantification, that is, Helena is more beautiful than any other woman. As the analysis crucially relies on the implicature generated from the asymmetric entailment relation between ⊂ and ⊆, it is not at all surprising that negative indefinites are ungrammatical with genauso (‘exactly so’), see (76) and von Stechow (1984b, pp. 187-188). If we assume – compositional details aside – that genauso encodes equality of sets = , the sentence does not generate any implicatures, which negation could in turn target (as in the case of ⊆).

(76) *Helena ist genauso schön [wie keine andere Frau].
Helena ist exactly so beautiful how no other woman
‘Helena is exactly as beautiful as no other woman.’

Why are Negative Indefinites ungrammatical in the complement clause of the comparative then? We speculate that the reason for the difference is a lack of alternatives that are not already entailed by the comparative (see also footnote 27). In the case of the comparative, exhaustification does not generate any implicatures ruling out stronger alternatives (and the operator may thus not even be available at LF).

Taking a step back, the discussion in this section suggests that the absence of negative island effects with NIs in the complement clause of German degree equatives (and their interpretative quirks) are an interesting challenge for the semantics of negative indefinites rather than a challenge for the standard analysis of degree so...wie. We suggest to derive the more-than-all interpretation by giving wide scope of a negation operator over an exhaustification operator. While this derives the desired interpretation, the exceptionally high position of the negation in this case, outside of the complement clause containing the negative indefinite, remains an interesting stipulation. The proposal thus opens up several interesting venues for further research: Why can the covert negation that licenses the negative indefinite only take exceptionally high scope when it targets an implicature (and cannot, for instance be used to negate the matrix clause)? How do overt VP negation and this covert operator differ in their interaction with exhaustification? Consider (77), for instance.

(77) *Helena ist so schön [wie Demeter nicht].
Helena is so beautiful how Demeter not
‘Helena is as beautiful as Demeter isn’t.’

Here, the embedded nicht ‘not’ cannot be used to negate the exactly-implicature, unlike its
matrix clause equivalent in (71). The sentence cannot be taken to mean that it is not the case that Helena is at least as beautiful as Demeter, but more beautiful.29

3.5 Interim summary

Let’s take stock. With a focus on German, we have provided a comprehensive review of the standard quantificational analysis of the degree equative and its merits, one being that it captures the close parallels between the equative and the comparative. We are not aware of any competitor analysis that reaches the same degree of explicitness or empirical adequacy. While the licensing behaviour with respect to *jemals* (‘ever’) in the complement clause remains a puzzle for the analysis (as does its diachronic change), we have also provided evidence from *überhaupt* (‘at all, ever’) that the German degree equative does license (some) NPIs in its complement clause. We have also offered a solution to the second puzzle for the standard semantics of the equative, the interpretation of Negative Indefinites in the complement clause. Against this backdrop, we now turn to extending the quantificational analysis to the non-scalar case.

4 The proposal

We will first show that an extension of the above analysis to property equatives merely requires adjusting the types of semantic objects that *so...wie* quantifies over, from degrees to properties, leaving us with two systematically related lexical entries. Such an analysis is plausible under the close conceptual relationship between degrees and properties. After spelling out the unified analysis in a bit more technical detail, we turn to the parallels between degree and property equatives, which provide the crucial empirical support for our unified approach.

4.1 Extending the standard analysis

Intuitively, under its use outside of gradable adjectives, *so...wie* still expresses some kind of comparison of equality. Yet, this comparison does not involve measurement along some scale, and is thus not degree-based. Rather, it concerns a set of contextually relevant properties. To return to our example from the introduction, the sentence is true if and only if the goal that Nadine scored shares all relevant properties of the goal that Sigrid scored, say being a header from close range into the far corner.

(2)  *Nadine hat auch so ein Tor geschossen wie Sigrid.*
    ‘Nadine scored a goal in the same manner as Sigrid.’

Some further examples are in (78) and (79), where *so...wie* is used predicatively and adverbially, respectively. Intuitively, in these cases, too, comparison is with a certain set of properties. The sentence in (78) is true if no other woman shares the relevant properties of the addressee. The example in (79) compares one particular manner of Beckedahl speaking with his other appearances on television.

29 We would like to thank one of our reviewers for this example and for their discussion.
(78) *Keine* ist *so* *wie* *du.*
no.one(fem.) is so how you
‘No woman is like you.’

(79) *Beckedahl spricht* *so* *wie* *er* *immer* *im* *Fernsehen* *spricht.*
Beckedahl talks so how he always in+the television talks
‘Beckedahl talks just like he always does on television.’

The basic idea that we would like to suggest here against the backdrop of the standard
quantificational analysis of the degree equative is simple: We can straightforwardly capture
this intuition by analysing property *so...wie* as a universal quantifier over properties of
type ⟨e,t⟩ (or type ⟨v,t⟩, with v the type of eventualities), as opposed to degrees. The
corresponding lexical entry is in (80) (to be refined), along with its degree counterpart.

(80) \[ so_{\text{property}} = \lambda R_{(e,t)}, \lambda R_{(e,t)} \cdot \{ f' : R'(f') = 1 \} \subseteq \{ f : R(f) = 1 \} \]

(27) \[ so_{\text{degree}} = \lambda D'_{(d,t)}, \lambda D_{(d,t)} \cdot \{ d : D'(d) = 1 \} \subseteq \{ d : D(d) = 1 \} \]

While our grammar treats degrees and properties as distinct semantic types (and one as
particulars and the other as functions), the move from degrees to properties is plausible as
degrees, outside of the grammatical ontology, can be conceptualised as properties. Conceptually,
an age degree like 30 years can be characterised as the set of individuals whose age is
thirty years, that is \( \{ x : \text{AGE}(x) = 30 \text{ yrs} \} \). A property is just that, a set of individuals,
that is \( \{ x : x \text{ is old} \} \), for instance. Re-phrasing this in a slightly more technical way, degrees
can be reconstructed from equivalence classes (Carnap 1928; Cresswell 1976; Klein 1982;
von Stechow 2008), sets of entities that are indistinguishable from each other with respect
to a certain characteristic like age: If \( R \) is a heuristic degree relation, assumed to be anti-
symmetric and transitive (for instance, being older), \( R \)-degrees are equivalence classes of
individuals that are not distinguishable with respect to \( R \)-ness. Degree scales are sequences
of such classes. A formal definition of equivalence is given in (81), from von Stechow (2008,
p. 3): Take two entities \( x \) and \( y \) that are in the field of the heuristic relation \( F(>R) \), then
\( x \) is equivalent to \( y \) with respect to \( R \) if and only if for any third entity \( z \) from the field of
the relation, \( x \) exceeds \( z \) with respect to \( R \) if and only if \( y \) also does, and \( z \) exceeds \( x \) with
respect to \( R \) if and only if it also exceeds \( y \).

