The scope of nominal quantifiers in comparative clauses

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1 Background

Clausal degree constructions can contain nominal or modal quantifiers and when they do they tend to yield readings that involve degrees corresponding to some minimum or maximum. The best-known example of this is the case of comparatives, where a universal modal in the *than*-clause yields comparison either to the maximally allowed degree, (1), or the minimally required one, (2).

(1) John drove faster than he should have. max

(2) John drove faster than he needed have. min

Similarly, nominal universal quantifiers in comparative clauses result in readings involving comparison to the degree that is maximal with respect to the quantifier's domain. For instance, for (3) John's speed is compared to the maximal speed among the speeds of his rivals.

(3) John drove faster than each of his rivals did. max

A huge body of literature addresses the compositional semantics of clausal comparatives and other clausal degree constructions containing quantifiers (von Stechow, 1984; Larson, 1988; Kennedy, 1997; Beck and Rullmann, 1999; Stateva, 2000; Heim, 2000; Schwarzschild and Wilkinson, 2002; Heim, 2006; Gajewski, 2008; Schwarzschild, 2008; van Rooij, 2008; Beck, 2012a; Krasikova, 2008; Beck, 2010; Matushansky, 2011; Beck, 2012b, 2014; Aloni and Roelofsen, 2014; Alrenga and Kennedy, 2014; Fleisher, 2015; Dotlačil and Nouwen, 2016). A common theme in a fair part of these articles is that degree semantics interacts with scope, and it is this relative scope that determines whether there is a maximum-related or minimum-related reading. A significant amount of work is devoted to distinguishing between (2), on one hand, and (1) and (3), on the other hand.

In this note, we focus on a distinction that was not discussed in detail so far, as far as we know. We study the contrast between (3), on one hand, and (1) and (2), on the other hand. What we find is that the interpretational effects of nominal quantifiers in degree constructions need to be accounted for differently from the effects of intensional operators. More specifically, we will argue that the maximum-related readings for (1) and (3) come about differently and, in particular, that the maximum-related reading for (3) comes about via scope that (in a sense that will become clear below) is extraordinarily high.

2 Wider scope for nominal quantifiers

We provide three arguments for our thesis.

2.1 Argument 1: degree questions

Our first argument amounts to the observation that the maximum-related reading for nominal universal quantifiers does not uniformly arise in degree constructions. In degree questions, modal quantifiers do, but nominal quantifiers do not have minimum- or maximum-related readings. Assuming certain parallels between *than* clauses and degree questions (see below), we interpret this as suggesting that the reading for (1) and (3) are only accidentally similar.

At first sight, there is a parallel between comparatives and degree questions. Compare, for instance, the maximum readings of both (1) and (4) and the minimum readings of both (2) and (5).

(4) How fast should I be driving? max

(5) How fast do I need to drive? min

But nominal universals are different: while (3) has a maximum-related reading, (6) lacks any reading related to a maximum or a minimum.[1]

(6) How fast was each of the rivals driving? #max/#min

There are two readings available for (6). It has a pair-list reading asking for each rival how fast this rival was driving and it has what we will call single-point reading, which presupposes that every rival drove at the same speed and the question is asking what speed that was.[2]

2.2 Argument 2: constraints on movement

One reason why we think that our observation for degree questions can provide hints as to what goes on in comparatives is because both structures involve operator movement, as illustrated by the island violations discussed in Bresnan (1975), cf the parallel between (7) and (8).

(7) *John is taller than he knows a boy who is.

(8) *How tall do you know a boy who is.

These data are typically interpreted as showing that there is a form of covert movement in comparative clauses, leaving behind a trace and introducing lambda abstraction at

[1]At this point, we should say that readers may disagree with the judgements in (4) and (5). We have noticed that there is considerable flexibility as to which modal gives rise to which reading. (See McNabb, 2016, for experimental evidence of this flexibility.) However, what is important to us is not which particular readings are available for these examples, but *that* one or the other endpoint-related readings are available and no endpoint-related reading is present in (6).

