Splitting Germanic negative indefinites

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Abstract

We propose a new view on the phenomenon of split scope. Traditionally, negative indefinites are seen as the paradigmatic case of scope splitting expressions. At the same time it is widely recognized that modified numerals yield interpretations that are similar to split scope in the sense that different parts of the DP take different scope. Such interpretations are not as mysterious however as split scope with negative indefinites, since the split readings with modified numerals have been characterized as degree quantifier movement. While the superficial connection between negative indefinites and modified numerals has often been made, so far only Abels and Martí (2010) present a comprehensive theory of both phenomena. In this paper, we show what happens if one views the scope taking of modified numerals as the core semantic mechanism involved in all split scope phenomena, with split negative indefinites as a special case. Taking this view, we unearth a hitherto undiscovered dichotomy in the semantic behaviour of Germanic negative indefinites. At the same time, a new challenge emerges: while our theory is a comprehensive theory of splitting phenomena, it also identifies expressions that fail to split their scope consistently.

`word count: 5717 words.`

1 Split scope

Negative indefinites in Dutch and German are known to give rise to so-called **split scope readings** in which the meaning of the negative indefinite seems to be split in two pieces by another scope-bearing element (Jacobs, 1980; Kratzer, 1995; Rullmann, 1995; Geurts, 1996; de Swart, 2000; Penka and Zeijlstra, 2005; Abels and Martí, 2010; Penka, 2011). Such reading is illustrated here with an existential modal in Dutch:

(1) Henk mag **geen** toetje eten.
you may GEEN dessert eat
'Henk is <u>not</u> allowed to eat <u>a</u> dessert.' $\neg > \Diamond > \exists$

It is widely acknowledged that modified numerals give rise to similar readings (Hackl, 2000; de Swart, 2000). For instance, if we think of *at most two* as equivalent to *not more than two* than (2) is paraphrasable as Henk is *not* allowed to eat *more than two biscuits*.

(2) Henk is allowed to eat at most two biscuits. $\neg > \Diamond >$ more than 2

As shown by Hackl (2000) (following Heim 2000), however, one does not need to assume that numeral quantifiers split into a negative and positive part to account for (2). The possibility of split scope for a sentence like (2) follows directly if we assume that *at most two* is a degree quantifier that can quantifier-raise above the modal. In other words, for cases like (2) split scope does not involve splitting at all. Rather, it is a case of *determiner QR* made possible by the fact that the determiner denotes a degree quantifier. (See below for details). Many have followed Hackl in this style of analysis for modified numerals (e.g. Nouwen 2010; Kennedy 2015; Buccola and Spector 2016). For Penka (2011), the availability of an independent analysis for the reading in (2) means that these cases are a separate phenomenon from cases like (1). Hackl's account is available for (2) since it can be maintained that numeral modification is a degree phenomenon. Since negative indefinites seem to have nothing to do with degrees, the seeming parallel between scope for negative indefinites and scope for modified numerals will have to be taken to be accidental.

Elsewhere in the literature, one finds a more unifying approach. Most notably, one of the desiderata of Abels and Martí (2010) is to have a single account for (1) and (2). They do so by proposing a theory that does not take modified numerals to be degree expressions. The central idea in their work is that split scope follows from general properties of quantification.[1] That is, (1) and (2) give rise to similar readings simply because they both involve quantifiers. This means that Abels and Marti reject the analysis of (2) in terms of degree quantification, in favor of one that is capable of connecting such examples to (1).

Here, we explore a different approach to Abels and Marti's desideratum of a unified approach to (1) and (2). In particular, we question whether we can obtain such a unified approach while at the same time holding on to the idea that (2) involves movement of a degree quantifier. That is, we work out the following hypothesis:[2]

Reductive hypothesis:
All scope splitting involves degree quantifier movement.

While Abels and Marti attribute all scope splitting to a general property of quantification, the hypothesis we follow in this work will *reduce* split scope to degree quantifier scope. As such, negative indefinites like *geen* in (1) will have to be seen as degree quantifiers. Our goal is to investigate what

[1]Although the proposals are very different, de Swart (2000)'s analysis shares exactly this aspect with Abels and Marti's.