(81) \[
\forall x, y \in F(>R) : x \sim_R y \iff \\
\forall z \in F(>R) : (x >_R z \iff y >_R z) \& (z >_R x \iff z >_R y)
\]

Conceptually, then, the transition between degrees to properties is almost trivial. We suggest
here that the grammar of German exploits this close conceptual relationship in the semantics
of *so...wie*. (Note though that not all languages do, as we can see from the differential
distribution of the PM across languages. We will return to this issue in section 5.)

Let’s apply the analysis to a slightly simplified variant of the predicative property equative
in (82). Its Logical Form is given in (85). It is entirely parallel to the degree case in that
two movement operations create the relevant sets for the quantification, the set of properties
which Luca has, in (83-b), derived by Quantifier Raising, and the set of properties which the
addressee has, in (83-a), derived by *wh-*movement of the *wie*-operator in the complement
clause. Note that – contra Landman (2006)’s No Higher-Level Variable Constraint, which
she posits as a potential semantic universal— we assume the existence of variables of type
\(\langle e, t \rangle\), following Heim & Kratzer (1998, p. 212 et seqq.) and references given there: Both movements in (85) leave behind a variable of this type.

(82) \[Luca\text{ ist so wie du bist.}\]
Luca is so how you are
‘Luca is like you.’

(83) a. \[\langle A \rangle = \lambda f. f(\text{addressee})\]
b. \[\langle B \rangle = \lambda f'. f'(L)\]

(84) \[\{ f : f(\text{addressee}) \} \subseteq \{ f' : f'(L) \}\]

The sentence in (82) thus is true if and only if Luca has all of the properties of the addressee, as in (84). This is too strong, obviously. As with all universal quantifiers (Westerståhl 1985; von Fintel 1994), the domain of quantification is contextually restricted in this case as well. In (86), this is the first argument of the quantifier, which at LF will be filled by a free variable over sets of properties.\(^{30,31}\) For German so in particular, this idea is also voiced in Lenerz & Lohnstein (2005, p. 97, our translation) who write that comparison is with “a set of properties from which we select the salient properties.”

(86) \[\langle so\text{ property} \rangle = \lambda_{\langle (e, t), t \rangle} \cdot \lambda_{\langle (e, t), t \rangle} \cdot \lambda_{R}(f') \cdot \lambda_{R}(f') \cdot \{ f' : C(f') \& R'(f') \} \subseteq \{ f : R(f) \}\]

For our example from (82), Luca would be required to share all contextually relevant properties of the addressee, say, her wit, her good-naturedness, and a certain degree of sloppiness. How are the relevant properties determined in context? We would like to suggest that the mechanisms underlying the resolution of the context dependency in the case of the property equative are those that also are at work in the many other cases of context dependency (the definite determiner, the domain restriction of determiner quantifiers, the accessibility relation of modal quantifiers, the cover variable of the plural operator, and so on). As is, our analysis has nothing to say as to which properties will be prominent or plausible candidates in a context to serve as the contextual domain restriction, but see König & Umbach (2018) for insightful discussion.

\(^{30}\) Given that the denotational parts in (84) correspond to the Montegovian semantic conception of proper names as generalised quantifiers, the assumption of contextual restriction is also required for avoiding the counter-intuitive result that one individual be fully subsumed by another. There are always properties such as self-identity and the precise moment of birth that can not be shared between individuals.

\(^{31}\) We discuss below in how far the domain of a degree quantifier can also be contextually restricted.
This analysis also covers the attributive cases of property equatives like (87) (as well as (2) from the introduction). Even when the PM has been fronted as in (87-a) (see also Lenerz & Lohnstein 2005), it will be interpreted as an adjunct within the noun phrase, just like the morphologically transparently related adjective so+lch ‘such’ in (87-b). The truth conditions for (87) are in (88), and require that there be an x such that x is a horse that Susan bought and x has all contextually salient properties of the horse Black Beauty.

\((87)\)

\begin{align*}
\text{a. } & \text{ Susanne kaufte so ein Pferd wie Black Beauty eines ist.} \\
& \text{Susan bought so a horse how Black Beauty a is} \\
& \text{‘Susan bought a horse like Black Beauty.’} \\
\text{b. } & \text{ Susanne kaufte ein solches Pferd wie Black Beauty eines ist.} \\
& \text{Susan bought a such horse how Black Beauty a is} \\
& \text{‘Susan bought a horse like Black Beauty.’}
\end{align*}

\((88)\)  
\[\exists x [x \text{ is a horse } \& \text{ Susan bought } x \& \{f': C(f') \& \text{B.B. is a horse that is } f'\} \subseteq \{f : x \text{ is } f\}]\]

We sketch a Logical Form that derives the intended truth for (87-a) and (87-b) in (89). This Logical Form is characterised by three movements: Firstly, Quantifier Raising of the indefinite noun phrase from its object position, secondly, wh-movement within the complement clause, and thirdly, noun-phrase internal short-distance Quantifier Raising of the so...wie-constituent, the XP in (89). We assume that the so...wie-constituent originates within an AP-modifier that hosts an internal subject variable in its specifier position (that is abstracted over at a higher syntactic position) (see also Heim & Kratzer 1998, pp.221-229). As the XP is not interpretable in situ for type reasons, it undergoes an –in this case very short – movement that parasitically inserts it below the lambda binder of the subject variable. With respect to interpretation of the indefinite in the matrix clause, this short-distance movement of the so...wie-constituent guarantees that the indefinite and its restrictor Pferd ‘horse’ are interpreted outside of the scope of the property comparison quantifier.

