CLAUSAL VS. PHRASAL COMPARATIVES

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1. INTRODUCTION

The formal representation of gradable adjectives such as *tall* or *intelligent* is standardly assumed to make reference to the notion of DEGREES, which can be conceived of as points ordered on a SCALE (Cresswell 1976; see also chapter 14, 'Gradable adjectives and degree expressions'). For instance, to be *6 feet tall* means to be tall to a degree which is equal or exceeds the degree that corresponds to 6 feet on the scale of vertical height. As the paraphrase above reveals, even simple degree predicates implicate RELATIONS between degrees. Some of these relations are grammaticalized in DEGREE CONSTRUCTIONS, the most prominent of which include equatives (*as tall as*), superlatives (*tallest*), excessives (*too tall*), their dual, sufficiency constructions (*tall enough*) and comparatives, exemplified by (1).

(1) a. John is taller than 6 feet. → The degree to which John is tall exceeds 6 feet.
b. Ann is taller than Ben is. } → The degree to which Ann is tall exceeds the
c. Ann is taller than Ben. } degree to which Ben is tall.

Semantically, comparatives express the greater-than relation between a degree predicated of the subject to a second degree, commonly referred to as the STANDARD OF COMPARISON, which is provided by the structure following the STANDARD MARKER (*than* in English; terminology adopted from Ultan 1972). The overt form of the standard argument displays a wide range of variability. In (1)a, it is made *explicit* by a MEASURE PHRASE (*6 feet*; see chapter 2, 'Measure Phrases') But the standard can also be introduced *implicitly* by a DEGREE CLAUSE, resulting in a CLAUSAL COMPARATIVE (CC; (1)b), or by a single, usually nominal constituent following *than* in PHRASAL COMPARATIVES (PC; (1)c). The present chapter is concerned with the distinguishing characteristics of CCs and PCs, the analyses these two structures have been given in the literature, and some theoretical implications arising from these accounts for the compositional semantics of degree constructions.

PCs have been posing intriguing challenges for theories of degree constructions mainly for three reasons. First, it needs to be decided whether PCs should be given the same analysis as unreduced CCs, hence affording a uniform semantics for comparatives, or whether there are designated semantic or syntactic mechanisms which are only at work in the derivation of PCs. Among others, the answer to this question has consequences for the organization of the lexicon. If all PCs can be shown to be truncated CCs, it is sufficient to posit a single entry for the comparative relation. By contrast, if it turns out that some PCs are not derivationally related to CCs, the functional vocabulary must be enriched to include lexical entries that are tailor-made to fit the semantics of PCs. An ancillary issue in this area is whether measure phrase PCs ((1)a) and regular individual PCs ((1)c) form a homogeneous class or not.

Second, while historically, the debate outlined above has been wielded between two camps holding adversary positions about PCs universally, largely ignoring language diversity, recent studies, extending the empirical scope from Germanic and Romance to Japanese, Greek, Slavic, Hindi, Chinese and other languages have resulted in a more nuanced cross-linguistic typology of PCs that also strives to account for language variation. Anticipating some results, a consensus has emerged that PCs are derived from CCs in some languages, but not in others, and that not all languages have access to both CCs and PCs in the first place.

Third, the study of PCs has initiated a trend in the search for the sources of semantic diversity, investigating 'deep' semantic differences that cannot be reduced to lexical variation only. Specifically, it has been hypothesized that some languages do not admit binding of object language degree variables, and therefore resort to alternative strategies such as comparison of individuals, instead of degrees (Beck et al. 2004, 2009; Kennedy 2009). Findings in this domain are of relevance as they contribute to a better understanding of the nature of fundamental semantic parameters.

The chapter is structured in four sections. Subsequent to the explication of some background assumptions about degree semantics and the syntax of gradability and comparatives in Section 2, Section 3 will trace the main positions in the history of the study of PCs within the generative framework. Section 3.1 introduces some basic contrasts between PCs and CCs, while 3.2 explores more recent discoveries, focusing on analytical strategies that have been developed in order to accommodate these findings. Section 4 concludes. Even though syntactic criteria play an important role in co-determining the interpretation of PCs, remarks on form will be limited to the necessary minimum.

2. Background: The Syntax and Semantics of Comparatives

The semantics of comparatives involves three central components: (i) a gradable property such as *tall, intelligent* or *many*; (ii) degree semantics, which is commonly taken to be encoded in DEGREE HEADS and morphologically reflected by the presence of comparative morphology (*-er* or *more* in English). Degree heads in turn relate the gradable property to (iii) the standard of comparison, which can be supplied by a measure phrase ((1)a), a full degree clause ((1)b) or a single, typically nominal standard argument in PCs ((1)c). The present section lays out basic assumptions about each of these three ingredients in turn.[1]

2.1. Semantics of gradable adjectives

There are three prominent views on the semantics of gradable adjectives. On the *vague predicate* (also *delineation*) *theory*, gradable and non-gradable predicates (*even*, *linguistic, French*) are assigned the same semantic type (<e,t>), but differ in the way they choose their denotation domain (McConnell-Ginet 1973; Kamp 1975; Klein 1980, 1982; van Benthem 1983; Larson 1988; Sánchez-Valencia 1994). An adjective like *tall* denotes a partial function that partitions the individual domain into three sets: a positive extension which collects all tall entities, a negative extension of individuals that are not tall, and an extension gap for those individuals

[1]For surveys of degree semantics see Klein (1991); Schwarzschild (2008); Beck (2011); Pancheva (2012) and Morzycki (2015).

which are neither tall nor short (Klein 1980).The existence of the third, neutral partition (Sapir 1944) is justified, among others, by the observation that the negation of a gradable adjective (*John is not tall*) does not entail its antonym (*John is short*).

In contrast to the ontologically nominalist vague predicate theory, the second perspective, which has become predominant in the field and will also be adopted here, embraces the realist position that the atomic denotation domain is enriched by degrees of type d (see von Stechow 1984, p. 47ff). Concretely, degrees are abstract representations of measurement that are elements of a partial (i.e. reflexive, transitive and antisymmetric) order. Together with a lexically specified DIMENSION, which determines the property to be measured (e.g. height, length, weight, age or temperature), such an order constitutes a SCALE. Gradable adjective meanings are then defined as expressions of type <d,<e,t>> (or <e,<d,t>>) which denote functions from degrees on a scale, relative to a dimension, to sets of individuals (Seuren 1973; Hellan 1981; von Stechow 1984; Heim 1985; Bierwisch 1989). These degree functions are usually assumed to be monotone decreasing (Gawron 1995: 348; Heim 2001).[2] As a result, a predicate like *tall,* which is lexically associated with a scale of linear extent, has in its extension for each individual the set of degrees from the lowest scale point up to that individual's height ((2)). A sentence like (3)a accordingly states that John is at least six feet tall and assigns to John the set of degrees from zero up to John's actual height, as shown in (3)b. (Bold face marks object language.)

(2) $[\![\textbf{tall}]\!] = \lambda d_d.\lambda x_e.\text{HEIGHT}(x) \geq d$

(3) a. [John is [[6 feet] tall]]
b. $[\![(3)a]\!]$ = $\text{HEIGHT}(\text{John}) \geq 6$ feet

Note that the meaning rule (2) employs the greater-than relation and not identity. This choice is motivated by the observation that intuitively, John qualifies as *6 feet tall* even if he exceeds the explicit standard. Furthermore, defining the degree relation in terms of identity would have the undesirable consequence of assigning to all individuals that fall into the positive extension of a degree adjective a single, contextually given value. Thus, *John is tall and Mary is tall* would wrongly lead one to expect that John and Mary are of the same height (Gawron 1995).

The lexical entry (2) does not make yet explicit, though, how real world objects are related to their metalanguage degree values. This task is delegated to the *Representational Theory of Measurement* (RTM; Krantz et al. 1973). In RTM, a scale is conceived of as an abstraction from objects and their relations in the real world, formally defined as a homomorphism from a qualitative, empirically established order of objects into a numerical structure (usually the set of real numbers $\mathbb{R}$). For instance, the empirical relations among line segments on the left of (4) can be mapped into various homomorphic numerical orders, two of which are spelled out in (4) as μ_1 and μ_2. These order preserving relations μ_1 and μ_2 from individuals to numbers are also known as MEASURE FUNCTIONS (μ). A measure function assigns each object to its position on a scale,

[2] A function f is *monotone decreasing* iff $\forall x \forall d \forall d'[f(d)(x) \wedge d' < d \rightarrow f(d')(x)]$ [Heim 2001: 216]

relative to a given dimension (height, weight, age, etc...).[3]

(4)		*Empirical order*		μ_1	μ_2
	a	_____	→	2	3
	b	_____	→	1	2
	c	_____	→	3	4
		a ≻ b, c ≻ b, c ≻ a		a > b, c > b, c > a	a > b, c > b, c > a

Applied to gradable adjective semantics, the meaning rule (2) can now be decomposed into the measure function HEIGHT of type <e,d>, which maps each individuals to the unique degree of its height, and a functor ($\lambda\mu_{<e,d>}.\lambda d_d.\lambda x_e.\mu(x) \geq d$), turning HEIGHT into a degree function from degrees to individuals. Alternatively, it has been suggested to use bare measure functions as the denotation of gradable adjectives (Bartsch and Vennemann 1973; Kennedy 1999).

The third theory of gradability minimally differs from the degree analysis presented above in that degrees are not primitives of the model but emerge from equivalence classes of individuals (Cresswell 1976). According to this conception, the extension of an adjective like *tall* is partitioned into mutually exclusive cells, each of which contains all individuals of equal height. Since numerical degrees can be conceived of as names for these equivalence classes, this view is for all means and purposes identical to the degree analysis.[4] As already noted, the present article presupposes that the denotation domain also includes degrees.

2.2. Degree heads

In degree constructions, lexical entries of gradable properties such as (2) combine with a member of a family of abstract DEGREE HEAD encoding the positive, equative, excessive, superlative or comparative meaning. It is commonly assumed that these operators are embedded in a functional DegP projection, which also contains the gradable property and the degree complement (Abney 1987; Corver 1990). Although there are in principle at least the three possible factorizations for these three components made explicit in (5), all of which have been explored in the literature,[5] the best account for a transparent mapping from syntax to semantics resides with scheme (5)c, where the AP serves as the specifier and the standard argument is the complement of the comparative degree head MORE:

(5) a. $[_{AP}\ [_{DegP}$ MORE *than*-phrase] A°] (*DegP in SpecAP*)
b. $[_{DegP}$ [MORE AP *than*-phrase]] (*AP and standard as complements of MORE*)
c. $[_{DegP}$ AP [MORE *than*-phrase]] (*AP as specifier, standard as complement of MORE*)

First, (5)c gives substance to a venerable tradition in semantics, also reflected in current analyses

[3] μ_1 and μ_2 both maintain the original qualitative order, but only μ_1 also preserves the proportions. Thus, the set of admissible μ's has to be further restricted. On RTM see Lassiter (2011), Sassoon (2010) and references therein. On measure functions see Klein (1980) and Krifka (1990), a.o.

[4] To be precise, equivalence classes are more expressive than RTM; see Lassiter (2011).

[5] For an overview, see Pancheva (2012), Morcycki (2014) and Lechner and Corver (2017), a.o.

(Cresswell 1976; Heim 1985, 2000; see below), according to which the comparative head and the degree complement form a semantic constituent. Second, the head-complement dependency between Deg° and the degree clause is particularly well-suited to express the fact that different degree heads select for different types of degree complements (*as tall as, taller than*, *too tall to*; Bresnan 1973). Finally, parsing the AP and the degree head into a specifier-head configuration makes it possible to link the emergence of comparative morphology (*-er*) on the head of the AP to feature valuation between two features ([COMP]) on MORE and AP. The more fine-grained syntax of (1)a, including morphosyntactic features, can accordingly be spelled out as in (6):[6]

(6) $[_{TP}$ John is $[_{DegP}$ $[_{AP}$ tall$_{[COMP]}]$ $[_{Deg'}$ MORE$_{[COMP]}$ $[_{standard}$ than 6 feet]]]]

The semantics of MORE has been given a variety of definitions in the literature, which differ, among others, in the domain of the comparison relation (degrees vs. intervals, i.e. connected sets of degrees) and the force of the operators used to quantify over these degrees/intervals in the metalanguage (MAX vs. $\exists$ vs. $\forall$). According to the maximization theory (Russell 1905; von Stechow 1984; Rullmann 1995), the lexical entry for MORE is an expression of type <d,<<d,<e,t>>,<e,t>>> which combines with three arguments – the standard value d, a gradable adjective meaning g and the subject x – and asserts that x's maximal degree of g-ness exceeds the standard d ((7)). The maximality operator (8) functions as a nominalizer (Russell 1905) that returns the singular, maximal degree of the degree predicate.