[2]We found one other construction that displays the same split between nominals and modals. Superlative adjectives can combine with relative clauses without an overt nominal head. When such examples contain modals, they are parallel to (1) and (2). For instance, *the fastest you should drive* refers to the maximally allowed speed, while *the fastest you need to drive* refers to the minimally required one. However, the nominal case is, again, different: *the fastest each rival drove* does not refer to a minimum or a maximum. In what follows, we won't discuss this construction.

the top of the clause, as in (9) for *than John is tall.*

(9) [λd [John is d tall]]

If we take the standard interpretation of adjectives as relations between entities and degrees, as in (10), a structure like (9) will result in the set of degrees that range from 0 to John's height. We could then take the *than* clause to refer to the maximum degree in that set.

(10) $[\![\text{tall}]\!] = \lambda d \lambda x.\mu(x) \geq d$

(11) $[\![(9)]\!] = \lambda d.tall(j,d) \rightsquigarrow$ [0,John's height]

(12) $[\![\text{than (9)}]\!] = max(\lambda d.tall(j,d)) =$John's height

Infamously, this strategy fails as soon as there is (for instance) a universal quantifier in the comparison clause. The reason is that the lambda abstraction will collect degrees d such that every girl is tall to that degree and as a consequence any degree exceeding the shortest girl's height will be excluded from the set (see von Stechow 1984).

(13) $\lambda d.\forall x[girl(x) \rightarrow tall(x,d)] \rightsquigarrow$ [0,the height of the shortest girl]

A prominent response is to assume that degree constructions involve intervals (Schwarzschild and Wilkinson, 2002) and that these intervals are formed by a covert shifting operator Π: point-to-interval (Heim, 2006). Scope with respect to Π determines whether a minimum or a maximum reading is obtained (Heim, 2006; Beck, 2010).

Consider the example in (14), which follows (Beck, 2010). The A node is the structure as in (9). Π is defined as taking an interval I and an interval I' and saying that I contains the maximum of I'. The I' argument is going to be the A node and the I argument is going to be abstracted over. What this will give us at the node C is the set of intervals I that contain the maximum degree of the interval denoted by A.

(14) $[_D$ select $[_C$ $\lambda 2$ $[_B$ [Π t_2] $[_A$ $\lambda 1$ [John [is [t_1 tall]]]]]]]

A the set of degrees to which John is tall $\rightsquigarrow$ [0, John's height]

B the maximum degree to which John is tall is contained in t_2
= John's height is contained in t_2

C the set of intervals that contain John's height

D John's height

Beck, 2010

So, rather than having the than-clause denote the degrees up to and including John's height, the than-clause now denotes the set of intervals that contain John's height. To get back to a single degree, we follow (Beck, 2010) in using a selection operator to shift back to a degree at the top of the structure.

(15) $[\![\text{select}]\!] = \lambda P_{\langle\langle\langle d,t\rangle,t\rangle,d\rangle}.max(min(P))$

Here, *max* is the usual maximality operator; *min* collects all the degree that are part of a minimal interval in a set $min = \lambda P. \cup \lambda I.P(I) \wedge \neg\exists I'[P(I') \wedge I' \subset I]$.

As we explained above, the simple λ-abstraction account of *than* clauses generated minimum-related readings for clauses with universal quantifiers. Indeed, when we apply the Π operation to a node A containing a universal modal, the structure is simply going to return the set of intervals containing that minimum and, then, via the selection operator that minimum itself.

(16) $[_D$ select $[_C$ $\lambda 2$ $[_B$ [Π t_2] $[_A$ $\lambda 1$ $\Box$ John drive t_1 fast]]]]

A the set of degrees such that John drives at least so fast in every permissible world $\rightsquigarrow$ $[_{0,}$ the minimally required speed]

B the minimally required speed is contained in t_2

C the set of intervals that contain the minimum speed

D the minimally required speed

However, as soon as the modal is given wide scope over the Π operation, the interpretation changes into one selecting the maximum allowed speed.