\[32\] From the view of the interface with syntax, there is more (and interesting) work to be done here, of course. For interesting syntactic micro-variation in this area, see also Kallulli & Rothmayr (2008).

\[33\] Circling back to the interpretation of the indefinite determiner in attributive comparison constructions (see footnote 10 above), note that the indefinite noun phrase in the wh-constituent in this example is interpreted predicatively, hence the issues discussed above do not arise. They arise equally for example like (i) below however, provided by one of our reviewers.

\[(i)\]

\text{Susanne hat so ein Pferd [wie dort eines auf der Weide steht].}

\text{Susan has so a horse how there a on the pasture stands}

\text{‘Susan owns a horse like the one on the pasture over there.’}

\[34\] We would like to thank Sigrid Beck and one of our reviewers for in-depth discussion. The LF of attributive comparisons (see also footnotes 10 and 33) still requires further research, though: Notice that the syntax we propose here runs into problems with respect to the licensing conditions imposed by ellipsis when the ellipsis site is larger than a mere NP, as in (i) with VP-ellipsis, courtesy of the reviewer: Here, we would lack an appropriate antecedent, i.e. one excluding the ellipsis site, when applying the very short AP-internal movement of the property quantifier that we propose in (89).

\[(i)\]

\text{Sabine kaufte so ein Pferd wie Anna <ein Pferd kaufte>.

Sabine bought so a horse how Anna a horse bought}

\text{‘Sabine bought a horse just like the horse that Anna bought.’}
The complement of the indefinite determiner in the complement clause in (89) has undergone ellipsis in examples like (87), as indicated by the presence of ellipsis-triggered phi morphology on the determiner *ein-es*. As a result of ellipsis in the complement clause, the property of being a horse must also be a property that Black Beauty and Susan’s horse share. The oddness of (90-a) is thus expected: Being a cow and being a horse are mutually exclusive properties. This reasoning extends to the example in (90-b): Being an all black horse is incompatible with having a white coat.

(89)

(90) a. #Susanne will auch so ein Pferd wie Black Beauty, aber eine Kuh.
   ‘Susan wants just such a horse like Black Beauty. But she wants a cow.’

b. #Susanne will auch so ein schwarzes Pferd wie Black Beauty, aber in Weiß.
   ‘Susan wants also so a black horse how Black Beauty but in white’

Returning to the observable parallels between degree and property equatives, we would like to conclude this subsection by briefly discussing the case of adverbial property equatives. We repeat a simplified version of the relevant example below. In (79), quantification is over properties of events. The lexical entry in (91) accommodates this observation. The example receives the interpretation in (92).

When it comes to the interface between syntax and semantics, attributive comparatives are indeed, as one of the reviewers points out, “a tough nut to crack” (see also Berezovskaya 2019).
Beckedahl spricht so wie er immer spricht.

Beckedahl talks so how he always talks

‘Beckedahl talks just like he always does.’

\[ [s_{\text{event property}}] = \lambda C_{\langle\langle v,t \rangle, t \rangle} \cdot \lambda R'_{\langle\langle v,t \rangle, t \rangle} \cdot (f' : C(f') \& R'(f')) \subseteq \{ f : R(f) \} \]

\[ \exists \{ f' : C(f') \& \forall e' [ e' \text{ is an event of B. talking } \rightarrow f'(e')] \} \subseteq \{ f : f(e) \& e \text{ is an event of B. talking} \} \]

The set of contextually salient properties which generally characterize Beckedahl’s speaking must be a subset of the properties which characterize his way of speaking in the particular evaluation situation. Shifting from degrees to properties of events or individuals thus allows for an analysis of predicative, attributive and adverbial uses of the non-scalar use of German so...wie that proceeds in a structurally parallel fashion.

4.2 Structural similarities between degree and property equatives

Beyond grammatical form and syntactic distribution, the scalar and the non-scalar use of so...wie share a number of syntactic and semantic properties that lend further plausibility to an analysis that systematically relates the different uses. The parallels are summarised in Table 4, where DegEq stands for the the degree equative, the use of so...wie with scalar predicates, and PropEq stands for the property equative, the use of so...wie with non-scalar predicates.

|                     | DegEq | PropEq |
|---------------------|-------|--------|
| Syntactic distribution (attributive, predicative, adverbial) | ✓     | ✓      |
| Scope ambiguities | ✓     | ✓      |
| Negative Island Effect | ✓     | ✓      |
| Negative Polarity Items | ✓     | ✓      |

Table 4: Shared properties of degree and property equatives

Before we review the remaining properties on this list, we would like to remind the reader again of the differences between English and German when it comes to the syntactic distribution of as...as as opposed to so...wie. Across the board, the PM in English cannot receive a property reading, and the SM-phrase does only give rise to a property equative reading when used with a verbal marker, as in (95). Attributive uses are either ungrammatical or do not result in the intended interpretation, as in (93). Predicative and adverbial uses of the PM always result in ungrammaticality, as is shown in (94) and (95).

(93) a. *Nadine scored an as goal as Sigrid.  –attributive–
     b. #Nadine scored a goal as Sigrid.

     Intended: ‘Nadine scored a goal in the same manner than Sigrid.’

(94) *No woman is (as) as you.  –predicative–

     Intended: ‘No woman is like you.’

(95) John (*as) danced as Sue did.  –adverbial–
The cross-categorial analysis outlined for German *so...wie* in the previous section thus does not extend to English, that is, as Rett (2013) suggests, English PM *as* may not receive a property-based analysis. We return to this difference in section 5.