(7) $[\![\textbf{MORE}]\!] = \lambda d_d.\lambda g_{<d,<e,t>>}.\lambda x_e.\text{MAX}(\lambda d'.g(d')(x)) > d$

(8) $\text{MAX} =_{Def} \lambda D_{<d,t>}.\iota d[D(d) \wedge \forall d'[D(d') \rightarrow d' \leq d]]$

Assuming that measure phrases denote degree descriptions of type d (but see below) and that the complementizer *than* is semantically vacuous (von Stechow 1984; but see below), the sample derivation of (6) proceeds as in (9). The degree head (7) combines with the standard (*6 feet*) first, and takes the gradable adjective denotation as its second argument. As desired, sentence (6) describes situations in which John's maximal degree of height exceeds 6 feet.

(9) $[\![(6)]\!] = [\![\textbf{MORE}]\!]([\![\textbf{than 6 feet}]\!])([\![\textbf{tall}]\!])([\![\textbf{John}]\!])$
$= \lambda d.\lambda g.\lambda x.\text{MAX}(\lambda d'.g(d')(x)) > d$ (6 feet) $(\lambda d.\lambda x.\text{HEIGHT}(x) \geq d)$ (John)
$= \lambda x.\text{MAX}(\lambda d'.\lambda d\lambda x.\text{HEIGHT}(x) \geq d\,(d')(x)) > 6$ feet (John)
$= \lambda x.\text{MAX}(\lambda d'.\text{HEIGHT}(x) \geq d') > 6$ feet (John)
$= \text{MAX}(\lambda d'.\text{HEIGHT}(\text{John}) \geq d') > 6$ feet
$= \iota d[\text{HEIGHT}(\text{John}) \geq d \wedge \forall d'[\text{HEIGHT}(\text{John}) \geq d' \rightarrow d' \leq d]] > 6$ feet

To avoid clutter, the metalanguage will be simplified by using the notational shorthand *λdλx.x is d-tall* for the translation of a natural language predicate like *tall*.

[6]Periphrastic comparatives (*more intelligent*) require a more complex syntax, possibly involving an additional functional projection above DegP that hosts *more* (Corver 1997; Embick 2007; Bobaljik 2012).

Finally, differential comparatives (*John is 2 inches taller than 6 feet*) can be integrated into the analysis by adding a differential degree argument to the revised version of MORE in (10). Differentials are set to zero or existentially bound if left unpronounced.[7]

(10) $[\![\textbf{MORE}]\!] = \lambda d_d.\lambda d'_d.\lambda g_{<d,<e,t>>}.\lambda x_e.\text{MAX}(\lambda d'.g(d')(x)) > d + d'$

As was seen above, the maximization analysis (7) is directly compositional (in the sense of Barker and Jacobson 2007) in that it computes all three components of the comparative – the degree head, the AP and the standard value – *in-situ*. This misses an important generalization, though, brought to attention by Heim (2000) and Stateva (2000). Both the comparative relation expressed by MORE and the degree clause also admit non-surface interpretations. To illustrate, the differential comparative (11) is ambiguous between a wide and narrow scope reading of MORE with respect to the modal *require* (Heim 2000; for a precedent see Gawron 1995). Relevant portions of the LF-representations underlying these readings are spelled out in (12). ($Acc_{Deon}(w)$ denotes the set of deontic alternatives accessible from w.)

(11) The paper is required to be exactly 5 pages longer than 10 pages.
   a. $\lambda w.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow \text{MAX}(\lambda d.\text{the paper is d-long in w'}) = 15 \text{ pages}$
   'The paper must be no longer than 15 pages.' (*require* ≻ MORE, *maximum*)
   b. $\lambda w.\text{MAX}(\lambda d.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow \text{the paper is d-long in w'}) = 15 \text{ pages}$
   'The paper must be at least 15 pages long.' (MORE ≻ *require*, *minimum*)

(12) a. [required [[exactly 5 pages MORE than 10 pages] [the paper be d-long]]]
   b. [[exactly 5 pages MORE than 10 pages] [required [the paper be d-long]]]

The surface scope interpretation (11)a/(12)a states that in all worlds compatible with the regulations, the length of the paper is exactly 15 pages and no longer. This imposes an upper limit on the paper's size. By contrast, the inverse scope reading (11)b equates the length of the shortest paper (viz. the maximal degree all papers reach across worlds) with 15 pages, which amounts to a minimal length requirement.

Notably, the derivation of the LF-representation (12)b implies that the unit *[exactly 5 pages MORE than 10 pages]* can scope out of its base position. Whereas this is unexpected on the maximization analysis, which computes all components *in-situ*, the passage from surface syntax to (12)b finds a natural explanation if the degree head MORE is treated as a second order predicate of degrees, that is a quantificational determiner in the degree domain (Beghelli 1994; Gawron

[7]Lexical entries for the other degree heads can be defined in analogy to MORE. LESS is like MORE with > replaced by <; equatives are based on ≥ or = (Rett 2008). The positive head POS includes a contextually given standard value, e.g. supplied by a standard function, which serves the same purpose as the explicit standard in comparatives. Among others, this accounts for the fact that the comparative (6) does not entail the positive *John is tall*.

(i) $[\![\textbf{POS}]\!] = \lambda d_d.\lambda g_{<d,<e,t>>}.\lambda x_e.\text{MAX}(\lambda d'.g(d')(x)) > \text{standard}(g)$

Note on the side that the meaning of the positive is not a proper subpart of the comparative, even though it appears to be a cross-linguistic universal that comparatives are morphologically derived from the positive form (Bobaljik 2012).

1995; Heim 2000, 2001; Hackl 2000; Bhatt and Pancheva 2004; the differential argument *exactly 5 pages* will be suppressed from here on):[8]

(13) $[\![\textbf{MORE}]\!] = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\text{MAX}(D) < \text{MAX}(D')$ [Heim 2001]

The quantificational version of MORE (13) takes two sets of degree as arguments. The meaning of MPs (*10 pages*) accordingly needs to be adjusted so as to map them into sets of degrees instead of entities of the atomic degree domain. In fact, that MPs are ambiguous between a degree and degree predicate reading has been independently argued for by Schwarzschild (2005, crediting McConnell-Ginet 1973). With this change in place, the combination of MORE and the standard argument (*10 pages*) results in a Generalized Quantifier of degrees (<d,<d,t>>). Similar to individual quantifiers in object position, the unit *[MORE than 10 pages]* undergoes QR in order to avoid a type conflict with its sister adjective denotation (<d,<e,t>>; see (14)a), binding from its landing site a degree variable in the location of the trace.[9] (14)b is the desired semantic derivation mediated by the LF (14)a. (Following Heim and Kratzer 1998, the movement index is subscripted to the λ-binder.):

(14) a. $[[\text{MORE than 10 pages}]_{<<d,t>,t>}\ [_{<d,t>}\ \lambda_1$ required the paper to be d_1-long]]

b. $[\![(14)a]\!] = [\![\textbf{MORE}]\!]\ ([\![\textbf{10 pages}]\!])\ ([\![\textbf{}\lambda_1\textbf{ required the paper to be }d_1\textbf{-long}]\!])$

$= \lambda w.10 \text{ pages} < \text{MAX}(\lambda d.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow$ the paper is d-long in w')

On this 'standard theory' of comparatives, the ambiguity in (11) is explained by the different landing sites for the degree quantifier, hence an ambiguity in syntactic scope. The hypothesis that degree quantifiers undergo QR receives further support from degree clause internal ellipsis phenomena. But since the discussion of the relevant evidence presupposes the articulated structure for clausal degree complements to be introduced in Section 3, discussion will be postponed for the moment.[10] Before proceeding, it is instructive to turn briefly to an alternative

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[8](i) lists three popular alternative meanings for MORE, all of which deliver identical truth conditions for the simple cases (see Pancheva 2012):

(i) a. $[\![\textbf{MORE}]\!] = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.D \subset D'$ [Bhatt and Pancheva 2004]

b. $[\![\textbf{MORE}]\!] = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\exists d[D'(d) \wedge \text{MAX}(D) < d]$ [von Stechow 1984]

c. $[\![\textbf{MORE}]\!] = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\exists d[D'(d) \wedge \neg D(d)]$ [Seuren 1973; Larson 1988; McConnell-Ginet 1973; Ross 1968; Klein 1980; Doetjes et al. 2011, a.o.]

The choice among these versions is not straightforward. For instance, the subset entry is better equipped than the maximization definition to handle degree clauses without a maximum, such as *Ann is shorter than Ben*, which arguably derives from *than Ben is not d-tall* (Beck 2011: 1353). But Beck also notes that this move would, as an unwelcome side effect, undermine von Stechow's (1984) maximization analysis of negative islands (**Ann is taller than Ben is not*).

[9]Early precursors of degree quantifier movement include Dresher (1977: 375ff) and Hellan (1981). Larson (1988) suggests to treat comparatives as generalized quantifier in the individual domain.

[10]The movement analysis also potentially profits from the parallelism between the Specificity Effect ((i)) and the Definiteness Effect in comparatives ((ii); Lerner and Pinkal 1995; Xiang 2005). In both cases, strong determiners appear to block movement of the bracketed constituents:

(i) [Who] did you paint a/*the/*every picture of t.

explanation for the scope facts, though, which will resurface prominently in the discussion of PCs below (see 3.2.5).

Departing from orthodoxy, Alrenga et. al (2012) propose that the comparison relation is not only introduced by the degree head MORE but also encoded in the standard marker *than*, defined as in (16). SUP denotes the supremum function (16), which singles out the least upper bound of a set. In contrast to the maximum, the supremum of a set does not have to be a member of that set itself; for consequences of this assumption see Alrenga and Kennedy (2012).

(15) $[\![\textbf{THAN}]\!] = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \text{SUP}(D) < \text{SUP}(D')$ [Alrenga et al. 2012: (6)b]

(16) $\text{SUP} =_{\text{Def}} \lambda D'_{<d,t>}.\iota d.\exists D[D' \subseteq D \wedge D(d) \wedge \forall d'[D'(d') \rightarrow d' \leq d]]$

(17) a. The paper is required to be exactly 5 pages longer than 10 pages. (= (11))
b. $[[_{<d,t>}\ \lambda_1$ required [the paper is (exactly 5 pages) d_1-long]]
$[_{<<d,t>,t>}\ \text{THAN}_{<<d,t>,<<d,t>,t>>}\ [_{<d,t>}$ 10 pages]]]

Ignoring details as well as the differential argument, the analysis assigns to (11), repeated above as (17)a, the LF-representation (17)b. In contrast to the QR-analysis of comparatives, the degree complement is interpreted in its surface position, from where it binds the degree argument (d_1) of the matrix AP. Since the *than*-phrase can be merged above or below the modal, both readings of (17)a are accounted for. One of the advantages of this alternative conception is that it does not need to stipulate an abstract constituent made up of the degree head and the standard argument, two expressions that do not form a morphosyntactic unit (cf. von Stechow 1984). Another potential benefit of the analysis, to be addressed in Section 3.2, is that it is, at least at first sight, better equipped to capture cross-linguistic morphosyntactic variation.

2.3. The internal structure of degree clauses

In the examples so far, the standard marker was supplied by degree predicates that surfaced as measure phrases. Expanding the empirical scope, the current subsection reviews aspects of clausal degree complements, exemplified in (18), which will equally be seen to denote expression of type <d,t>. (Angled brackets in examples enclose unpronounced nodes.)

(18) a. Ann is taller than OP_1 Ben is <d_1-tall>.
b. Mary wrote better poems than OP_1 John wrote <d_1-good poems>.
c. Sally worked more intensely than OP_1 Bill worked <d_1-intensely>.