(17) $[_D$ select $[_C$ $\lambda 2$ $[_B$ $\Box$ [[Π t_2] $[_{.A}$ $\lambda 1$ John drive t_1 fast]]]]]

A [0, John's speed]

B it is required that John's speed is contained in t_2

C the set of intervals that contain John's speeds in every permissible world

D the maximally allowed speed

As such, the Π theory of *than* clauses gives us everything we need for modals, since via the relative scope of Π we can generate both minimum and maximum-related readings. (See Beck 2010 for a more finegrained picture of all the predictions.)

Abrusán and Spector (2011) extend this framework to degree questions. Parallel to the comparative examples above, Π allows them to derive the interpretation of question that target the maximum allowed degree via a scope ordering $\Box > \Pi$ and questions about the minimally required degree via $\Pi > \Box$.

(18) How fast should I be driving? max = $\Box > \Pi$

(19) How fast do I need to drive? min = $\Pi > \Box$

At this point we can go back to our first argument: neither of the available scope orderings yields the correct interpretation for (20):

(20) How fast did each of the rivals drive? #max/#min

We claim this is to be expected on a strict interpretation of the so-called Heim-Kennedy constraint (HKC), which is usually stated as follows:

(21) *Nominal quantifiers cannot intervene between degree operators and their trace.*

Or schematically,

(22) $*[\ \mathrm{DegOp}_i \ldots \mathrm{Q}_{\mathrm{nom}} \ldots t_i\ ]$ Heim 2000

Support for this constraint comes from (23) and (24). While the latter is ambiguous between a surface scope reading (the paper has to be exactly 15pp long) and an inverse scope reading (the minimum requirement for the paper's length is exactly 15pp), the former example only has a surface scope reading (Heim, 2000). (See also, Hackl 2000).

(23) (John is 4' tall.) Every girl is exactly 1" taller than that.

(24) (This draft is 10pp.)
The paper is required to be exactly 5 pages longer than that.

The same data could also be accounted for by a stricter version of the Heim-Kennedy constraint, one where it is not intervention between an operator and a trace that matters but rather intervention between a lambda abstractor and its bound variable:[3]

(25) $^*[\ \lambda d \ldots \mathrm{Q}_{\mathrm{nom}} \ldots d\ ]$ strict HKC

We propose here to adopt this stricter version, since it would immediately account for why (20) lacks a reading about a minimum or a maximum. In (26) and (27), we give the two logical forms for these readings:

(26) $^*[\lambda 2\ [\ [\ \Pi\ t_2\ ]_1\ [\ \boldsymbol{\lambda 1}\ [\ [\textbf{each rival}]_3\ [\ t_3 \text{ drove } \mathbf{t_1} \text{ fast }]\ ]\ ]\ ]\ ]$ min

In (26), *each rival* intervenes between $\lambda 1$ and t_1. As such, this is excluded by the original Heim-Kennedy constraint as well as our stricter version, and so both versions block minimum-related readings. The LF for the maximum reading, (27), is ruled out by our stricter version only: *each rival* intervenes between $\lambda 2$ and t_2.

(27) $^*[\boldsymbol{\lambda 2}\ [\ [\textbf{each rival}]_3\ [\ [\ \Pi\ \mathbf{t_2}\ ]_1\ [\ \lambda 1\ [\ t_3 \text{ drove } t_1 \text{ fast }]\ ]\ ]\ ]\ ]$ max

Apparently, the pair-list reading and the single-speed reading are escape hatches to the scoping dilemma posed here. At least for the pair-list reading this makes sense, since it is generally assumed that such readings involve scope that is higher than everything else in the clause (e.g. Krifka, 2001).