[2]This hypothesis has a precursor in Heim (2000) when in the end of that paper she speculates: "What I would like to suggest instead is that scope-splitting (at least sometimes) is DegP-movement." (p. 225)

such a move could bring us. While this route may at first seem somewhat surprising, we identify some attractive theoretical consequences. Adopting the above hypothesis allows us to cover the following four observations we will make in this paper: (1) Split scope with negative indefinites is not generally available cross-linguistically; (2) Split scope with run of the mill degree quantifiers *is* generally available cross-linguistically; (3) Split scope is constrained by a scope constraint observed for degree expressions; (4) Only negative indefinites that can modify numerals allow for split scope readings systematically. The ensuing theory takes split scope to be a degree phenomenon and will maintain that while Dutch *geen* and German *kein* are degree quantifiers, English *no* is not. The approach is self-limiting, however. Our theory will predict there to be languages in which negative indefinites behave like degree quantifiers and, thus, give rise to split scope. Since all split scope is reduced to raising of degree quantifiers, the theory will not be able to account for sporadic cases of split scope with negative indefinites in languages where such expressions do not appear to be degree-related. In particular, while we can explain why English *no* lacks scope splitting readings where its Dutch or German counterpart have such readings, we cannot explain why in sporadic other cases split reading do occur.

Note that if we follow the hypothesis, then Dutch *geen* and German *kein* are not indefinite determiners, but rather degree quantifiers. In particular, we will propose meanings for these expressions that basically amount to degree negation. In what follows, we will nevertheless keep the descriptive label *indefinite* for these expressions. The reader should bear in mind that this label carries no theoretical commitment.

2 Properties of split scope

2.1 Split scope: Cross-linguistic limitations

Most studies of split scope with negative indefinites concern Dutch or German. Yet, split scope is sometimes discussed for English *no* (Potts, 2000; von Fintel and Iatridou, 2007; Iatridou and Sichel, 2011; Kennedy and Alrenga, 2014), usually illustrated with examples as the following:

(3) The company need fire **no** employees. $\neg > \Box > \exists$
'It is <u>not</u> the case that the company is obligated to fire <u>an</u> employee.'

However, the phenomenon is much more restricted in English than in Dutch / German. Changing an NPI *need* to a neutral *have to* leads to the loss of the split scope reading:

(4) The company has to fire **no** employees. $\neg > \Box > \exists$
'#It's <u>not</u> the case that the company has to fire <u>an</u> employee.'

Similarly, a direct translation of the paradigmatic split scope example (1) into English results in a sentence with no split scope reading. It only has a *de dicto* reading.

(5) At this party, you have to wear no tie.

We take this to mean that English *no* lacks the *general* scope splitting ability of Dutch *geen*. This discrepancy will play a large role in our story below.

2.2 Split scope beyond negative indefinites

Apart from negative indefinites, *degree expressions* tend to split their scope (e.g. Hackl 2000). Importantly, they do so to the same extent in English as in Dutch / German:

(6) Tom has to bring **at most two** blankets. $\neg > \Box > >2$
'Tom does <u>not</u> have to bring <u>more than two</u> blankets'

(7) They are allowed to write **few** letters. $\neg > \Diamond >$ many
'It is <u>not</u> the case that they are allowed to write <u>many</u> letters'

It is important to note several things here. First, all quantifiers in these examples are degree quantifiers. At first sight, degree quantifiers do not seem to form a natural class with *geen*-type expressions (or with *no*, for that matter). Why this particular collection of expressions (degree quantifiers + *geen* / *kein*) gives rise to split scope is a puzzle that the reductive hypothesis eliminates by demanding *geen* / *kein* to have the semantics of a degree quantifier. Finally, in contrast to the behaviour of *no* that we observed in the previous subsection, split scope with English degree quantifiers is unlimited. That is, for both English and Dutch/German, degree quantifiers always have the ability to split scope. Note, for instance, that the examples in (6) and (7) contain modals for which split scope with *no* is unavailable. This means that the English negative indefinite is the odd one out, since in contrast to degree quantifiers crosslinguistically and negative indefinites in Dutch and German, it fails to generally allow for split scope readings. The analysis we will develop below on the basis of the reductive hypothesis deals with this variation in a straightforward way: by treating split scope as a degree phenomenon and analyzing *geen* / *kein* as degree quantifiers, unlike *no*.