From there, the discussion will turn to signature differences between PCs and CCs in Section 3.

The internal makeup of the matrix clause diverges from the structure of the degree clause in two important ways. First, in order to guarantee a transparent mapping procedure from syntactic form to semantic interpretation, it is usually assumed that the degree complement contains a copy of the gradable property introduced in the main clause (*d-tall* in (18)a) that is

(ii) Peter owns a/*the/*every fast[er car than Bill]. [Lerner and Pinkal 1995]

silenced by COMPARATIVE DELETION (CD; Bresnan 1973; see also Lees 1961). As shown by (18), CD may target expressions of different categorial specification, including APs (*d-tall* in (18)a), NPs (*d-good poems* in (18)b) and adverbs (*d-intensely* in (18)c).[11] In analogy to the matrix clause, the gradable property occupies the specifier of DegP, while the complement position of DegP introduces a degree variable (d in (19)) that serves as the external argument of the AP denotation and is bound by an empty operator (OP) in the left periphery of the clause:

(19) Ann is $[_{DegP}$ taller [MORE (than) $[_{<d,t>}$ **OP** $\boldsymbol{\lambda_1}$ Ben is $[_{DegP}$ $<tall_{<d,<e,t>>}>$ $[Deg°_{\varnothing}$ $\mathbf{d_1}]]]]]$

Variable binding relates to the second property that separates the degree complement from the main clause: they fall in the same group of empty operator (OP) movement constructions as relative clauses, topicalization, and *tough* constructions (Chomsky 1977). Syntactic reflexes of OP-movement can be detected in island configurations (**Ann is taller than* OP_1 *Ben invited a friend who claimed that Mary is* t_1). Semantically, fronting of the operator results, as seen in (19), in the formation of a derived predicate of degrees by abstraction over the degree variable. Degree abstraction supplies the matrix degree head MORE ((13)) with a suitable <d,t>-type denotation to combine with. One notable consequence of this system is that the degree head inside the degree clause is semantically empty (but see Alrenga et al. 2012).

In attributive constructions, illustrated in (20), the AP and the common noun have been argued to form a unit which occupies SpecDegP (Lechner 2004). This has at least four desirable effects. First, on the standard analysis of prenominal modifiers, sketched in (20)b, the relation between the operator and its trace is disrupted by an adjunct island. The problem can be avoided if the DegP is organized as in (20)c, though, where the degree variable occupies the complement position of Deg° and the AP moves together with the common noun to SpecDegP:

(20) a. Mary met an older man yesterday than Sally met.
b. *Mary met an older [than ***OP*** λ_1 Sally met $[_{DP}$ a $[_{NP}$ $[_{DegP}$ $[_{AP}$ $\boldsymbol{d_1}$-old] $[_{NP}$ man]]]]]
c. Mary met $[_{DP}$ an $[_{DegP}$ [old man]$_{[COMP]}$ yesterday $[_{Deg'}$ $MORE_{[COMP]}$
[than ***OP*** λ_1 Sally met $[_{DP}$ a $[_{DegP}$ <old man> $[_{Deg'}$ $Deg°_{\varnothing}$ $\boldsymbol{d_1}]]]]]]]$

Second, unlike (20)b, the factorization (20)c does not owe an explanation for why the *than*-phrase is prohibited from surfacing inbetween the AP and the head noun. Third, extraposition out of prenominal adjuncts is generally blocked ((21)a; adapted from Alrenga et al. 2012). Thus, the orthodox analysis, which posits the syntax in (21)b, wrongly predicts that comparatives should be subject to the same constraint. The alternative parse (20)c is not confronted with this challenge, because the *than*-phrase serves as the complement of the matrix degree head.[12]

[11]While the second occurrence of *tall* cannot be phonologically realized in (18)a, a limited set of languages also admits SUBDELETION constructions, which involve two overt, distinct degree predicates (Beck et al. 2009; Kennedy 1999, 2002; Stassen 1985):
(i) Rod A is longer than the door is wide.

[12]The reasoning also extends to approaches that introduce the degree clause in its scope position (Bhatt and Pancheva 2007; Alrenga et al. 2012), as they also need to be able to structurally distinguish between licit ((21)a) and illicit instances of dislocation to the right ((21)b).

(Further extraposition across *yesterday,* as in (20)a, is unproblematic.)

(21) a. *Mary met [an [angry t_1] man] yesterday [at Sally]$_1$.
b. Mary met [an [older t_1] man] yesterday [than Sally met]$_1$.

Finally, in attributive PCs, the size of CD correlates with the position of the degree clause (Bresnan 1973):

(22) a. Mary met a man [$_{DegP}$ [$_{AP}$ older] than Sally <old>].
b. #Mary met an [$_{DegP}$ [older man] than Sally <old man>].

In the postnominal construction (22)a, CD has removed the gradable AP only, whereas in the prenominal comparative (22)b, the sortal conflict triggered by predicating *old man* of *Sally* signals that the elided constituent comprises both the AP and the head noun. A natural interpretation of this asymmetry resides with the assumption that SpecDegP is occupied by an AP in (22)a, but by the larger unit [AP NP] in (22)b.

The remainder of this section turns to independent evidence for the QR theory of comparatives from correlations between ellipsis and coreference. Similar patterns will surface prominently again in the discussion of PCs, where they will aid in adjudicating between competing analyses of the construction.

2.4. The Ellipsis-Scope Generalization

The paradigm (23) documents that the behavior of comparatives parallels that of nominal quantifiers ((23)b) and differs from that of bare plurals ((23)c) in that only the former two constructions can embed an antecedent contained deletion (ACD; Larson 1988; Wold 1995; Lerner and Pinkal 1995). Assuming that ACD-resolution requires that the elliptical VP-node must not be dominated by its antecedent at LF, this indicates that the bracketed constituents in (23)a and (23)b have either been transported to a VP-external position by QR (Wold 1995) or are directly inserted in their scope positions (Bhatt and Pancheva 2004; Alrenga et al. 2012):

(23) a. John was climbing higher trees/more trees [than Bill was __]. [Heim 2001: 230]
b. John was climbing every tree [that Bill was __].
c. *John was climbing trees [that Bill was __].

The claim that degree phrases are mobile is further solidified by correlations between ellipsis scope and disjoint reference effects, captured by the ELLIPSIS-SCOPE GENERALIZATION (Williams 1974; Gawron 1995; Bhatt and Pancheva 2004: 30pp). (24) admits both a wide ellipsis reading (*than Mary's boss tells her to work*) and a narrow ellipsis interpretation (*than Mary's boss works*). This ambiguity is commonly held to be the result of the varying height of attachment for the degree clause, which can, as posited by the QR-analysis, either adjoin to the higher ((24)a) or the lower TP ((24)b):

(24) Her father tells her$_1$ PRO$_1$ to work harder than Mary$_1$'s boss does.

[Bhatt and Pancheva 2004: 30, ex. (63)]

a. [$_{TP1}$ [MORE than λ_2 ***Mary$_1$'s*** boss works d_2-hard]$_{<<d,t>,t>}$ (MORE ≻ *tell*)
[$_{<d,t>}$ λ_3 her father tells ***her$_1$*** to work d_3-hard]]
'Her father tells her$_1$ to work harder than Mary$_1$'s boss tells her to work.'

b. *[$_{TP1}$ Her father tells ***her$_1$*** [$_{TP2}$ [MORE than λ_2 ***Mary$_1$'s*** boss works d_2-hard]$_{<<d,t>,t>}$
[$_{<d,t>}$ λ_3 to work d_3-hard]]] (*tell* ≻ MORE)
'Her father tells her$_1$ to work harder than Mary$_1$'s boss works.'

Furthermore, (24) sanctions coreference between *Mary* and *her* on the wide ellipsis construal (24)a only. This follows if wide ellipsis correlates with attachment of the degree clause to TP1 above the pronoun ((24)a, while in the narrow ellipsis reading, the degree quantifier moves locally to the lower TP2 ((24)b).[13]

To account for the Ellipsis-Scope Generalization, it has moreover to be ensured that the trace of the degree quantifier (d_3 in (24)a) does not contain a syntactic copy of the scoped constituent (*[.... than λ_2 Mary$_1$'s boss works...]*). Otherwise, both LFs in (24) would be expected to be barred by Principle C. Two strategies have been proposed in the literature. Either the degree clause is introduced in the derivation counter-cyclically, subsequent to movement of the degree head MORE to its scope position, as illustrated in the partial derivation (25) (Bhatt and Pancheva 2004). Late Merge of the underlined constituent in (25)b has the effect of inserting the name (*Mary*) at a point where it is no longer c-commanded by the pronoun (*her*):

(25) a. *Move MORE to its scope position*
[MORE [λ_3 [$_{TP1}$ her father tells *her$_1$* PRO$_1$ to work d_3-hard]]]

b. *Late Merge of degree clause*
[[$_{<<d,t>,t>}$ MORE [$_{<d,t>}$ <u>than λ_2 *Mary$_1$'s* boss works d_2-hard</u>]]
[$_{<d,t>}$ λ_3 [$_{TP1}$ her father tells *her$_1$* PRO$_1$ to work d_3-hard]]]

Alternatively, if the comparative relation is assumed to be expressed in the standard marker *than*, the whole degree complement can, as pointed out by Alrenga et al. (2012), be base generated in its scope position, without evoking counter-cyclic insertion:

(26) *Degree clause base generated in scope position*
[[$_{<<d,t>,t>}$ <u>THAN λ_2 *Mary$_1$'s* boss works d_2-hard</u>]
[$_{<d,t>}$ λ_3 [$_{TP1}$ her father tells *her$_1$* PRO$_1$ to work d_3-hard]]]

Thus, both variants of the quantificational analysis find empirical support from correlations between the scope of the comparative relation, measured in terms of ellipsis size, and admissible coreference patterns.

The present section reported findings from the literature indicating that comparative semantics is the result of a second order relation of degrees, encoded in the two-place degree

[13]For an argument against the QR analysis from counterfactual conditionals see von Stechow (1984).

head MORE and possibly also the standard maker THAN. Evidence for degree quantification came from ACD, scope relative to intensional operators and the Ellipsis-Scope Generalization. The following section connects the results so far to the core topic of this chapter, the dichotomy between PCs and CCs.

3. DIRECT ANALYSIS VS. REDUCTION ANALYSIS

PPs differ from CCs in that in the former group of constructions, the standard marker precedes a single, typically nominal constituent:

(27) a. Ann appears to be taller than Ben. (*phrasal comparative*)
b. Ann appears to be taller than Ben appears to be. (*clausal comparative*)

The constituent following the standard marker *than* is the REMNANT. Each remnant is paired with a constituent that it contrasts with in the matrix clause, to be referred to as the CORRELATE (Heim 1985; also sometimes called ASSOCIATE in the literature). In (27)a, for instance, *Ann* is the correlate of the remnant *Ben*.

The cardinal question in the study of PCs, to be explored below, has been whether it is possible to systematically reduce all PCs to elliptical versions of CCs or whether syntactic and semantic properties of PCs warrant a special analysis that precludes a derivational relation to their clausal variants. In the literatures, this dispute manifests itself in two opposing positions. On the REDUCTION ANALYSIS (RA; Smith 1961; Lees 1961; Chomsky 1965; Bresnan 1973; Lechner 1999, 2004; partially Bhatt and Takahashi 2007, 2011; a.o.), all PCs are the product of ellipsis operations targeting an underlying clausal source. *Prima facie*, RA gains plausibility from the observation that degree clauses can be affected by a wide variety of standardly sanctioned ellipsis operations, including Gapping ((28)a), VP-deletion ((28)b), Pseudogapping ((28)c) and Stripping. Stripping, also known as COMPARATIVE ELLIPSIS (Bresnan 1975), produces PCs ((28)d; CD, the deletion which removes the gradable property, is not represented in (28)):

(28) a. Ann visited Berlin more often than Cleo <visited> Dubai.
b. Ann visited Berlin more often than Cleo did <[$_{VP}$ visit Berlin]>.
c. Ann visited Berlin more often than Cleo did <[$_{VP}$ visit t_1]> Dubai$_1$.
d. Ann visited Berlin more often than Cleo <visited Berlin>.