Note that if we adopt the strict HKC, there is *no* position in the clause that the nominal quantifier could go to. As a result, we not only predict that degree questions with nominal *universal* quantifiers will never have minimum / maximum-related readings, we, in fact, predict that minimum / maximum-related readings never occur with *any* nominal quantifier in a degree question. This prediction is borne out. For instance:

(28) How fast were most of John's rivals driving? #min/#max

Since, *most* doesn't allow pair-list readings, (28) only has a single-speed reading.

Let us take stock. We have seen that while comparatives suggest that nominal and modal universal quantifiers affect the interpretation of the degree construction in the same way, the data for degree questions is quite different. However, these observations are expected if we take the Heim-Kennedy constraint and turn it into a prohibition of nominals intervening between a lambda abstraction over degrees. It follows that the readings for (29) and (30) should come about differently.

(29) John drove faster than each of his rivals did max

(30) John drove faster than he should have max

We can already get a feeling for why they are so similar, however. Given the above we expect the following logical forms for (29) and (30), repectively.

(31) $[\text{each rival}]_3 >> [\lambda 2\ [\ [\ [\ \Pi\ t_2\ ]_1\ [\ \lambda 1\ [\ t_3 \text{ drove } t_1 \text{ fast }]\ ]\ ]\ ]\ ]$ max

(32) $[\lambda 2\ [\ \Box\ [\ [\ \Pi\ t_2\ ]_1\ [\ \lambda 1\ [\ \text{John drove } t_1 \text{ fast }]\ ]\ ]\ ]\ ]$ max

We already understand why (32) gives rise to the maximum reading, but it is also quite easy to see why (31) would do the same. The following interpretation, where the quantifier has the widest scope possible yields a more-than-maximum reading.

[3]This is how Bhatt and Pancheva (2004) present the constraint, but we do not know whether they had a departure from, say, Heim's 2000 conception in mind.

(33) $\forall x[\text{rival}(x) \rightarrow$ John is taller than $x]$

As we will see next, we can get direct evidence for a structure along the lines of (31).

2.3 Argument 3: differentials

We now need to show that the maximum-related reading of (31) differs from the one that is associated to (32). We do this by adding a differential measure phrase to comparatives. We then see that the minimum / maximum-related readings persist with modals, but not with nominals.

(34) John is driving exactly 2mph faster than he should be driving.

(35) John is driving exactly 2mph faster than he needs to be driving.

In a scenario where the minimum speed is 40 and the maximum one is 70, (34) says that John is drving 72mph and (35) says he is driving 42mph. This is exactly as expected: comparatives with modals give rise to minimum / maximum-related readings and since we have no reason to think that differential comparatives are in any sense special, it is natural to expect they are no different. Yet, differentials with nominal quantifiers *are* different. For instance, (36) lacks a reading in which John is driving 2mph faster than his fastest rival (let alone faster than his slowest rival).

(36) John is exactly 2mph faster than each of his rivals is.

The only available reading is one in which all the rivals are driving at the same speed, namely 2mph slower than John. Crucially, this is what you would expect if the nominal quantifier had wide scope, for a wide scope paraphrase give exactly this reading:

(37) For each rival x: John is exactly 2mph faster than x.

Note that although the modal cases are compatible with such readings, they certainly do not entail them:

(34) John is driving exactly 2mph faster than he should/need be driving.
$\not\Rightarrow$ For each permissible world w: John is driving exactly 2mph faster in @ than he is in w
= John is driving 2mph faster than the only speed he is allowed to drive at.

In sum, using the differential we can show that what looks like a regular maximum reading in bare comparatives with nominal universal quantifiers is really just an accident. Sticking in the differential argument clarifies that the nominal and the modal cases are essentially different.

Our main claim is then as follows: *in degree construction universal DPs take scope at a position that is higher than is normally assumed.* We have provided two ways to support this empirically: (i) there are no minimum / maximum-related readings in degree questions; (ii) there are no minimum / maximum-related readings in differential comparatives. We have also given theoretical support: wider than standard scope is expected given the strict Heim-Kennedy constraint.