This kind of analysis has immediate appeal due to the fact that split scope readings with degree quantifiers come naturally under a relatively standard analysis of degree quantification, which we adopt here. According to this analysis, quantifiers like *at most n*, *fewer than n* and *few* are not type $\langle\langle e,t\rangle,\langle\langle e,t\rangle,t\rangle$ quantifiers, rather they are type $\langle\langle d,t\rangle,t\rangle$ (Hackl, 2000; Nouwen, 2008, 2010; Kennedy, 2015) with the kind of meaning shown in (8) for *at most two*. (Also note that under this analysis a silent MANY is needed to mediate the relation between the degree and the noun, see Hackl 2000 and below for more details). Given this analysis, split scope readings with degree quantifiers are straightforward cases of QR:

(8) $[\![\text{at most 2}]\!] = \lambda P_{\langle dt \rangle}.max(P) \leq 2$ (Kennedy, 2015)

(9) $[\![$ at most 2 [Tom has to bring ~~at most 2~~ MANY books] $]\!]$
$= [\![\text{at most 2}]\!](\lambda n.\Box\exists x\ [\mathbf{*bring}(\mathbf{T}, x)\ \&\ \mathbf{*book}(x)\&\#x = n])$
$= max(\{n|\Box\exists x[\mathbf{*bring}(\mathbf{T}, x)\ \&\ \mathbf{*book}(x)\&\#x = n]\}) \leq 2$

(10) $[\![\text{few}]\!] = \lambda P_{\langle dt \rangle}.max(P) < d_{st}$

If, as is standardly assumed, *geen*-type negative indefinites are not degree quantifiers, then an analysis of the split scope readings they give rise to will have to be quite different from what is illustrated in (9). That is, split scope will have to be essentially different in nature for degree quantifiers on the one hand and *geen* / *kein* on the other. Naturally, that would make it harder to explain their similar properties.

2.3 Split scope and the Heim-Kennedy generalization

We have seen modal verbs (*must*, *need*, *can*, *may*) split scope of *geen*-type indefinites. Are modals the only scope-splitters? With normal intonation, *geen*-type indefinites do not split scope over non-modal quantifiers. The following example from German illustrates this:

(11) Genau ein Arzt hat **kein** Auto.
exactly one doctor has KEIN car
#'It's not the case that exactly one doctor has a car'
'Exactly one doctor has no car'

The distribution of split scope is reminiscent of the Heim-Kennedy generalization (Kennedy, 1997; Heim, 2000):degree quantifiers can scope above (at least some) intensional verbs (13), but nominal quantifiers can never intervene between a degree quantifier and its trace (14).[3]

(12) *[$\text{D}_{dtt} \ldots \text{Q}_{ett} \ldots t_d$]

(13) Tom needs at most two blankets.
'Tom does not need more than three blankets.'

(14) Every student has at most three books.
'#Not every student has more than three books.'

Negative indefinites behave in a parallel fashion (example from Dutch):

(15) Iedere student heeft **geen** oplossing gevonden.
every student has GEEN solution found

[3]See Nouwen and Dotlačil (2017) for discussion of details as to how this constraint should be stated.

#‘Not every student found a solution’

Why would split scope with *geen* obey a generalisation concerning degree quantifiers if it’s not a degree quantifier? Once more, the data suggests that the broad phenomenon of scope splitting, including the splitting of negative indefinites, is a degree phenomenon, thus supporting the reductive hypothesis.

2.4 *Geen*-type negative indefinites with numerals

We have seen above (Section 2.1) that there is a difference between *geen* / *kein* and *no* in that split scope is systematic with the former and restricted with the latter:

(1) Je hoeft **geen** stropdas te dragen.
you must-NPI GEEN tie to wear
‘You do not have to wear a tie.’ $\neg > \Box > \exists$

(16) At this party, you have to wear **no** tie. $*\neg > \Box > \exists$

We observe another difference between *geen* / *kein* and *no* – namely that *geen* / *kein* combine with numerals while *no* generally doesn’t:

(17) Nigella heeft **geen** 20 taarten gebakken.
Nigella has GEEN 20 cakes baked.
‘Nigella has not baked 20 cakes.’

(18) *Nigella baked no 20 cakes.