(29) documents that all of these reduction processes are also attested in coordinate structures, in support of the central tenet of RA that degree clauses are legitimate targets for ellipsis:

(29) a. Ann visited Berlin and Cleo <visited> Dubai.
b. Ann visited Berlin and Cleo did <[$_{VP}$ visit Berlin]>.
c. Ann visited Berlin and Cleo did <[$_{VP}$ visit t_1]> Dubai$_1$.
d. Ann visited Berlin and Cleo <visited Berlin>, too.

By contrast, the DIRECT ANALYSIS (DA; Hankamer 1973; Napoli 1983; Hoeksema 1983; Heim 1985; Reinhart 1991; Kennedy 1999; partially Bhatt and Takahashi 2011; a.o.) denies a

derivational relationship between PCs and CCs and treats phrasal standards as base-generated constituents introduced by a prepositional version of *than*.

From a theoretical perspective, the decision between DA and RA is relevant inasmuch as it has repercussions for the broader debate of how to resolve mismatches between the syntactic and the semantic component. Whereas adherents of DA typically posit a greater degree of abstractness or irregularity in semantics, keeping syntactic representations relatively simple and surface oriented, proponents of RA usually attempt to limit semantic variation at the cost of more abstract syntactic representations. Naturally, the choice between these options remains motivated mainly by methodological inclinations and ontological proclivities unless supplemented by empirically based, specific analyses - this is the primary objective of the discussion to follow.

A remark regarding the organization of the remainder of this chapter is in order here. Historically, the debate between DA and RA roughly falls into three periods: an early phase, in which research mainly focused on syntactic and morphosyntactic differences between PC vs. CCs; a period following the introduction of a compositional semantics for PCs (Heim 1985), which made it possible to evaluate theories also according to semantic criteria; and current research, characterized by an increased interest in cross-linguistic variation as well as alternative semantic strategies for modeling PCs (comparison between individuals vs. degrees; Beck et al. 2009; Kennedy 2009). For reasons of perspicuity, the exposition to follow reflects the intellectual history only to a limited extent, anticipating future developments whenever justified by considerations of internal consistency.

3.1. Early period

In general, empirical evidence discriminating between DA and RA derives from three sources: similarities and disparities between the ellipsis processes affecting degree clauses and coordinate structures; (morpho)syntactic restrictions on the standard argument in PCs; and interpretive differences between PCs and CCs. The current section reports core results from all three domains, starting with finding from the 1970ies to the 1980ies.

3.1.1. Initial evidence for RA

The first argument for the reduction analysis consists in the fact that the ellipsis processes targeting degree clauses are not only similar to reduction operations in coordinate structures, but observe exactly the same conditions characteristic of conjunction reduction. To exemplify, in comparatives as well as in coordinate structures, Gapping is unable to reach into embedded clauses ((30)b/(31)b) or delete a finite sentence boundary ((30)c/(31)c; Lechner 2004):

(30) a. Some visited Millhouse more often than others <visited> Bart.
b. *Lisa said that some visited Millhouse more often than Otto claimed that others <visited> Bart.
c. *Lisa said that some visited Millhouse more often than Otto <claimed that others visited> Bart.

(31) a. Some visited Millhouse and others <visited> Bart.
b. *Lisa said that some visited Millhouse and Otto claimed that others <visited> Bart.
c. *Lisa said that some visited Millhouse and
Otto <claimed that others visited> Bart.

Second, in V2-languages like German, verb ellipsis is prohibited from operating across overt complementizers both in comparatives and coordinate structures (Lechner 2004; Hendriks 1995).

(32) a. Ich glaube daß mehr Leute das Buch lesen als (*daß) ⌂ den Artikel$_{ACC}$ <lesen>.
I believe that more people the book read than that the article read
'I believe that more people are reading the book than the article.
b. Ich glaube daß Hans das Buch liest und (*daß) Maria den Artikel$_{ACC}$ <liest>.
I believe that H. the book reads and that M. the article reads
'I believe (that) John is reading the book and Mary the article.

Next, the PC (32)a also illustrates the requirement that morphological case marking of the remnant matches that of the correlate. This is expected on the reduction analysis, which posits the same hidden structure in degree clauses that is found in analogous conjunctions ((32)b). Finally, to mention a fourth similarity, comparatives resemble coordinations also in that they admit ATB-movement. ATB-movement is for instance implicated in the analysis of (33), which is ambiguous between the two alternative parses (33)a and (33)b:

(33) Someone gave Ann a more expensive present than Ben.
a. Someone gave Ann a more expensive present than Ben < gave Ann>.
b. Someone$_1$ t_1 gave Ann a more expensive present than <t_1 gave> Ben.

While (33)a can be derived by Stripping, the indefinite in (33)b must have been removed by ATB-movement, as evidenced by the fact that the missing subject inside the ellipsis is interpreted as a bound variable. It follows that (33)b is the result of Gapping and ATB-movement, and not a construction specific process of subject-verb deletion.

Another type of argument for RA derives from conditions on the external distribution of the standard phrase in PCs. As seen in (34), *than*-phrases obligatorily undergo extraposition (Pinkham 1985: 108). The ill-formedness of (34)b naturally falls out from the ellipsis analysis, since Gapping ignores contexts in which the antecedent precedes the Gap, yet remains mysterious for proponents of the direct account of PCs (see Bhatt and Takahashi 2007 for a possible reply):

(34) a. Unfortunately, more people like Mozart [than <like> Bach].
b. *Unfortunately, more people [than <like> Bach] like Mozart.

In sum, homologies between coordinate structures and comparatives, some of which have been collected above, give substance to the claim that all variation in the surface shape of degree clauses is reducible to standard ellipsis operations. On further evidence for the parallel behaviour of ellipsis in comparatives and coordinate structures see Hendriks (1995) and Lechner (2004).

3.1.2. Initial evidence against RA

While deriving all PCs from CCs by deletion represents the methodologically most attractive position, it was recognized early on that the radical ellipsis analysis over- as well as undergenerates (Hankamer 1971, 1973; McConnell-Ginet 1973; Pinkham 1982, 1985; Hoeksema 1983; Brame 1983; Napoli 1983; a.o.). To begin with, it is possible to find CCs that cannot be pruned into well-formed PCs, suggesting that RA overgenerates. Illustrative of these cases are PCs with expletive remnants ((35)a; Brame 1983).

(35) a. There couldn't have been any more people than there *<were>. (✗*PC*/✓*CC*)
b. There were some good solutions and there *<were> some bad ones

However, (35)a receives a natural explanation once it is taken into consideration that remnants of Gapping are necessarily focused, irrespective whether they are embedded in comparatives or coordinate structures ((35)b; for further instances of apparent overgeneration see Lechner 2004).

Conversely, there are also PCs which lack a well-formed underlying clausal source and can therefore, it has been argued, not be the result of reduction operations targeting a sentential degree complement. Representative for this group of arguments from under-generation is the observation that reflexive and accusative remnants are only found in PCs (Hankamer 1973):

(36) a. Nobody is taller than himself <*is>. (✓*PC*/✗*CC*)
b. Ann is taller than me <*am>. (✓*PC*/✗*CC*)

But contrasts such as the ones in (36) pose a challenge to RA only as long as it is assumed that all non-phrasal degree complements are full, tensed clauses. If this restriction is lifted, the sister constituent of *than* can be parsed as a small clause, in analogy to the ECM-constructions in (37). Crucially, since small clauses lack tense specification, which is in turn responsible for establishing a binding domain and assigning nominative case, the PCs in (36) receive now an analysis parallel to that of (37) (Lechner 1999, 2004: 181; Pancheva 2006):

(37) a. Nobody considered [$_{\text{small clause}}$ himself tall].
b. Ann considered [$_{\text{small clause}}$ me tall].

On this view, small clause PCs consist of a degree predicate, a degree variable and the subject, resulting in a formula. To accommodate type mismatches, the degree variable accordingly needs to be abstracted over (Pancheva 2006), such that the small clause can semantically combine with the comparative relation MORE (or a version of *than*, as in Pancheva 2006).

(38) ...MORE (than) [$_{\text{small clause, <d,t>}}$ λd_1 [me [$_{<e,t>}$ d_1-tall$_{<d,<e,t>>}$]]]

Independent support for the small clause hypothesis comes from (22)a, repeated below as (39)a, and the narrow ellipsis reading of (39)b. In both examples, the comparative complement embeds a bare degree predicate, demonstrating that the ellipsis site can be subclausal:

(39) a. Mary met a man older than Sally <d-old>. (= (22)a)
b. Mary met an older man than Bill <d-old man>.

Apart from its small clause reading, (39)b also has a broad construal on which the ellipsis is reconstruced as *than Bill met a d-old man*. Interestingly, as pointed out by Beil (1997), only the wide ellipsis reading (40)a is subject to the Definiteness Effect (Lerner and Pinkal 1995, a.o.):

(40) a. *Sue defeated every stronger contestant than Bill (did) <defeat every d-strong contestant>.
b. Sue defeated every stronger contestant than Bill <d-strong contestant>.

This follows because in (40)a, ACD-resolution imposes a movement requirement on the *than*-phrase, which in turn conflicts with the Name Constraint (see fn. 10 and Xiang 2005), whereas the base generated small clause PC (40)b can be interpreted *in-situ.* Taken together, these considerations furnish further support for the view that PCs can also be interpreted as small clauses, defusing a classic pair of arguments against RA.

Qualitatively different evidence in favor of DA has been adduced on the basis of two further asymmetries between PCs and CCs. First, the purported clausal source of PCs like (41)a is nonsensical. Second, as documented by (41)b, extraction is possible out of PCs only:

(41) a. She ran faster than the world record (*ran). (✓*PC*/✗*CC*)
b. Who_1 is Ann taller than t_1 (*is). (✓*PC*/✗*CC*)

Based on the contrasts in (36) and (41), Hankamer (1973) argues that *than* is ambiguous between a prepositional version, restricted to PCs, and a complementizer which surfaces in CCs only. Again, these objections against RA have not gone unchallenged. And just like above, the response rests on the hypothesis that PCs can also be construed as non-elliptical small clauses. In (41)a, *the world record* presumably serves as the subject of an empty, contextually specified degree predicate like *10 seconds* or *15mph* (see discussion below (13); Heim 1985; Lechner 2004; Pancheva 2006). Since RA does not deny the existence of small clause complements, the problem disappears. As noted in Pancheva (2006), the possibility of remnant extraction (41)b also falls out from the small clause analysis, because it effectively treats PC-remnants as ECM subjects, and ECM subjects are known to be mobile. Further diagnostics for the presence of structure inside PCs will be introduced in 3.3. But first, it needs to be determined how the direct analysis maps PCs onto their semantic representations.