3 What the scope of nominal quantifiers should look like

If nominal quantifiers take extra-wide scope, where do they go? The structure we have now looks like this:

(38) $[_{\mathrm{D}:d}$ select $[_{\mathrm{C}:\langle\langle d,t\rangle,t\rangle}$ $\lambda \ldots \Pi \ldots [\ \ldots t$ ADJ]]]

Raised quantifiers can only adjoin to t-nodes, but there is none available. This may suggest the quantifier needs to scope out of the degree clause (cf. von Stechow, 1984) and adjoin to the matrix clause. But this is undesirable for well-known reasons, witness the following examples from Larson (1988). The example in (39) shows that *than* clauses prohibit wh-extraction. Assuming a parallel between wh-movement and QR, the latter should be not be possible out of the *than* clause either. A more semantic argument comes from (40). If quantifiers in comparative clauses can attach at the matrix level, then they should be able to scope higher than the subject, and so one would expect inverse scope readings along the lines of [[every professor] [[some student] is smarter than t is]]. But the resulting reading is not available.

(39) *I wonder who John ran faster than _ cycled

(40) Some student is smarter than every professor is.
$\neq$ For every professor x, there exists a student y: y is smarter than x.

We have now reached a tricky dilemma: If QR out of the comparative clause is not available and our current model of what that clause looks like leaves no position open for a quantifier to move to, then we are truly out of options. As it stands, we would predict that nominal quantifiers in comparative clauses are simply infelicitous.

As we see it, the only way out of this dilemma is to assume that there must be a previously unacknowledged layer in the *than* clause. This layer should have two properties: (i) it should introduce a propositional node that can be targetted by QR; and (ii) it should be vacuous for cases where the *than* clause does not contain a nominal quantifier. Schematically, we want a structure like (41) which for non-nominal cases simply passes the value at node D up to the top node, and where there is some node α which is propositional in nature.

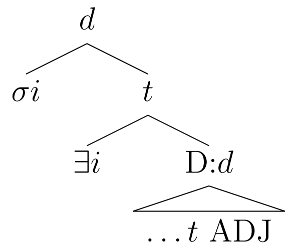
(41) $[\ \ldots [\alpha \ldots [_D$ select $\lambda \ldots \Pi \ldots t$ ADJ]]]

As we will show now, there is a way to achieve this while at the same time making all the right predictions for comparatives with nominal quantifiers.

4 A double shift: from d to t and back

Let's assume that we have a theory that derives the following: (i) It assigns a degree to *than* clauses; (ii) for non-quantificational clauses, this is the maximum degree to which someone has the property denoted by the adjective (for instance John's height for *than John is tall*); (iii) for some modals it returns the minimally required degree (e.g. *than John need to drive fast*); (iv) for other modals it returns the maximally allowed one (e.g. *than John is required to drive fast*). An example of a theory like this would be the one we have been following above, essentially the proposal of Beck (2010), as illustrated in (38). We will assume that this theory derives these interpretations for a node we will call D. We now introduce two operations, one will shift this d to t and the second operator shifts the resulting t back to d.

(42)



It is desirable that the combination of these operators is in principle vacuous, so that the correct results of the theory that delivers the degree in node D are passed on to the top node. We do this as follows: we assume that $\exists i$ takes a degree and states that there is a value assigned to variable i that is identical to this degree:

(43) $[\![\exists v]\!] = \lambda d.v = d$

The sigma operator now looks up the values assigned to variables in such propositions. This operation is reminiscent of a dynamic framework: σ is, for instance, inspired by the Σ operator or DRT Kamp and Reyle (1993). In fact, this whole procedure can only work if we understand type t not as truth-values, but rather as context change potentials. It is naturally impossible to retreive the value of a variable from the truth-value of a proposition, but it is possible to retreive such values from, say, the relation between assignment functions that the proposition expresses in a dynamic framework like Dynamic Predicate Logic (Groenendijk and Stokhof, 1991). Conceptually, then, what σi does when applied to a proposition p is collect all the values that get assigned to i at some point in a successful update with p. This makes most sense in a dynamic *plural* predicate logic (van den Berg, 1996; Nouwen, 2003; Brasoveanu, 2006; Nouwen et al., 2016), since in such formalisms this sum is exactly what ends up being assigned to i when an update with p takes place.