**Scope ambiguities.** Under the quantificational approach, we should be able to witness scope ambiguities in the right kind of structural configurations even when *so...wie* talks about properties. Consider (97) in the context of (96), where the property equative is embedded under a deontic possibility modal. The context makes available the three event properties in (98), which will be the extension of the complement clause *wie du deine Mittel verwenden darfst* ‘how you are allowed to spend your funds’.

(96) **Context:** A colleague from a university from outside the country tells me about the restrictions there are for spending a certain type of funding. The restrictions are as follows: He’s okay to buy books, computer hardware and lab equipment. I reply...

(97) 

...dass ich meine Mittel genauso verwenden darf wie du.

that I may use my funds exactly, so use may how you

‘...that I may use my funds in the same way like you.’

(98) \[ C = \{ \lambda e. e \text{ is an event of buying books}; \lambda e. e \text{ is an event of buying lab equipment}; \lambda e. e \text{ is an event of buying computer hardware} \} \]

If the property quantifier scopes below the modal, we get a reading under which it is possible for me to buy books, lab equipment and computer hardware with the funds I have, see (99). (There may, however, be other worlds, in which I buy other stuff in addition, say office furniture, or hire a lab assistant. There may also be worlds in which I only buy lab equipment.)

(99) modal \(\gg\) property quantifier:

In some world \(w\) deontically accessible from the actual world \(w_\emptyset\):

\[ C = \{ m : \text{I use my funds in manner } m \text{ in } w \} \]

If the property quantifier takes wide scope, we derive the reading to which we referred as upper-limit reading in the case of degree quantification. The three eventualities listed in \(C\) constitute an exhaustive description of how I can spend my funds, that is, there are no other options. The continuation in (100) brings out this reading. The truth conditions are spelled out in (101).

(100) \textit{Und nicht anders.}

and not otherwise

‘And not otherwise.’

(101) property quantifier \(\gg\) modal:

\[ C = \{ m : \exists w [\text{ACC}(w, w_\emptyset) \& \text{I use my funds in manner } m \text{ in } w] \} \]

Both readings are readily available, as predicted under a quantificational analysis. We turn next to some properties of the complement clause in German property as opposed to degree comparison, starting with the interpretation of negative elements.
**Negative Island Effects.** Out of the blue, adding a negation to the *wie*-constituent of a property equative is at best odd, as shown in (102).

(102) ??*Peter ist so [wie Maria nicht].*

Peter is so how Mary not
‘Peter is just like Mary isn’t.’

However, we provide below a number of naturally occurring (and more naturally sounding) examples, along with the denotation of the respective complement clause.

(103) a. *Weil Rösler öffentlich nicht ankommt, wie er ist, präsentiert er sich inzwischen immer öfter so, wie er nicht ist. Er macht jetzt keine Witzchen mehr, bleibt vor Publikum stets ernst. Wichtiges liest er nun auch schon mal ab, früher sprach er stets frei.*

“As Philipp Rösler does not have any success in public the way he is, he now frequently presents himself in a way that he actually isn’t. He does not joke around any more and is stern in front of audiences. He reads off important announcements and does not speak freely any more, as he used to.”

b. *Er präsentiert sich so, [wie er nicht ist].*

he presents REFL so how he not is
‘He presents himself in a way how he is actually not.’

c. \{f : C(f) & \neg f(P.R.)\}

(104) a. *Sie [die Medien] ... zeigen den Islam so, wie er nicht ist.*

“The media portray Islam in a way that it is not.”

b. *Die Medien zeigen den Islam so, [wie er nicht ist].*

the media show the Islam so how he not is
‘The media portray Islam in a way that it is not.’

c. \{f : C(f) & \neg f(Islam)\}

(105) a. *... im Rahmenprogramm sehen sie [die ARD] die Realität mit Vorliebe so, wie sie nicht ist: als Blut-und-Boden-Fabel, als abstruse TV-Posse... und als staatserhaltenden Polizei-Thriller.*

“In their fringe programme, they, the consortium of public broadcasters in Germany, have a fondness to depict the reality just like it is not: As a fable of blood and soil, as an abstruse farce, and as a state-supportive police thriller.”

b. *Der Sender sieht die Realität mit Vorliebe so, [wie sie nicht ist].*

the station views the reality with preference so how it not is
‘The station prefers to depict reality in a way that it really isn’t.’

c. \{f : C(f) \neg f(\text{reality})\}

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35 „Der Fremde,“ *Die Zeit*, January 5, 2013 (URL: http://www.zeit.de/2013/02/Philipp-Roesler-Schicksal/, accessed February 10, 2014).

36 Daniel Förster, „Dabei hat das nichts mit dem Islam zu tun,“ *Moritz*, July 16, 2007 (URL: http://webmoritz.de/2007/07/16/archiv8140/, accessed October 14, 2013).

37 „Gute Partner,“ *Der Spiegel*, December 14, 1970, p.183 (URL: http://magazin.spiegel.de/EpubDelivery/spiegel/pdf/43822502, accessed July 19, 2015).
Crucially, the sets forming the quantificational domains in the above examples can all plausibly be viewed as finite sets in the context provided: For (104), for instance, quantification is over a certain set of contextually constrained properties that do not hold of Islam as discussed in the interview, and the set of properties which the media attribute to Islam: The property equative requires the former to be a subset of the latter: \{f : C(f) \& \neg f(\text{Islam})\} \subseteq \{f' : f'(\text{the portrayal of Islam in the media})\}. As the subset relation may hold between these sets, (104) does not give rise to the Negative Island Effect, unlike with degree equatives and their unbounded sets of degrees. \(^{38}\) Other types of negation like negative indefinites in the complement clause do not give rise to uninterpretability either as long as there is a plausible finite set of properties recoverable from the context. Consider (106), for instance, where the negative indefinite is plausibly interpreted within the complement clause. Here, the complement clause denotes the set of contextually salient properties \(f\) such that there is no woman of which \(f\) is true.

\[\text{(106)} \quad \text{Helena ist so wie keine andere Frau (ist).} \]