3.2. Intermediate period

Base generated PCs cannot be handled by the meaning rule for MORE in (13), among others because in PCs, the first argument of the degree head is an individual term and not a degree predicate. It has therefore been proposed that the grammar includes a second, alternative comparative degree head MORE_{PC} for the compositional translation of PCs defined as in (42)

(Hoeksema 1983; Heim 1985; Kennedy 1999, 2009; Bhatt and Takahashi 2007, 2011).[14] MORE_{PC} is a ternary operator that applies to the individual remnant, a gradable property and the correlate, in that order:

(42) $[\![\textbf{MORE}_{\textbf{PC}}]\!] = \lambda x_e.\lambda g_{<d,<e,t>>}.\lambda y_e.\text{MAX}(\lambda d.g(d)(x)) < \text{MAX}(\lambda d.g(d)(y))$

The sample derivation (43) illustrates the semantic contribution of MORE_{PC} in predicative PCs:

(43) a. Ann is taller than Ben.
b. LF: Ann is [[$_{\text{DegP}}$ tall [MORE_{PC} than Ben]]
c. $[\![(43)]\!] = [\![\textbf{MORE}_{\textbf{PC}}]\!]([\![\textbf{Ben}]\!])([\![\textbf{tall}]\!])([\![\textbf{Ann}]\!])$
$= \lambda x_e.\lambda g_{<d,<e,t>>}.\lambda y_e.\text{MAX}(\lambda d.g(d)(x)) <$
$\text{MAX}(\lambda d.g(d)(y))(\text{Ben})(\lambda d\lambda x.\text{tall}(d)(x))(\text{Ann})$
$= \text{MAX}(\lambda d.\text{tall}(d)(\text{Ben})) < \text{MAX}(\lambda d.\text{tall}(d)(\text{Ann}))$

If, alternatively, the comparison relation is also located in the standard marker *than*, as suggested by Alrenga et al. (2012; see 2.2), the entry for the phrasal degree head is (44):

(44) $[\![\textbf{THAN}_{\textbf{PC}}]\!] = \lambda x_e.\lambda g_{<d,<e,t>>}.\lambda y_e.\text{sup}(\lambda d.g(d)(x)) < \text{sup}(\lambda d.g(d)(y))$ [ibid., (24)b]

On this conception, one is led to expect that there are languages in which the choice between the clausal and phrasal operator is reflected by changes in morphological exponence of the standard marker. Such correlations are, among others, attested in Greek, Russian, Polish and Bulgarian, which seem to have access both to the base generation and the ellipsis strategy (on Slavic see Pancheva 2006). In Greek, for instance, the accusative assigning preposition *apo*/'from' is used in PCs ((45)a), while CCs are introduced by the free relative marker *ap'oti*/'from what' ((45)b; Xeila-Markopoulou 1986; Merchant 2009):

(45) a. Ine adinato na ine o Giannis psilo-ter-os
is impossible NA is the Giannis tall-er
apo afton / ton eauto-tu.
than$_{\text{phrasal}}$ him$_{\text{ACC}}$/ the himself$_{\text{ACC}}$
'It is impossible that Giannis is taller than him/himself.'
b. Ine adinato na ine o Giannis psilo-ter-os
is impossible NA is the Giannis tall-er
ap'oti ine aftos /*o eautos-tu.
than$_{\text{clausal}}$ what is him$_{\text{NOM}}$ /the himself$_{\text{NOM}}$
'It is impossible that Giannis is taller than him/himself.'

[14](42) is derived from Heim's (1985) original formulation in (i) by right-to-left Currying. Alternative, equivalent definitions of (42) include (ii) ((ii)b from Bhatt and Takahashi 2011: 585):
(i) $[\![\textbf{MORE}]\!]$ <a,b> f = 1 iff f(a) > f(b)
(ii) a. $[\![\textbf{MORE}_{\textbf{PC}}]\!] = \lambda x_e.\lambda g_{<d,<e,t>>}.\lambda y_e.\lambda d.g(d)(x) \subset \lambda d.g(d)(y)$
b. $[\![\textbf{MORE}_{\textbf{PC}}]\!] = \lambda x_e.\lambda g_{<d,<e,t>>}.\lambda y_e.\exists d[g(d)(y) \wedge \neg g(d)(x)]$

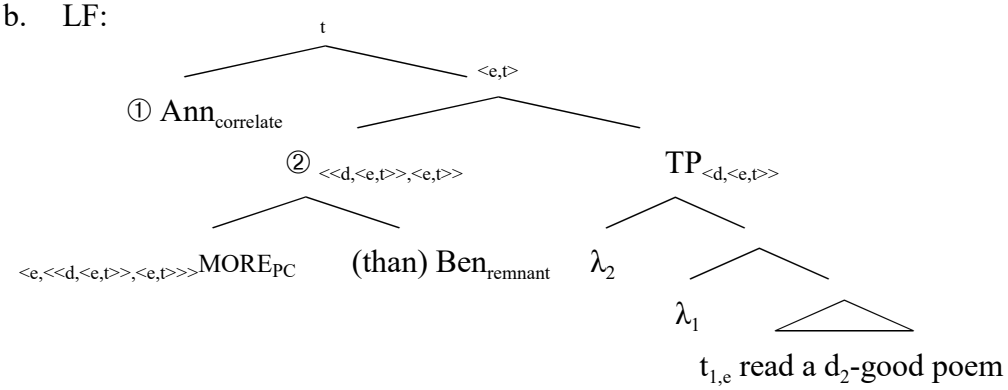
It does not come as a surprise, then, that case and binding properties co-vary with the choice of the standard marker: PCs with *apo* assign accusative to the remnant and admit externally bound reflexives ((45)a). If, on the other hand, the PC is introduced by *ap'oti*, the remnant bears nominative, which in turn blocks reflexives ((45)b). This finding aligns well with Alrenga et al. (2012)'s proposal, according to which the locus of morphological variation is the standard marker *than*, and not the degree head. It should be added, though, that the debate where to locate the comparative relation has not been settled yet, and constitutes an area of active research.

3.2.1. Attributive PCs and parasitic scope

Thus far, it has been demonstrated that the ternary comparative operator MORE_{PC} derives the correct results in predicative constructions. Attributive PCs such as (46)a require some additional covert re-adjustment of the tree, though, to ensure a transparent progression from syntax to semantics. Otherwise, the constituent made up of MORE_{PC} and the *than*-phrase would not be able to find a suitable degree-individual relation (<d,<e,t>>) to apply to. As detailed by the derivation tree (46)b, the correlate *Ann* therefore needs to undergo QR first, followed by movement of the unit $\textit{MORE}_{\textit{PC}}$ *than Ben* to a position inbetween the correlate and its λ-binder, resulting in a configuration of PARASITIC SCOPE (Barker 2007; see also Sauerland 1998; Nissenbaum 1998; Beck and Sauerland 2000; on parasitic scope in PCs see Kennedy 2007; Bhatt and Takahashi 2007, 2011: 585; Lechner 2017):

(46) a. $\text{Ann}_{\text{correlate}}$ read a better poem than $\text{Ben}_{\text{remnant}}$.

b. LF:



c. ⟦(46)b⟧ = ⟦**MORE_{PC}**⟧ (⟦**Ben**⟧) (⟦**λ_2 λ_1 read a d_2-good poem**⟧) (⟦**Ann**⟧)
= MAX(λd.Ben read a d-good poem) < MAX(λd.Ann read a d-good poem)

In (46), the comparative modifies the object. But (47)a and its LF in (47)b reveal that parasitic scope is also implicated in the formation of subject comparatives. Again, the correlate (*LGB*) moves first and the comparative 'tucks-in', driven by the need to generate a two-place relation that the complex $\textit{MORE}_{\textit{PC}}$ *than MP* can combine with:

(47) a. More people read LGB than MP.

b. LF: [LGB [[MORE_{PC} than MP] [$_{<d,<e,t>>}$ λ_2 λ_1 [$_{TP}$ d_2-many people read t_1]]]]

c. ⟦(47)b⟧ = ⟦**MORE_{PC}**⟧ (⟦**MP**⟧) (⟦**λ_2 λ_1 d_2-many people read t_1**⟧) (⟦**LGB**⟧)
= MAX(λd.d-many people read MP) < MAX(λd.d-many people read LGB)

The movement analysis is, as Heim (1985) demonstrates, corroborated by the observation that the derivations hypothesized by DA respond to island diagnostics. In (48), for one, the comparative operator FEWER is trapped inside a relative clause, resulting in strong ill-formedness:

(48) a. *[$_{DP}$ Someone [$_{CP}$ who could answer ***fewer*** questions]] made a good impression on Bill than on Fred. [Heim 1985, 25: (39)]

b. *[$_{IP}$ Bill [[FEWER$_{PC}$ (on) Fred] [λ_2 λ_1 [[$_{DP}$ someone [$_{CP}$ who could answer ***$\mathbf{d_2}$**-many questions]] made a good impressions on t_1]]]]

Furthermore, the deviance of (49) is explained if correlates have to covertly raise to the scope position of the comparative operator, and if this movement is regulated by syntactic locality:

(49) a. ?*I spent more time with [$_{DP}$ a woman [$_{CP}$ that played ***the clarinet***]] than the lute.

b. [the clarinet [[MORE$_{PC}$ than the lute] [λ_2 λ_1 I spent d_2-much time with [$_{DP}$ a woman [$_{CP}$ that played ***$\mathbf{t_1}$**] than t_2]]]] [Heim 1985, 26: (52)]

Note at this point, though, that (48) and (49) are also amenable to a reduction analysis, as made explicit by their underlying sources in (50). In both instances, Gapping illicitly targets a string that includes a finite clause boundary, incurring a violation of the general conditions on Gapping (cf. (30)c; Lechner 2004). This result fends off a potential argument in favor of DA.[15]

(50) a. *Someone [$_{CP}$ who could answer fewer questions]] made a good impression on Bill than <t_1 [$_{CP}$ who could answer d-many questions]] made a good impression> on Fred.

b. *I spent more time with a woman that played the clarinet than <I spent d-much time with a woman that played> the lute.

Thus, locality conditions on the comparative operator and the correlate do not aid in deciding between the two competing PC-analyses.

The LF-representations discussed above expose yet another criterial property of DA, though, which will be seen to elicit an argument against base-generation: derivations based on MORE$_{PC}$ assign identical scope to the correlate and the comparative relation. This particular characteristic of the analysis presents a problem for the base-generation account in constellations where PCs scopally interact with modals, as in (51). ((51) minimally differs from (11) in that the remnant is an individual term, and not a measure phrase.)

[15]The *than*-phrase in (48) has also been illegitimately extraposed from an island. Interestingly, the non-extraposed variants are rated if anything even worse:

(i) * Someone [$_{CP}$ who could answer fewer questions *than on Fred*] made a good impression on Bill.

(ii) *I spent more time *than the lute* with a woman that played the clarinet.

This is unexpected for DA, but not for RA, on which ellipsis operates on extraposed degree clauses.

(51) The paper is required to be exactly 5 pages longer than the draft.

a. $\lambda w.\text{MAX}(\lambda d.\text{the draft is d-long in w}) + 5 <$ (MORE ≻ *require*)
$\text{MAX}(\lambda d.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow \text{the paper is d-long in w'})$

b. $[[[\text{exactly 5 pages MORE } [\lambda_1 \text{ than the draft } <\text{is } d_1\text{-long}>]]_{<<d,t>,t>}$
$[_{<d,t>} \lambda_2 \text{ required the paper to be } d_2\text{-long}]]$ (*RA*)

c. $[\text{the paper } [[\text{exactly 5 pages } \text{MORE}_{\text{PC}} \text{ than the draft}]_{<<d,<e,t>>,<e,t>>} [_{<d,t>} \lambda_2 \lambda_1 \text{ required } t_1$
to be d_2-long]]] (*DA*)

d. $[\![(51)c]\!]$ =
= $[\![\textbf{MORE}_{\textbf{PC}}]\!]([\![\textbf{5 pages}]\!])([\![\textbf{the draft}]\!])([\![\boldsymbol{\lambda_2\,\lambda_1}\textbf{ required }\mathbf{t_1\,d_2}\textbf{-long}]\!])([\![\textbf{the paper}]\!])$
= $\lambda w.\text{MAX}(\lambda d.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow \text{the draft is d-long in w'}) + 5 <$
$\text{MAX}(\lambda d.\forall w' \in \text{Acc}_{\text{Deon}}(w)(w') \rightarrow \text{the paper is d-long in w'})$

Sentence (51) admits an inverse interpretation, which requires the minimal length of the paper to exceed the actual length of the draft by 5 pages ((51)a). Under the reduction analysis, the derivation of this reading is uneventful and proceeds by interpreting the LF in (51)b. By contrast, the direct account posits the LF (51)c, which does not generate the target interpretation (51)a, but (51)d instead, because MORE_{PC} converts the whole degree relation, including the modal, into the degree complement. Even though (51)d is also a possible interpretation, roughly equivalent to *The paper must be exactly 5 pages longer than the draft must be*, it is not the desired one. Thus, the existence of reading (51)a poses a challenge for DA. At least some PCs with individual standards have to be treated as reduced clausal comparatives. This finding also has important typological consequences: if constructions analogous to (51) are attested in a language, it is predicted that this language also utilizes RA.

3.2.2. Russell sentences

Another classic, striking interpretive contrast between CCs and PCs manifests itself in Russell's '*yacht*-sentences' (Russell 1905; see chapter 8, 'Attitude Verbs'). (52) is ambiguous between a contradictory, opaque *de dicto* interpretation and a sensible, transparent *de re* reading for the elided predicate *is tall* (Russell 1905; von Stechow 1984; Heim 1985; Larson 1988; Rullmann 1995, a.o.; $\text{Acc}_{\text{Bel-A}}$ returns for each world believe alternatives for Ann).