(44) $[\![\sigma v]\!] = \lambda p.c[p](v)$

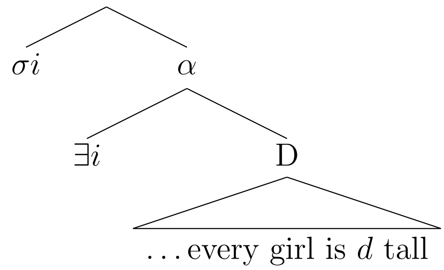
where $c[p]$ is the update of context c with p
where for any context c: $c(v) = \sqcup\{f(v) \mid \text{for } f \text{ an assignment function in } c\}$
where $\sqcup X$ is the infimum of the closure under sum formation of X (i.e. it turns a set into the corresponding plural individual).

As we said before, the combination of σi and $\exists i$ is vacuous. For instance $\sigma i(\exists i(x)) = x$, for any x. However, there is now a t-node that can be targetted by QR and, naturally, as soon as a quantifier intervenes between σ and $\exists$, the vacuity disappears. Take (45):

(45) John is taller than every girl is.

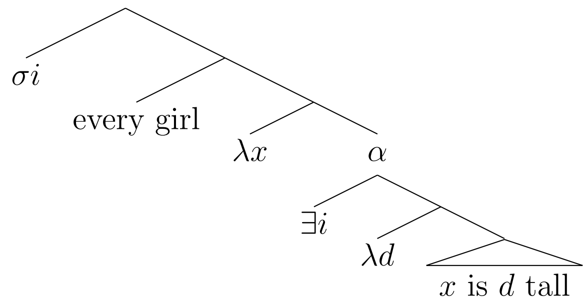
Following (42), we start with the structure in (46). Note that α is of type t:

(46)



The quantifier *every girl* needs to escape the prohibited Heim-Kennedy configuration, i.e. it needs to escape from D. There is just a single node where this is possible, labelled α. We get the structure in (47), which returns the interpretation in (48).

(47)



(48) $\sigma i.\forall x[girl(x) \to \exists i[\mu(x) = i]]$.

In a plural dynamic framework, scope interaction between quantifiers yield dependencies between the corresponding variable assignments. Let us assume there are three girls of 150cm, 170cm and 180cm, respectively. In such a context, the scope of the σ operator in (48) is a proposition that in a context will yield a set of assignment functions such that each function in that set assigns a girl to x and the height of that girl to i. The sigma term collects all the values assigned to i in that output context into a single plurality: $150 \sqcup 170 \sqcup 180$.

The upshot is that when quantifiers take scope between σ and $\exists$, the *than* clause denotes a potentially plural degree. For our example, (45), that would mean that the following comparison is checked:

(49) John's height$>$ $150 \sqcup 170 \sqcup 180$

But what is the interpretation of (49)? How does one compare one's height to the *plurality* of heights? We have nothing new to say here, we simply follow Beck 2014 and Dotlačil and Nouwen 2016 that provide semantics for cases like (49).