Helena is so how no other woman is
‘Helena is like no other woman.’
\[\{f : C(f) \& \neg \exists x [\text{woman}(x) \& x \neq H \& f(x)]\} \subseteq \{f : f(H)\}\]

We derive that the sentence is true if and only if Helena has all contextually salient properties that no woman in the domain of quantification has. \(^{39}\)

In the light of these data, we might ask whether contextual domain restriction is also available as a rescue strategy to lift the Negative Island Effect in the case of degree comparison. \(^{40},^{41}\) Closer scrutiny reveals that this is indeed the case. A relevant example might be (107), in which the context makes available three years as an upper limit of the age scale. The complement clause does not only contain a negation but in addition the scalar particle \(\text{noch}\) (‘still’), which is anaphoric to this degree. \(^{42}\) Comparison is thus with the set of age degrees below the age of three that Sammy has not yet reached, (108).

\[\text{(107)} \quad \begin{align*}
\text{a. Context: Sammy is really looking forward to his third birthday next week.} \\
\text{Tine just celebrated her third birthday.} \\
\text{b. Tine ist jetzt so alt wie Sammy noch} \quad \text{noch} \quad \text{nicht} \quad \text{ist}. \\
\text{Tine is how so old how Sammy still not is} \\
\text{‘Tine has now reached an age that Sammy has not yet reached.’}
\end{align*}\]

\(^{38}\) It is thus not contextual domain restriction per se that obviates the NIE in these examples, but context making available or allowing for accommodation of a finite set of properties. We would like to thank one of our reviewers for discussion of this point.

\(^{39}\) In the absence of lexical alternatives to property \(\text{so... wie}\) (like a corresponding property comparative construction), the property equative construction does not give rise to a scalar implicature. This also means that there is no exhaustivity operator for the NI-licensing negation to take scope over.

\(^{40}\) We would like to thank an anonymous reviewer for raising this question, and Sigrid Beck for discussion.

\(^{41}\) Fox & Hackl (2006, p. 546, fn. 13) also entertain the possibility that context may add a further restriction on the domain of a degree quantifier, but do not provide an example. See Hofstetter (2012) for cases where a negation does not result in ungrammaticality in the standard-constituent of the comparative, such as Better low pay than no pay.

\(^{42}\) For a semantic analysis of these particles, see, e.g., Ippolito (2004) and Beck (2020).
The comparative ease with which we are able to restrict the domain of quantification of the property equative when compared with the degree equative is plausibly a result of the type difference and the relative abstractness of degrees as compared to properties. Crucially, though, degree and property equatives behave alike in that they both allow for the contextual voiding of NIEs.

**Negative Polarity Items.** Just like their degree counterparts, property equatives license the NPI überhaupt (‘at all, even’) in the wie-constituent, as we show in (109). However, just as with degree equatives, jemals (‘ever’) appears to be unacceptable in cases such as (110). We do yet again find 19th century examples where the NPI is licensed, such as (111).

(109)  
*Unser Karnevalsspezial ist so [wie das Leben überhaupt] – janz jeck.*  
‘Our carnival special is so how the life at all completely crazy’

(110)  
*Susanne möchte so ein Pferd [wie sie jemals geritten ist].*  
‘Susan would like a horse just like the one she ever rode.’

(111)  
... das hohe Ansehen...,  
the high reputation  
welches England jetzt noch eben so [wie jemals in der politischen Welt genieße].  
which England now still DISC so how ever in the political world enjoys  
‘...the high reputation which England now still may enjoy in the political world, in the same manner as ever.’

Degree and property equatives exhibit a uniform behaviour when it comes to NPI licensing in the complement clause.

### 4.3 Interim summary

Extending the quantificational analysis of degree equatives to the property uses of German so...wie does not require more than shifting to a different quantificational type domain, namely properties of individuals or events. (This is also reflected in the terminology we have introduced, under which there are degree and property equatives.) Albeit different semantic types in our model, degrees might be thought of as standing in a one-to-one mapping

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43 Adapted from “Janz Jeck”, *Blick aktuell: Aus Liebe zur Heimat*, June 21, 2016 (URL: https://www.blick-aktuell.de/Verlosungen/Janz-Jeck-sowie-das-Leben-ueberhaupt-241345.html, accessed November 27, 2019).

44 *Oesterreichischer Beobachter* (July 1, 1836, p. 1125).
relation with equivalence classes, particular sets of individuals or events (and thus properties). Support for this unified analysis comes from the many properties that the degree and the property interpretation of German so...wie share, summarised in Table 5, where Comp stands for the comparative and Equ for the equative construction.

|                          | Comp | Degree Equ | Property Equ |
|--------------------------|------|------------|--------------|
| Syntactic distribution   | ✓    | ✓          | ✓            |
| (attributive, predicative, adverbal) |      |            |              |
| Scope ambiguities w/ modals | ✓    | ✓          | ✓            |
| Negative Island Effect (NIE) | ✓    | ✓          | ✓            |
| Contextual voiding of NIE | ✓    | ✓          | ✓            |
| NPIs licensing in complement | ✓    | (✓)        | (✓)          |

Table 5: Degree and property comparison, compared

Extending the standard quantificational analysis for the degree equatives in (27) to properties, in (80), is straightforward, but also raises the question as to the underlying status of degrees in the grammar (see also C. Anderson & Morzycki 2015).

(27) \[ s_0 \text{degree} = \lambda D'_{(d,t)} \cdot \lambda D_{(d,t)} \cdot \{d : D'(d) = 1\} \subseteq\{d : D(d) = 1\}\]

(80) \[ s_0 \text{property} = \lambda R'_{(f',t)} \cdot \lambda R_{(f,t)} \cdot \{f' : R'(f') = 1\} \subseteq\{f : R(f) = 1\}\]

One perspective on the status of degrees in the grammar is that they are ultimately a derived notion. One way in which to get a grammar of degrees off the ground would be to put it on a more basic conceptual footing, such as properties. We discussed above how degrees can be conceived of as a special type of properties, namely equivalence classes. That the grammar of degrees may ultimately be derived from the grammar of another concept is also plausible from a cognitive perspective, as re-use and extension of already existing capacities is considered a central organisational principle in the functional structure of the brain (see M. L. Anderson 2010 and references therein). Crucially, though, if there is an asymmetry between the status of degrees and properties in the grammar (and specifically when it comes to the equative construction), we would expect it to be reflected in grammaticalisation patterns in language change (see also König 2015 and Wood 2016), language variation (Beck et al. 2009 and subsequent research), and in the time course of child language acquisition.