(52) Ann believes that Ben_1 is taller than he_1 is.

a. $\lambda w.\forall w' \in \text{Acc}_{\text{Bel-A}}(w)(w') \rightarrow$ (*contradictory de dicto*)
$\text{MAX}(\lambda d.\text{he}_1 \text{ is d-tall in } \underline{\underline{w'}}) < \text{MAX}(\lambda d.\text{Ben}_1 \text{ is d-tall in w'})$

b. $\lambda w.\forall w' \in \text{Acc}_{\text{Bel-A}}(w)(w') \rightarrow \text{MAX}(\lambda d.\text{he}_1 \text{ is d-tall in } \underline{\underline{w}}) < \text{MAX}(\lambda d.\text{Ben}_1 \text{ is d-tall in w'})$
(*sensible de re*)

There are two prominent positions on this ambiguity: scoping of the *than*-phrase and non-local binding of world/situation variables ('double indexing'; Postal 1974; see von Stechow 1984 for in-depth discussion.) Compelling evidence against treating transparent readings in terms of an exportation mechanism like QR is supplied by apparent scope paradoxes ((53)a; Hoeksema 1983; Heim 1985; Rullmann 1995; a.o.). In (53)a, the degree complement contains a pronominal variable bound by a quantifier below the propositional attitude operator, yet the sentence admits

a sensible *de re* interpretation. Thus, the scope of the degree clause must be limited to the lower clause, with the consistent reading being produced by abstracting over the predicate's world variable at the matrix level, as in (53)b.[16] As for the specific implementation of the analysis, it will be assumed that gradable adjective denotations are of type <d,<s,<e,t>>>, and that the world/situation pronoun (Percus 2000) which serves as the second argument of the adjective is hosted by the auxiliary verb (Heim 1985; Keshet 2010: 403; QR of degree quantifier ignored).

(53) a. John believes that nobody$_1$ is taller than he$_1$ is.
b. λw[John believes$_w$ that λw'[*nobody$_1$* is$_{w'}$ taller than *he$_1$* is$_w$ <d-tall$_{<d,<s,<e,t>>>}$>]]

From the above, it follows that the ambiguity in (52) is resolved by different choices for the λ-binder of the world variable inside the degree clause. Relevant portions of the two LFs are spelled out in (54):

(54) a. *LF for contradictory de dicto reading of (52)*
λw[Ann believes$_w$ that λw'[that Ben is$_{w'}$ taller than he is$_{\underline{\underline{w'}}}$ <d-tall>]]
b. *LF for sensible de re reading of (52)*
λw[Ann believes$_w$ that λw'[that Ben is$_{w'}$ taller than he is$_{\underline{\underline{w}}}$ <d-tall>]]

What is of particular interest for present concerns is that Russell ambiguities can, at least in more complex constellations, be used to discriminate between the competing accounts of PCs.

Attending to simpler manifestations first, it is well-known that PCs with reflexive remnants, exemplified by (55), sanction only the inconsistent, opaque reading (55)a (McCawley 1967; Hellan 1981; Napoli 1983; Heim 1985; a.o.):

(55) Ann believes that Ben is taller than himself.
λw.∀w'∈Acc$_{Bel\text{-}A}$(w)(w') →
a. MAX(λd.himself$_1$ is d-tall in $\underline{\underline{w'}}$) < MAX(λd.Ben$_1$ is d-tall in w') *(de dicto)*
b. *MAX(λd.himself$_1$ is d-tall in $\underline{\underline{w}}$) < MAX(λd.Ben$_1$ is d-tall in w') (*de re*)

Heim (1985) observes that the absence of the sensible *de re* interpretation (55)b is a corollary of the natural assumption that ellipsis parallelism requires the world variable implicit in the elided verb (*is*) to match its antecedent. Since the index of the main predicate is locally bound by the abstractor right below the propositional attitude operator (Percus 2000: 201), the world variable inside the elided part of the degree clause needs, as detailed in (56), to be locally identified, too:

(56) λw[Ann believes λw'[that Ben is taller$_{\underline{\underline{w'}}}$ than himself <is$_{\underline{\underline{w',*w}}}$ d-tall>]]

[16]The scope paradox cannot be defused by exceptional, long QR of the binder (*nobody*) into the higher clause, because long movement should also be reflected in new wide scope options. The contrast in (i) documents that this expectation is not borne out, (i)a does not admit a distributive reading:
(i) a. It seemed to someone that everybody$_1$ is taller than he$_1$ is. (∃ ≻ ∀/*∀ ≻ ∃)
b. Someone$_1$ seemed to everyone t$_1$ to be taller than he$_1$ is. (∃ ≻ ∀/∀ ≻ ∃)

But Heim also points out that the *de re* reading can be excluded just as effectively on the direct analysis, which assigns to the reflexive example (55) the representation (57)a. In the LF (57)a, the correlate and MORE_{PC} have moved locally, resulting in the contradictory *de dicto* proposition (57)b. Moreover, provided QR is allowed to crosse clause boundaries, the direct analysis also produces the alternative LF (57)c, in which the comparative operator and the correlate are attached at the matrix clause level. But since the scope of MORE_{PC} now contains the propositional attitude predicte, the translation in (57)d again yields an inconsistent belief (presupposing that each world supplies only a single doxastic accessibility relation for Ann).[17]

(57) a. *DA-1: narrow scope de dicto reading*
λw[Ann believes that λw'[Ben [[MORE_{PC} than himself] [$_{<d,<e,t>>}$ λ_2 λ_1 [t_1 $\text{is}_{w'}$ d_2-tall]]]]]

b. ⟦(57)a⟧ = ⟦**believes**⟧ (⟦$\textbf{MORE}_{\textbf{PC}}$⟧) (⟦**himself**⟧) (⟦**$\lambda_2$ λ_1 $\mathbf{t_1}$ $\mathbf{d_2}$-tall**⟧) (⟦**Ben**⟧)) (⟦**Ann**⟧)
= λw.∀w'∈$\text{Acc}_{\text{Bel-A}}$(w)(w') → (*contradiction*)
MAX(λd.he_1 is d-tall in <u>w'</u>) < MAX(λd.Ben_1 is d-tall in w')

c. *DA-2: wide scope de dicto reading*
λw[Ben [[MORE_{PC} than himself] [$_{<d,<e,t>>}$ λ_2 λ_1 Ann believes that λw'[t_1 $\text{is}_{w'}$ d_2-tall]]]]

d. ⟦(57)c⟧ = ⟦$\textbf{MORE}_{\textbf{PC}}$⟧ (⟦**himself**⟧) (⟦**$\lambda_2$ λ_1 Ann believes $\mathbf{t_1}$ $\mathbf{d_2}$-tall**⟧) (⟦**Ben**⟧)
= λw.MAX(λd.∀w'∈$\text{Acc}_{\text{Bel-A}}$(w)(w') → himself_1 is d-tall in <u>w'</u>) <
MAX(λd.∀w'∈$\text{Acc}_{\text{Bel-A}}$(w)(w') → Ben_1 is d-tall in w')

It can be concluded that RA and DA are equally well equipped to handle the absence of consistent *de re* readings with reflexive remnants.[18]

As was seen above, the ellipsis analysis can reduce the absence of *de re* readings for (55) to the parallelism condition on ellipsis; the fact that the remnant is a reflexive remains merely accidental. This leads one to expect that *de re* readings for the unpronounced degree adjective should be more generally blocked, even if the remnant is a regular DP. Elaborating on remarks in Heim (1985), I will briefly speculate on a potential challenge for this prediction that is posed by PCs with non-reflexive remnants in which the silent gradable property can arguably also be interpreted *de re.* The existence of such combinations is relevant inasmuch as it constitutes an argument for RA. Before proceeding, it is instructive to attend to non-reflexive remnants with

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[17]By the same reasoning, overt raising in examples like (i)a, followed by covert correlate movement ((i)b), should unambiguously yield the contradictory *de dicto* reading. This appears to be correct.

(i) a. John seems to be taller than himself. (*contradictory de dicto only*)
b. [John [[MORE_{PC} than himself]$_{<<d,<e,t>>,<e,t>>}$ [$_{<d,t>}$ λ_2 λ_1 t_1 d_2-tall]]]

[18]The German analogue to (55) does not employ the reflexive *sich*/'self', but the focus anaphor *er selbst*/'he himself'. As in English, the PC only admits the contradictory interpretation:

(i) Anne glaubt, das Ben größer ist als er selbst/*sich
Ann believes that Ben taller is than he-himself/self

It might be tempting to reduce the ill-formedness of *sich* to the assumptions that reflexives need to move (Lechner 2012), but cannot do so in languages that prohibit preposition stranding. This analysis is contradicted by Greek, though, which also bans stranded prepositions yet licenses reflexive remants:

(ii) Kanenas den ine psiloteros apo ton eafto tu. [Merchant 2010: (12)]
nobody not is taller thanphrasal the himselfACC
'Nobody is taller than himself.'

de dicto degree predicates first, though.

Consider to that end the PC (58) in the following scenario. Ann, who suffers from amnesia, is married to Ben but mistakenly believes that her husband is John. Moreover, she is of the firm conviction that Ben is the tallest man she has every met.

(58) Ann believes that Ben is taller than her husband.

a. $\lambda w.\forall w' \in Acc_{Bel\text{-}A}(w)(w') \rightarrow$ (*consistent de dicto - de dicto, [true]*)
MAX(λd.Ann's husband in $\underline{\underline{w'}}$ is d-tall in $\underline{\underline{w'}}$) < MAX($\lambda d.Ben_1$ is d-tall in w')

b. $\lambda w.\forall w' \in Acc_{Bel\text{-}A}(w)(w') \rightarrow$ (*contradictory de re - de dicto*)
MAX(λd.Ann's husband in $\underline{\underline{w}}$ is d-tall in $\underline{\underline{w'}}$) < MAX($\lambda d.Ben_1$ is d-tall in w')

Given this setup, (58) is evaluated as true on the *de dicto* interpretation of *her husband* ((58)a) because Ann indeed believes that Ben exceeds John (her alleged husband) in height. Moreover, if the remnant is read *de re,* the sentence expresses the inconsistent proposition (58)b that in Ann's belief worlds, Ann's husband Ben is taller than Ben. In both cases, the degree predicate is read *de dicto*. Accordingly, the existence of such mixed *de re* (*husband*) - *de dicto* (*tall*) interpretations is again compatible both with the reduction and the base generation theory (Heim 1985). On both analyses, variation in referential transparency of the remnant can be related to the choice of the world variable binder, which, *qua* being overt, is not subject to parallelism. Relevant parts of the LFs underlying the *de re* reading for the remnant are given in (59):

(59) a. *RA: consistent mixed de re - de dicto*
λw[Ann believes that [$\lambda w'$ Ben is $tall_{w'}$ [MORE than her $husband_w$ <$is_{w'}$ d-tall>]]]

b. *DA: consistent mixed de re - de dicto*
λw[Ann believes that $\lambda w'$ [Ben [$MORE_{PC}$ than her $husband_w$] [$_{<d,et>}$ λ_2 λ_1 t_1 $is_{w'}$ d_2-tall]]]

Up to now, the missing predicate was construed *de dicto*. Is it also possible to interpret it transparently *de re*? While it has been claimed in the literature that such constellations are not attested (see (55); Napoli 1983; McCawley 1998: 713), the right kind of context paired with remnants that embed enough descriptive content appear to brings out just such readings. To exemplify, at least for some speakers, the degree predicate of sentence (60) can be understood *de re* in the following context: Ben has a younger sister, Daisy. At a Halloween party, Daisy dresses up as her mother Cloe, and Cloe dresses up as her daughter Daisy. Due to the skills of the make up artist, Ann mistakes, just as intended, Daisy for Cloe and Cloe for Daisy. In this scenario, (60) is evaluated as false on the *de re* (*his mother*) - *de re* (*old)* interpretation (60)a, but is verified by the *de dicto* - *de re* reading (60)b. Table (61) spells out some facts of Ann's mental space that help to bring out the truth conditional difference between (60)a and (60)b. ((60) is evaluated in w_0):

(60) Ann believes that Ben_1 is older than his_1 mother.
(Control: Ann believes that Ben_1 is older than his_1 mother is.)

a. $\lambda w.\forall w' \in Acc_{Bel\text{-}A}(w)(w') \rightarrow$ (*de re - de re, [false in* (61)*]*)
MAX(λd.Ben's mother in $\underline{\underline{w}}$ is d-old in $\underline{\underline{w}}$) < MAX(λd.$Ben_1$ is d-old in w')
"Ann believes that Ben_{40} is older than $Cloe_{70}$."

b. $\lambda w.\forall w' \in Acc_{Bel\text{-}A}(w)(w') \rightarrow$ (*de dicto - de re*, *[true in* (61)*]*)
MAX(λd.Ben's mother in $\underline{\underline{w'}}$ is d-old in $\underline{\underline{w}}$) < MAX(λd.$Ben_1$ is d-old in w')
"Ann believes that Ben_{40} is older than $Daisy_{30}$."