The idea is that comparison relations, e.g., $>$, only apply to atoms. This would generate a sort mismatch in case of (49), but such a mismatch is very common in the semantics of plurals. Distributive predicates often occur with plural arguments and when they do they are interpreted by quantifying distributively over the atoms in the plurality. We can think of the predicate λx.John's height $> x$ as a distributive predicate. Using the standard mechanisms from the semantics of plurals, in particular, the quantification over the atoms in the plurality, we can interpret (49) as:

(50) $\forall d[d$ is an atomic part of $150 \sqcup 170 \sqcup 180 \;\to\;$ John's height $> d]$

This is the desired more-than-maximum reading. Applying the same idea to differential comparatives, say for *John is exactly 2" taller than each girl is* we get (51) and (52) (for more details, see Dotlačil and Nouwen 2016).

(51) John's height - height-of-girl1$\sqcup$height-of-girl2$\sqcup$height-of-girl3 = 2"

(52) $\forall d[d$ is an atomic part of height-of-girl1$\sqcup$height-of-girl2$\sqcup$height-of-girl3 $\rightarrow$ John's height$-d$=2"]

This can only be true if all the girls have the same height, that is, if the top node of the structure returns an atom rather than a non-atomic degree. This is entirely as desired: as we observed above, differential comparatives with nominal quantifiers yield point readings.

5 Critical assessment

Since von Stechow (1984), it has been common to think of *than* clauses as degree points. This intuition was overturned in Schwarzschild and Wilkinson (2002), who make the following observation (p. 10): "In deciding whether [someone] is taller than everybody else is, we don't look for a point corresponding to everyone else, but rather we scan the scale to check everyone's height. This simple observation is missed by degree analyses." We have argued in this note that the intuition of Schwarzschild and Wilkinson (2002) is correct, but only for some comparative clauses – those that include nominal quantifiers. When modal quantifiers are used, the intuition that a *than* clause provides a degree point is justified. A way to account for the data is to say that degree clauses will have to contain an extra layer and the extra layer must be used by nominal quantifiers (but not by modals) as a scope position at a higher level than previously acknowledged.

While we strongly believe that the data calls for a revision of the semantics of the comparative along the lines we sketched above, we at the same time have some concern about the particular implementation of wide scope semantics for nominals. First of all, the account outlined in the previous section relies on the modelling of anaphoric dependencies in dynamic semantic frameworks, which is odd given that we are dealing with an essentially non-anaphoric phenomenon here. The second problem we see is much more serious. If the operations making up the layer we propose occur in comparative clauses, then why do we not see them in action anywhere else (e.g. in relative clauses)?

This second point, however, has an important twist, for the question why the mechanisms involved are not at play in other constructions will apply not just to the solution we sketched here, but to any solution that will solve our dilemma. In that sense, the data we uncovered in this note suggest that degree abstraction may diverge in important respects from other forms of abstraction.

We will end this note on a speculative note regarding the interaction of modals and nominal quantifiers. Schwarzschild and Wilkinson (2002) argue against an account that assigns wide scope to nominal quantifiers on the basis that they can be responsible for *de dicto* readings in the comparative clause. For instance, (53) most naturally has a reading in which Bill has no predictions for specific rivals in mind.

(53) John was faster than Bill predicted most rivals to be.

If we are right, *most rivals* should take scope at a very high position in the *than* clause of (53). But how then can it yield a de dicto reading? The only option would be that *predict* takes even wider scope. This means that it should in principle be possible for not just nominal quantifiers to scope in the extended part of the *than* clause, but also intensional ones. None of the data we presented above excludes this options, since we have only shown that nominal quantifiers do not yield the readings compatible with the lower position; we have not shown that modals exclude the readings that occur in the very high part of the clause. And, indeed, the differential version of (53) gives rise to a point interpretation, and not to a minimum / maximum-related reading.

(54) John was exactly 2mph faster than Bill predicted most rivals to be.

We are not sure how insightful this is, however, since predictions are quite naturally related to a single point way anyway. It is not clear, for instance, what a maximum-related reading of (55) would be.

(55) How fast did Bill predict John to drive?

It is hard, though, to construct examples parallel to (53) and (54) that contain, say, the deontic modals we discussed above. For that reason we leave investigating such examples for further research.

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