5 Discussion

5.1 The type difference, revisited

We saw in the introduction that German is in good company in that (at least Indo-European) languages frequently chose to use the same functional material to talk about degrees and properties. For German, we find this not only in the case of the equative construction, but also in the pronominal case, as in (112) from Umbach & Gust (2014, p. 75, no. (1)) and in (113), which illustrate the deictic and the anphoric use of so as a degree, quality or manner demonstrative (see Umbach & Ebert 2009; Wiese 2011; Tiemann, Hohaus & Beck 2012; König & Umbach 2018). A straightforward analysis of these cases would be to analyse so as
a free proform of type $d$, type $\langle e, t \rangle$ or type $\langle v, t \rangle$, respectively, whose interpretation proceeds via the variable assignment function (but see Umbach 2014 and Umbach & Gust 2014).

(112) a. (Speaker indicating a height with their hand):
   b. *So groß ist Anna.*
      so tall is Anna
   ‘Anna is this tall.’
   c. (Speaker pointing to a car in the street):
   d. *So ein Auto hat Anna auch.*
      so a car has Anna also
   ‘Anna has a car like this, too.’
   e. (Speaker pointing to someone skinning and de-boning a fish):
   f. *So hat Anna den Fisch zerlegt.*
      so has Anna the fish disassembled
   ‘This is how Anna skinned and de-boned the fish.’

(113) a. *(Bastians Oma ist 86 Jahre alt.) Meine Oma ist auch *so alt.*
   Bastian’s gran is 86 years old my gran is also so old
   ‘(Bastian’s gran is 86 years old.) My granny is this old, too.’
   b. *(Kai fährt *nen rot en Sportwagen.) Eva kauft sich jetzt auch *so ein Auto.*
      Kai drives a red sports car Eva buys refl now also so a car
   ‘(Kai drives a red sports car.) Eva is now going to buy herself a car like this, too.’
   c. *(Sonja hat ihre Dissertation beim Universitätsverlag veröffentlicht.)
      Sonja has her dissertation with+the university.press published
   Nadine hat das auch *so gemacht.*
      Nadine has this also so done
   ‘(Sonja published her dissertation with the university press.) Nadine did it like that, too.’

We find the same pattern with the *wh*-word *wie*, which is used for degree questions as well as in inquiries about the properties of objects or about eventualities, as illustrated in (114).

(114) a. *Wie alt ist Madita?*
   how old is Madita
   ‘How old is Madita?’
   b. *Wie ist die Luft in Stuttgart heute?*
   how is the air in Stuttgart today
   ‘How is the air quality in Stuttgart today?’
   c. *Wie hast du das jetzt wieder geschafft?*
   how have you that now again managed
   ‘Now, how did that happen?’

This is most likely not an exhaustive list, but serves to illustrate that in German the type duality (or more strictly speaking, trinity) is exploited by a number of different constructions, in potentially different compositional ways. This observation is also at the heart of C. Anderson & Morzycki (2015, p.791), who write that ‘...a variety of constructions in a
variety of languages suggest a deep connection between kinds, manners and degrees” that does not seem to be a lexical accident. We agree. When it comes to exploring this relation, we are in good company (Carlson 1977, Siegel 1994, Landman 2006, Constantinescu 2011, Rett 2013, C. Anderson & Morzycki 2015). At the same time, it is crucially not the case that the grammar of natural languages allows for functional material to be used for both properties and degrees by default and across the board: German stands out as an exception to the generalisation discussed in Haspelmath & Buchholz (1998) and Rett (2013) in that the PM exhibits this ambiguity between properties and degrees as well.

We take these observations as evidence that while degree and properties are conceptually related, the grammar treats them as distinct. More specifically, the view that we have put forward in this paper is one were the availability of both property and degree readings of the PM is founded conceptually on the fact that degrees can be thought of as special types of properties and can be reconstructed from equivalence classes of individuals or events. At the same time, we maintain that these two are distinct semantic objects in the grammar of German, namely type $d$ versus types $\langle e, t \rangle$ and $\langle v, t \rangle$ (see also Lenerz & Lohnstein 2005).

C. Anderson & Morzycki (2015) explore a different way of thinking about the connection between degrees and properties, via state and event kinds, and a distinct semantic type $k$: Degrees are state kinds, intensionalised equivalence classes of states. Under such an analysis, *six feet* denotes a property of states that realises the state kind of being six feet tall, and gradable adjectives establish a relation between individuals and such states, as in (115).

\[(115) \quad \text{[tall]} = \lambda x. \lambda s. x \text{ is in a certain tallness state s}\]

Comparison constructions then express relations between kinds that are realised by the compare and comparison standard. While we are certainly sympathetic to a conceptually richer type ontology, our plot here was to show how far we get with “the now-typical off-the-shelf variety” (C. Anderson & Morzycki 2015, p. 803) of degrees and properties in an analysis of a number of core cases relating to the German data. An analysis that realises properties and degrees as one semantic type will predict the co-occurrence of degree and property readings as a default, contrary to fact. As far as we can see, even within the set of state kinds, degree state kinds will thus have to be assigned a special status in the grammar, to which functional material in the grammar can be sensitive. Such a distinction will be needed to account not only for the differential interpretation of PMs across languages, but also of degree pronouns, for instance:45 Tiemann, Hohaus & Beck (2012) report a survey of 14 of the languages from the Beck et al. (2009) paper when it comes to the availability of what they call the pronominal measure construction, in (116). Crucially, not all languages in their sample have a degree proform that can occupy the degree argument position of the gradable adjective (even when an overt measure specification would be acceptable in this syntactic position). We provide an example from Thai (Tai-Kadai; Thailand) in (117). While the demonstrative *nîi* (glossed as *nee* below) does have a property use (see also Prasithrathsint 2000), it lacks a degree use. A kind-based analysis would probably have to restrict the denotation of both the demonstrative in Thai as well as the English PM as to a sub-type of kinds then, to the exclusion of degree-state-kinds.