(61)

	Ben's mother	*Ben's age*	*Cloes's age*	*Daisy's age*
w_0	Cloe	40	70	30
w_1	Daisy (Ben's younger sister)	40	30	70

Many speakers accept (60) as a truthful description of (61).[19] If these judgements are taken to be representative, they contribute an argument against DA. This is so because on DA, the object language representation of the degree clause does not contain a predicate, and therefore also lacks a world variable that could be bound at a distance. Another, less welcome consequence is that the absence of a *de re* reading for (55) can now no longer be blamed on ellipsis parallelism, but must somehow be linked to the presence of the reflexive. This remains an open problem.

Further support for the existenc of silent *de re* predicates comes from Greek, which morphologically distinguishes between two versions of PCs. While base generated *apo*-PCs can only be interpreted *de dicto*, reduced *ap'oti*-PCs also appear to have the intended *de re* reading. To the extent that such interpretations exist, they provide evidence for the reduction analysis.

(62) a. I Maria pistevi oti o Iannis ine megaliteros ap'oti ine i mitera tu.
the Maria believes that the Iannis is older $than_{clausal}$ is the $mother_{NOM}$ his
b. ??I Maria pistevi oti o Iannis ine megaliteros ap'oti i mitera tu.
the Maria believes that the Iannis is older $than_{clausal}$ the $mother_{NOM}$ his
c. *I Maria pistevi oti o Iannis ine megaliteros apo tin mitera tu.
the Maria believes that the Iannis is older $than_{clausal}$ the $mother_{ACC}$ his
'Mary believes that John is taller than his mother (is).' (*de dicto/de re - de re*)

Once again, a more careful empirical investigation has to await another occasion. Fortunately, as will become evident in the sections to follow, interpretive properties also provide the basis for more reliable diagnostics for the presence of hidden structure inside PCs.

[19]Heim (1985: 15 and footnote 12) and Napoli (1983) discuss missing transparent readings for the degree predicate on the basis of examples like (i). Examples with more descriptive content, as used in the main text, are somewhat easier to judge, though - and also appear to elicit more liberal results:
(i) a. λw[Ann believes that λw'[Ben is taller than Carl $is_{w'/w}$ <d-tall>]]
b. λw[Ann believes that λw'[Ben is taller than Carl <$is_{w'/*w}$ d-tall>]]

3.2.3. Disjoint reference effects

Restrictions on admissible coreference relations furnish a strong argument for the ellipsis analysis in some languages, including English and German, and favor the direct account for others, among them Hindi-Urdu and Japanese. The nature of the evidence is similar to the data introduced in the discussion of the Ellipsis-Scope Generalization in Section 2.4.

To begin with, the absence of disjoint reference effects in (63) suggests that PC-remnants are not c-commanded by constituents of the matrix clause (Lechner 2004; (63)a/b from Bhatt and Takahashi [henceforth BT] 2011: (11)):

(63) a. Mary gave ***him***$_{1}$ more presents than [***John***$_{1}$'s mother]$_{NOM}$.
(= Mary gave him$_1$ more presents than John$_1$'s mother gave him$_1$.)
b. Mary gave more presents to ***him***$_{1}$ than [***John***$_{1}$'s mother]$_{NOM}$.
(= Mary gave more presents to him$_1$ than John$_1$'s mother gave to him$_1$.)
c. ***He***$_{1}$ gave us more presents than [***John***$_{1}$'s mother]$_{NOM}$.
(= He$_1$ gave us more presents than John$_1$'s mother gave us.)

However, this impression does not survive exposure to a wider range of examples. As documented by the contrast in (64), the grammar imposes strict formal conditions on possible coreference relations, made explicit in the generalization in (65) (BT 2011: (10), building on Lechner 2004):

(64) a. Sally introduced ***him***$_{1}$ to more friends than [***Peter***$_{1}$'s sister]$_{NOM}$.
(= Sally introduced him$_1$ to more friends than Peter$_1$'s sister introduced him$_1$ to.)
b. ****He***$_{1}$ introduced Sally to more friends than [***Peter***$_{1}$'s sister]$_{ACC}$.
(= He$_1$ introduced Sally to more friends than he$_1$ introduced Peter$_1$'s sister him$_1$.)

(65) Every node that c-commands the correlate also c-commands the remnant.

Of particular significance for present purposes is the fact that (65) is a direct consequence of the hypothesis that the degree clause contains hidden elliptical structure, as posited by RA (Lechner 2004: 214). To illustrate, in (64)a, the pronoun *him*$_1$ is located below the correlate (*Sally*) and accordingly does not c-command the name in the parallel elliptical representation (*Peter*$_1$*'s sister introduced him*$_1$ *to d-many friends*). By contrast, if the correlate is located above the pronoun, as in (64)b, the name ends up in the c-command domain of the coindexed pronoun in the reconstructed source (*he*$_1$ *introduced Peter*$_1$*'s sister to d-many friends*), inducing a disjoint reference effect.

The direct account is less successful than the ellipsis analysis, as it generates two LFs, shown in (66), which are indistinguishable with respect to the relevant c-command relations. In (66), both moved constituents adjoin at the sentence (TP) level, above the derived position of the subject, thereby neutralizing hierarchical differences between the correlate and the remnant.

(66) a. [$_{TP}$ Sally [$_{TP}$ [MORE$_{PC}$ than ***Peter$_1$***'s sister] [λ_2 λ_3 [$_{TP}$ t_3 introduced ***him$_1$*** to d_2-many friends]]]]

b. [$_{TP}$ Sally [$_{TP}$ [MORE$_{PC}$ than ***Peter$_1$***'s sister] [λ_2 λ_3 [$_{TP}$ ***he$_1$*** introduced t_3 to d_2-many friends]]]]

However, BT (2007) point out that there is an alternative parse for (64), shown in (67), which locates the parasitic scope relation at the vP instead of the TP level, thereby drawing the correct distinctions between (64)a and (64)b. Moreover, the low attachment alternative (67) should be preferred over (66) as it aligns better with Scope Economy (Fox 2000):

(67) a. [$_{TP}$ Sally [$_{vP}$ [MORE$_{PC}$ than ***Peter$_1$***'s sister]
[λ_2 λ_3 [$_{vP}$ t_3 introduced ***him$_1$*** to d_2-many friends]]]]

b. *[$_{TP}$ ***He$_1$*** λ_1 [$_{vP}$ Sally [$_{vP}$ [MORE$_{PC}$ than ***Peter$_1$***'s sister]
[λ_2 λ_3 [$_{vP}$ t_1 introduced t_3 to d_2-many friends]]]]]

The essence of the argument against DA remains unaffected, though, as BT note. Once the pronoun and the correlate have migrated into the VP-domain, as in (68) and (69), the structural differences between licit and illicit coreference patterns disappear again. In all four LF-representations, the pronoun fails to c-command the name:

(68) a. More people talked to Sally about him$_1$ than to Peter$_1$'s sister. [BT: (12)]
[$_{TP}$ Sally [$_{TP}$ [MORE$_{PC}$ than to ***Peter$_1$***'s sister]
[λ_2 λ_3 [$_{TP}$ d-many people talked to t_3 about ***him$_1$***]]]]

b. *More people talked to him$_1$ about Sally than about Peter$_1$'s sister.
[$_{TP}$ Sally [$_{TP}$ [MORE$_{PC}$ than about ***Peter$_1$***'s sister]
[λ_2 λ_3 [$_{TP}$ d-many people talked to ***him$_1$*** about t_3]]]]
(Control: More people talked to Peter$_1$ about Sally than about his$_1$ sister.)

(69) a. Mary introduced him$_1$ to more people than John$_1$'s mother. [BT: (11)]
[$_{TP}$ Mary [$_{TP}$ [MORE$_{PC}$ than ***John$_1$***'s mother]
[λ_2 λ_3 [$_{TP}$ t_3 introduced ***him$_1$*** to d-many people to t_3]]]]

b. *More people introduced him$_1$ to Mary than to John$_1$'s mother.
[$_{TP}$ Mary [$_{TP}$ [MORE$_{PC}$ than ***John$_1$***'s mother] [λ_2 λ_3 [$_{TP}$ d-many people introduced ***him$_1$*** to t_3]]]]
(Control: More people introduced John$_1$ to Mary than to his$_1$ mother.)

Hence, the conclusion remains the same as before: generalization (65) resists a satisfactory analysis on the base generation theory, but falls out directly from the ellipsis account.

BT further report that analogous structures to (68)b and (69)b are well-formed in Hindi-Urdu and Japanese, indicating that not all languages treat PCs alike. More specifically, the availability of coreference in (70) and (71) signals that in these languages, PCs are *not necessarily* derivationally related to elliptical clausal comparatives:

(70) Atif-ne [***Ravi-kii*** $_{1}$ behen-kii foto] se ***us-ko*** $_{1}$. [BT: (35)]
Atif$_{ERG}$ Ravi$_{GEN}$ sister$_{GEN}$ picture than he$_{DAT}$
Mohan-kii behen-kii foto zyaadaa baar dikhaa-ii
Mohan$_{GEN}$ sister$_{GEN}$ picture more times show$_{PERF}$
'Atif showed Mohan's sister's picture to him$_1$ more times than Ravi$_1$'s sister's picture.'

(71) ?[***Taroo*** $_{1}$-no hahaoya] yori Hanako-ni ***kare*** $_{1}$-ga nyuusu-o kawasiku setuseisita.[BT: (52)]
Taro$_{GEN}$ mother than Hanako$_{DAT}$ he$_{NOM}$ news$_{ACC}$ closely explained
'*He$_1$ explained the news to Hanako more closely than Taro$_1$'s mother.'

Observations about restrictions on complementation and quantifier scope also attest to the fact that Japanese and Hindi-Urdu PCs not only *can*, but *have* to be assigned the parses envisioned by the direct analysis. Strong evidence to this end is provided by the two observations that in Hindi-Urdu, (i) ellipsis is restricted to finite clauses and that (ii) addition, comparative complements are introduced by the particle *-se*, which exclusively combines with non-finite clauses. It follows that Hind-Urdu PCs cannot be the result of a deletion operation. To determine the status of Japanese PCs requires additional information, though, to be attended to below.

3.2.4. Quantifier scope

Quantifiers inside degree complements are known to be subject to intricate conditions regulating their scope with respect to other operators in the sentence (Heim 2006; Beck 2011; Alrenga and Kennedy 2014 and references therein). For instance, (72) can only be understood with wide scope of the quantificational remnant with respect to the comparative relation ((72)a). Embedding the distributive DP inside the maximality operator, as in (72)b, results in weak truth conditions that would already be satisfied if John exceeded the smallest boy's height:

(72) John is taller than every boy in his class.
a. $\forall x[boy(x) \rightarrow \text{MAX}(\lambda d.\ x \text{ is d-tall}) < \text{MAX}(\lambda d.\text{John is d-tall})]$
b. $\text{MAX}(\lambda d.\forall x[boy(x) \rightarrow x \text{ is d-tall}]) < \text{MAX}(\lambda d.\text{John is d-tall})$

BT add a further entry to the catalogue of intriguing scope phenomena that have been assembled in the literature. In PCs with quantificational object remnants and quantificational correlates, the comparative relation can be assiged wide scope only:

(73) More students read every syntax paper than every semantics paper. [BT: (39)]
(= More students read every syntax paper than read every semantics paper.)
a. [[MORE [λ_1 than d_1-many students read every semantics paper]] (MORE $\succ \forall$)
[λ_2 [d_2-many students read every syntax paper]]]
"The number of students who read every syntax paper exceeds the number of students who read every semantics paper."
b. [[every syntax paper] [λ_3 [[every semantics paper] (???$\forall \succ$ MORE)
[λ_4 [[MORE [λ_1 than d_1-many students read t_4]] [λ_2 [d_2-many students read t_3]]]]]]
"Every syntax paper was read by more students than every semantics paper."

Narrow scope inside the standard argument arguably requires a clausal structure, which BT take to support the claim that English has access to the reduction strategy only. In Hindi-Urdu and Japanese, the scope judgements are exactly the reverse. This receives, the authors note, a natural explanation on the base generation account as follows: the three-place operator MORE_{PC} selects for an individual term as its first argument. Hence, quantificational standard arguments have to QR to avoid a type conflict. But since the first possible landing site (node of type t) is above the LF-position of the correlate, which is in turn higher than MORE_{PC}, the quantifier is correctly predicted to be unambiguously assigned wide scope:

(74) $[\boldsymbol{QP_3}\ [_{t}\ \textit{correlate}\ [_{<e,t>}\ [\text{MORE}_{\text{PC}}\ \text{than}\ \boldsymbol{t_3}]\ [_{<d,<e,t>>}\ [\lambda_2\ \lambda_1\ ...d_2\text{-many...}]]]]]$

Thus, the absence of narrow scope signals the absence of hidden structure. The wide scope requirement for Japanese and Hindi-Urdu accordingly demonstrates that these languages do not employ the reduction strategy in the formation of PCs.

3.2.5. Single remnant restriction

BT discuss another cross-linguistic generalization, illustrated by (75), which states that in Hindi-Urdu, the standard marker can be followed by a single constituent only. This 'single remnant restriction' is best compatible with the DA, because (75) would require a degree head that simultaneously combines with two remnants in the structural configuration *[more (than) [remnant$_1$ remnant$_2$]]*. But such structures are, as BT observe, not compositionally interpretable:

(75) *Tina-ne aaj [Pim kal-se] zyaadaa kitaabe parh-ĩ
Tina$_{\text{ERG}}$ today Pim yesterday-than] more books readPfv.FPI.
'Tina read more books today than Pim yesterday.'

While it is correct that the single remnant restriction is a consequence of DA on the assumption that the comparative relation is encoded in the degree head itself, there is another, alternative analysis of multi-remnant PCs, though, that makes it possible to derive (75). Suppose that the asymmetric ordering induced by comparative semantics is relocated into the standard marker, as suggested in Alrenga et al. (2012), and that the grammar also makes available the five-place, two-remnant version $\text{THAN}_{2\text{R}}$ defined in (76).

(76) $[\![\textbf{THAN}_{\textbf{2R}}]\!] = \lambda w_e.\lambda x_e.\lambda g_{<d,<<e,<e,t>>>>}.\lambda y_e.\lambda z_e.\sup(\lambda d.g(d)(w)(x)) < \sup(\lambda d.g(d)(y)(z))$

$\text{THAN}_{2\text{R}}$ originates as the sister node of the lower remnant (*remant$_2$*), moves to its surface position (*THAN$_{2R}$ [remnant$_1$ [<THAN$_{2R}$> remnant$_2$]]*) and reconstructs again at LF, much like ditransitive predicates in Larsonian shells (cf. Lin 2009). To simplify the further exposition, I assume that both remnants are individual denoting terms embedded in the target sentence (77). In the initial steps of the derivation, which track the transition from the LF-input (77)a to (77)b, $\text{THAN}_{2\text{R}}$ is reconstructed, followed by covert movement of the two correlates *him* and *the book*, in that order, with the second movement (*the book*) 'tucking in' below the first one *(him)*. Next, the degree complement is moved to a position right below the second correlate *the book*, resulting in a

stacked version of parasitic scope ((77)c).

(77) More people showed him the book than her the picture.

a. More people [THAN_{2R} her [<THAN_{2R}> the picture]] showed him the book

b. [**him$_1$** [**the book$_2$** [$_{<e,et>}$ λ_2 λ_1 [$_{TP}$ [more people [her **THAN_{2R}** the picture]] **t$_1$** showed **t$_2$**]]]]

c. [him$_1$ [the book$_2$ **[[her THAN_{2R} the picture]** [$_{<d,<e,<e,t>>>}$ λ_3 λ_2 λ_1 [$_{TP}$ [**d$_3$**-many people] t_1 showed t_2]]]]]

Crucially, this derivation produces the desired three place relation which serves as the input for THAN_{2R}. Thus, some minor and rather innocuous changes in the analysis of comparatives render even structures with more than a single remnant interpretable by DA. Note in passing that the difference between DA and the extended analysis in terms of THAN_{2R} can be reduced to type polymorphism, hence is indeed minimal. In fact, an account along these lines has been proposed by Lin (2009) for reduced, apparently clausal comparatives with multiple remnants in Mandarin. But it also follows now that even though attractive, BT's explanation for the single remnant restriction in Hindi-Urdu must be related to another property of the derivation. This is an interesting area open for future research.[20] The reminder of this section reports results from a mixed language, in which some, but not all, PCs fall under the single remnant restriction: Greek.

As already noted, Greek distinguishes between two standard markers: prepositional *apo* and the complementizer *ap'oti.* Merchant (2009) demonstrates that these two versions systematically differ in a number of ways. First, the single remnant condition holds for *apo* only:

(78) a. Perisoteri anthropi milisan me ton Gianni tin Kyriaki [Merchant 2009: (21)b]
More people spoke with the Giannis the Sunday
ap'oti me ton Anesti to Savato.
than$_{clausal}$ with the Anestis the Saturday

b. *Perisoteri anthropi milisan me ton Gianni tin Kyriaki [ibid., (22)b]
More people spoke with the Giannis the Sunday
apo me ton Anesti to Savato.
than$_{phrasal}$ with the Anestis the Saturday
'More people spoke with Giannis on Sunday than with Anestis on Saturday.'

Second, only *ap'oti* may combine with PPs. These two initial observations indicate that *apo*-PCs are base generated and are to be analyzed in terms of DA, whereas *ap'oti*-PCs have a clausal source.

[20]For a possible explanation in terms of conditions on multiple overt wh-movement see Lechner (2017).

(79) a. Perisoteri anthropi menun stis IPA *ap'oti* sti Rosia [ibid., (21)a]
more people live in.the USA than$_{clausal}$ in.the Rosia.
'More people live in the US than in Russia.'
b. *Perisoteri anthropi menun stis IPA *apo* sti Rosia. [ibid., (22)a]
more people live in.the USA than$_{phrasal}$ in.the Russia
('More people live in the US than in Russia.')

Third, the relation between the remnant and its (reconstructed) base position is subject to island conditions in *apo*-PCs but not in reduced constructions introduced by *ap'oti*:

(80) Perisoteri anthropi menun sto kratos pu kivernai o Putin [ibid., (31)]
more people live in.the state that governs the Putin
a. *ap'oti* o Bush.
than$_{clausal}$ the Bush$_{NOM}$
b. **apo* ton Bush.
than$_{phrasal}$ the Bush$_{ACC}$
'More people live in the state that Putin governs than live in the state that Bush governs.'

For Merchant, the PC in (80)a manifests an instance of 'island repair by ellipsis', a mechanism operative, among others, in sluicing that is known to ameliorate certain locality violations by foregoing pronunciation of the island ((81)a; Merchant 2001):

(81) a. Ben wants to hire someone who speaks a Balkan language, but I don't remember which$_1$ <[$_{TP}$ he wants to hire someone who speaks t_1]>.
b. *Ben wants to hire someone who speaks a Balkan language, but I don't remember ***which (language)$_1$*** he wants to hire someone who speaks ****t_1***.

Assuming that the ellipsis site in both constructions contains an abstract syntactic representation, Merchant suggests that the remnants (*Bush* and *which* in (80)a and (81)a respectively) move to clause initial positions, followed by TP-deletion, as made visible in (82) for the Greek *ap'oti*-PC with English glosses. The latter step neutralizes island violations by removing all non-locally bound traces from the representation:

(82) ...*ap'oti* Bush$_1$ <[$_{TP}$ d-many people live in the state that governs t_1]> (= (80)a)

The movement analysis also generates the correct prediction that in languages that prohibit preposition stranding, like Greek, the remnant cannot be a bare prepositional complement:

(83) *Perisoteri anthropi menun stis IPA ap'oti Rosia$_1$ <menun sti(s) t_1>.
more people live in.the USA than$_{clausal}$ Russia live in
('More people live in the US than in Russia.')

Returning to the ill-formed (80)b, the island sensitivity of *apo*-PCs falls, as Merchant notes,

squarely within the bounds specified by the base generation account. The DA-derivation for (80)b, schematized in (84), requires the correlate to raise out of a phonologically overt relative clause island. But this renders (80)b ineligible for reasons of syntactic locality.

(84) Putin [[MORE_{PC} than Bush] [λ_2 λ_1 [d_2-many people live in the state that ***t*** $_1$ governs]]]
(*More people live in the state that Putin governs than Bush.) (= (80)b)

Merchant's analysis of PCs in Greek accordingly confirms the two hypotheses that (i) the choice between DA and RA is subject to cross-linguistic variation and that (ii) MORE_{PC} implicates formation of a parasitic scope context which is created by covert syntactic movement.

Table (85) summarizes the typological results. Hindi-Urdu interprets the DP following *than* as the complement of three place MORE_{PC}, while English reconstructs a clausal frame around the remnant of PCs. In Japanese, all PCs are derived by DA, but the language also uses two-place MORE (e.g. in reduced constructions with multiple remnants). Finally, Greek has two versions of PCs, reduced and base-generated, which are distinguished by the shape of the standard marker:

(85)

	Ellipsis in degree clause?	*Principle C diagnostic*	*Scope of QP*	*Multiple remnants?*
English	✓	RA	$\forall \succ$ MORE	✓
Hindi-Urdu	*	DA	MORE $\succ \forall$	*
Japanese	✓	DA	MORE $\succ \forall$	✓
Greek	✓	[not tested]	[not tested]	$\checkmark_{\text{ap'oti}}$ /$*_{\text{apo}}$

To recapitulate, the present section has collected phenomena and diagnostics from research over the last four decades on the distinguishing characteristics of PCs and CCs. While the proper analysis of some constructions (e.g. Russell sentences; the location of the comparative relation; the single remnant condition; extraction in (41)b) is still under debate, it is also possible to discern an emerging consensus in some other domains, which can be summarized as follows. First, languages employ at least two different, possibly related (Kennedy 1999), semantic strategies to derive PCs: (i) syntactic reduction of degree clauses that serve as the restrictor argument of generalized degree quantifiers and (ii) base generation with the help of a three-place comparative operator. Second, the internal make-up of PCs is subject to typological variation, not all languages have at their disposal the same inventory of degree operators. PCs can be the result of reduction (English, German), base generation (Hindi-Urdu) or both (Japanese, Greek). Third, there are constructions which fit the signature of PCs but are uninformative with respect to the dispute between DA and RA because they consist of small clauses (see e.g. (36)).

4. Conclusion

The proper analysis of PCs has a number of important repercussions for semantic theory, and affects topics such as nature of the repertoire of operations that transpose surface trees into logical form representations; the limits of cross-linguistic variation; conditions on lexical

ambiguity; the debate around how much abstract, hidden structure the grammar admits; and the ontology underlying comparison in natural language (individuals vs. degrees). Finally, it should not go unnoticed that various phenomena which display the signature of PCs still remain understudied, prominently among them *exceed* comparatives in the Bantu languages, in which the degree relation is introduced by a transitive predicate corresponding to 'exceed':

(86) nin ndabo e kolo buka nine [Duala; Ittman 1939: 187]
thi house it big exceed that
'This house is bigger than that.'

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