45 See also Moltmann (2015) for further worries related to the kind-based approach to similatives and comparison, among them the observation that degree descriptions do not have the same distribution as kind-referring terms in German.
Last night, John, our neighbour went for a walk with his father along the river. At dinner, he tells his mother about a fish which he saw. His mother asks him what size the fish was. John shows her and replies: “The fish was this big.”

Maria soong 172 cm.
Mary tall 172 cm
‘Mary is 5 ft 6 in tall.’
(Beck et al. 2009, p. 58)

These considerations are also relevant in the light of cross-linguistic variation in the interpretation of gradable adjectives. In a substantial number of languages, the analysis of adjective-based comparison constructions does not require the notion of degree (see also Beck et al. 2009; Bochnak 2013, 2015; Bowler 2016; Deal & Hohaus 2019; Hohaus & Bochnak 2020). A relevant example is the conjoined comparative construction. We provide examples from Motu (Austronesian; Papua New Guinea) and Warlpiri (Pama-Nyungan; Australia) in (118). This type of comparative can receive a simple degreeless analysis as asserting that the comparee is considered tall, but the the standard is considered short (Klein 1980).

Mary-na lata to Frank-na kwadoği. – Motu –
Mary-TOP tall but Frank-TOP short
‘Mary is tall but Frank is short.’
(Beck et al. 2009, p. 20, no. (66))

Nyirrpi=ji nguru yukanti. Yuendumu=ju wiri-jarlù. – Warlpiri –
Nyirrpi=TOP country small Yuendumu=TOP big-AUG
‘Nyirrpi is small. Yuendumu is big.’
(Bowler 2016, p. 4, no. (15))

Beck et al.’s (2009) capture this variation with the Degree Semantics Parameter, repeated below from the introduction. The notion of degree thereby offers a simple and elegant way of capturing an important point of cross-linguistic variation. The success of a semantics based on states and state kinds would depend very much on the ability to offer an equally attractive analysis of these data.

Degree Semantics Parameter [± DSP] (Beck et al. 2009, p. 19, no. (62)):
A language {does/ does not} have gradable predicates (type ⟨d, ⟨e, t⟩⟩ and related), i.e., lexical items that introduce degree arguments.

In distinguishing between degreeless and degree-based analyses of gradable adjectives, there is one construction that has played a prominent role, namely the analysis of differential comparatives such as (119), which is considered a cornerstone of any theory of comparison (see von Stechow 1984a,b; Kennedy & Levin 2008; Beck et al. 2009; Beck 2011; Bochnak 2013, 2015; Deal & Hohaus 2019; Hohaus & Bochnak 2020).

Anne is two years older than Gero.
In a nutshell, if (119) would merely require that Anne be considered old and Gero not (like in a conjoined comparative), it is unclear how to incorporate the meaning contribution of two years, which requires an arithmetic addition operation. An unresolved question is whether it is possible to define such an operation over state kinds or states, which will have as its output two years, a property of states realising the state kind of being two years old. We will leave this question for the interested reader.

5.2 Property/degree constructions across languages

While it appears to be a cross-linguistically common strategy to exploit the close conceptual relation between degrees and properties in the grammatical coding, the interpretative possibilities of PMs across languages show that the inventory of property/degree constructions is subject to variation, just as the inventory of degree operators itself is subject to cross-linguistic variation (Pancheva 2006; Beck et al. 2009; Bhatt & Takahashi 2011; Merchant 2009, 2011; Beck, Hohaus & Tiemann 2012; Hohaus 2015; Berezovskaya & Hohaus 2015; Potsdam 2017; Deal & Hohaus 2019; Berezovskaya 2019; Lechner, to appear). There may thus be cases in which degree-related and property-related meanings are not expressed by the same grammatical means. This is the case for the English PM, but not for the SM. As Rett (2013) shows, English PM as can only be analysed as a degree-based expression. The English SM can however also be used in a property relative clause like as Mary did in (120), and shares the syntax and semantics of its German wh-counterpart in a property equative like (121).

(120) John washed the dishes [as Mary did].
(121) Laura wäscht das Geschirr auch so [wie Maria].
   Laura washes the dishes also so how Mary
   ‘Laura does the dishes as Mary does.’

Both as Mary did and its German counterpart denote a set of properties of the event (= manners) described, derived by lambda-abstraction, as in (122-a). The syntactic status of the constituents is different, however: The English as-phrase is an adjunct and interpreted intersectively. In German, the denotation of the wie-constituent is the first argument of a quantificational operator, for which there is no counterpart in English (120). Rett (2013, pp.1122-1123) proposes to interpret the as-constituent as an event property modifier that is interpreted intersectively. We sketch her analysis (somewhat modified for comparability) in (122). The modification analysis requires that the LF structure also makes available the manner in which John washed the dishes. To this end, Rett (2013) stipulates an operator –here, the M-operator in (122-c)–, which shifts John washed the dishes from a property of events to a property of the property of this event. The two resulting manner sets are then combined via a generalised predicate modification, resulting in a set of properties that John washing the dishes and Mary washing the dishes share, in (122-d). The manner argument then will be existentially quantified off by a default closure operation, resulting in the truth conditions in (123).

(122) a. \[\lambda e. \exists f. \forall e \left[ e \text{ is an event of Mary washing the dishes} \land f(e) \right] \]

42
b. \[ [((v_t,t)_M \square \text{John washed the dishes})] = \lambda f'. \exists e' [e' is an event of John washing the dishes & f(e')]
\]
c. \[ [M] = \lambda p((v_t,t), \lambda e. \lambda f((v_t,t)). f(p) & p(e)]
\]
d. \[ \lambda f''. \exists e' [e' is an event of John washing the dishes & f''(e')] & \exists e [e is an event of Mary washing the dishes & f''(e)]
\]

(123) \[ [\text{John washed the dishes as Mary did}] = 1 \text{ iff } \exists f'' [\exists e' [e' is an event of John washing the dishes & f''(e')] & \exists e [e is an event of Mary washing the dishes & f''(e)]]
\]

This analysis correctly predicts that \textit{as}-phrases under their manner interpretation do not license Negative Polarity Items, as is illustrated in (124). NPIs are predicted to be licensed in the \textit{as}-phrase of a degree equative like (49), in which the downward-entailing degree operator (the PM \textit{as}) acts as a licensor (see also section 3.4).

(124) *John dances \textit{as anyone else danced}. \textit{Rett 2013, p.1121, no.(55)}

(49) Paris is as quiet \textit{as ever}. \textit{Rett 2013, p.1121, no.(55)}

The pattern is different in German, where we have seen an entirely parallel behaviour of degree and property equatives (in sections 3.4 and 4.2), in that both do seem to license the NPIs \textit{jemals} ‘ever’ (in restricted cases) and \textit{überhaupt} ‘at all’ (more reliably so). This is predicted under the uniform quantificational analysis of the PM that we propose. Clausal \textit{wh}-constituents without the PM are at best marked in German. Unlike the canonical \textit{so...wie}-examples we have discussed in this paper, their acceptability appears to be subject to significant variation among speakers.

(125) a. ?? \textit{Nadine hat gerade auch ein Tor geschossen wie Sigrid gestern}. Nadine has just also a goal scored how Sigrid yesterday ‘Nadine just scored a goal just like Sigrid’s goal yesterday.’

b. ?? \textit{Nadine hat heute auch gespielt wie Sigrid gestern}. Nadine has today also played how Sigrid yesterday ‘Nadine played like Sigrid.’

c. ?? \textit{Das Wetter heute ist wie es gestern auch schon war}. the weather today is how it yesterday also already was ‘The weather today is just how it was yesterday already.’

English and German thus take quite different compositional routes to property comparison. If we adopt Rett (2013)’s analysis for English, the resulting truth conditions are however also different, as one of our reviewers points out. Property comparison in English is existential quantification, while it involves universal quantification in German. This difference in quantificational force might be subtle to detect in practice as the domain of quantification of the universal quantifier might be narrowed down to a singleton set by the context. Evidence in favour of a universal rather than existential analysis of German property equatives might come from examples such as (126), courtesy of the reviewer, where the relevant properties are explicitly mentioned in the context. The only available interpretation of Anna’s reply in (126) is that she takes both milk and sugar in her coffee, and not just one or the other.
(126)  
a.  Joseph: “How do you want your coffee? Do you want sugar or milk?”
     Maria: “I’ll take mine with sugar and milk.”
     Joseph: “How about you, Anna?”
     Anna replies:
     Ich trinke meinen Kaffee so wie Maria.
      I drink my coffee so how Mary
      ‘I drink my coffee like Mary.’
     c.  #Mit Milch.
        with milk
        “That is, with milk.”
     d.  Mit Milch und Zucker.
        with milk and sugar
        “That is, with milk and sugar.”

While our analysis does not have any explanation to offer as to why the two languages
are different, let us note that the unavailability of property-based readings of the PM in
Present-Day English (PDE) is a result of language change: PDE as developed during the
course of the Middle English Period from a reduction of Old English eall swa ‘all so’, which
still allowed for the property-based readings.46

(127)  Eall swa yfen gegaderað þæt word, eall swa diastole hyt totwæmð.
       all so hyphen gathers that word all so diastole it divides
       ‘Just as the hyphen gathers the word together, even so the diastole divides it.’47
       [ByrM 1 (Baker/Lapidge) 1190(3.3.175), 1011 A.D.] – Old English –

There appears to be an entire research programme waiting here, then, exploring the patterns
in which languages exploit the conceptual connection between degrees and properties in their
grammars and functional inventories, both synchronically and diachronically. Only an in-
depth investigation of the syntax and semantics of the respective constructions (as opposed
to superficially surveying the distribution of certain morphological markers) will be able to
answer these question.

6 Concluding remarks

The narrow focus of this paper has been to develop a unified and compositionally trans-
parent semantics for the different types of comparisons that German so...wie can encode–
comparisons of manner, quality and degree. We have argued that under all of these uses,
the construction relates two sets via the subset-or-equal relation. These can be either sets
of degrees, or sets of properties, of events or individuals. Our starting point for this analysis
was the standard quantificational analysis of the comparative constructions, and the many
structural properties it has been known to share with the equative construction. While a
close relative, it certainly has not received the equal amount of attention in the research

46 Oxford English Dictionary, s.v. “as, adv. and conj.”, Oxford University Press (URL: <https://www.oed.com/view/Entry/11307>, accessed November 25, 2019). We would like to thank Richard Zimmermann for discussion of this point.
47 S. J. Crawford (1929), “Byrhtferth’s Manual” (London: Oxford University Press), vol. 1, pp. 184-185.
literature, and an additional perk of this paper is a comprehensive review of its properties, at least in German, and of the standard quantificational analysis. A simple extension of this analysis to two related semantic types (type \((e, t)\) and type \((v, t)\)) can account for the interpretation of *so...wie* outside of the gradable adjective case (and predicts the many properties the different interpretation share). At the same time, this type duality is not random, we suggest, but founded on the fact that, conceptually, degrees are just special kinds of properties, namely equivalence classes, from which they can be reconstructed. This brings us to the less narrow focus of this paper, the status of degrees in the grammars of natural languages. If the grammar of degree is indeed derived, one pathway for degrees appears to be through re-use of linguistic material that is dedicated to quality or manner. At the same time, it appears that the grammar of degree is however also frequently modelled after the grammar of other, by default scalar, domains such as time and space (see, e.g., Ippolito 2007; von Stechow 2009; Hohaus 2018; Hehl 2015; Beck 2020).

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