We suggest that this difference is not accidental, both cross-linguistically and semantically. An exploration of Germanic languages supports the following generalisation:

> **The numeral modifier generalisation for negative indefinites in Germanic:** *whenever a negative indefinite can modify numerals, its capacity to create split scope readings with intensional operators is unlimited.*

We found that Icelandic and Frisian pair with Dutch and German in that they have negative indefinites (*eng* and *gjin*, respectively) which can modify numerals and which have unlimited split scope. The Swedish negative indefinite *ing* is like English: it lacks a use as a numeral modifier and does not generally give rise to split scope readings.

These differences, we believe, can help us point in the direction of an understanding of split scope readings of *geen*-type indefinites and the lack of such readings with *no*. In short, our observations are in line with the reductive hypothesis. The means that *geen* is a degree quantifier, quite like other expressions subject to split scope. In the next section, we first spell out an analysis of *geen* in combination with numerals, as in (17), and then move on to the paradigmatic bare cases.

3 Analysis

3.1 *Geen* with numerals

Since *geen* can combine with numerals, we will analyse it parallel to expressions that are more standardly considered to be numeral modifiers. In particular, we will assume that numerals denote numbers and that there is a mediating silent determiner MANY that links the complement noun phrase to the relevant cardinality (Hackl 2000 and much subsequent work). For instance, (19-a) has the structure in (19-b) and the interpretation in (19-c).

(19) a. Three balloons popped.
  b. [[[three MANY] balloons] popped]
  c. $\exists x[\#x = 3 \wedge {}^*\mathbf{balloon}(x) \wedge {}^*\mathbf{popped}(x)]$

The silent determiner MANY is an operator that takes a degree (a number) and it returns a (type $\langle 1, 1\rangle$) generalized quantifier: $\lambda n.\lambda A.\lambda B.\exists x[\#x = n \wedge A(x) \wedge B(x)]$. Modified numerals make use of the same configuration and thus also combine with MANY, yet they are not of type d, but rather that of degree quantifiers, $\langle\langle d, t\rangle, t\rangle$. This means they need to quantifier-raise for type reasons, leaving behind a trace of the appropriate type d. For example, one could analyse *at most* as $\lambda n.\lambda P.max(P) = n$, leading to (20).

(20) a. At most three balloons popped.
  b. [[[at most] three] [[[t MANY] balloons] popped]]
  c. $max(\lambda n.\exists x[\#x = n \wedge {}^*\mathbf{balloon}(x) \wedge {}^*\mathbf{popped}(x)]) \; = \; 3$

The analysis in (20) is basically that of Kennedy (2015). Kennedy's account of *bare numerals* is slightly different from that in (19), though. This is for two reasons: (i) bare numerals are ambiguous between the kind of unilateral ("at least") meanings as derived in (19-c) and bilateral ("exactly") interpretations; (ii) bare numerals can express maximum values in the context of modal predicates. For instance, (21) is ambiguous between the three readings in (a)-(c).

(21) Sue may eat 3 biscuits.
  a. *Sue has permission to eat 3 or more biscuits (and perhaps other quantities too)*
  b. *Sue has permission to eat exactly 3 biscuits (and perhaps other quantities too)*
  c. *Sue is allowed to eat 3 biscuits, but she is not allowed to eat more than three biscuits.*

Kennedy accounts for the latter two readings by assuming maximality as part of the lexical semantics of numerals. The difference between (21-b) and (21-c) is that in the former the numeral takes narrow scope with respect to the modal, while in (21-c) it takes wide scope. In what follows we will adopt this account but alter it by decomposing Kennedy's semantics. That is, we will assume that maximality is an operator that may be optionally inserted, and is not part of the lexical semantics.

In (19) the numeral is interpreted as a number (of type d). To allow the numeral to take scope, it will need to be able to shift to a quantifier (of type $\langle\langle d,t\rangle,t\rangle$). If one thinks of type-shifting as syntactically represented, one can represent it as a sister of the numeral in the syntactic structure – we label it QUANT:

(22) a. $[\![\textsc{Quant}]\!] = \lambda n_d \lambda P_{\langle dt\rangle}.P(n)$
b. $[\![3_{\textsc{Quant}}]\!] = [\![\textsc{Quant}\ 3]\!] = \lambda P_{\langle dt\rangle}.P(3)$

$3_{\textsc{Quant}}$, as defined in (22-b), denotes the set of intervals that include 3. Given QUANT, we now have a second way of generating the lower-bounded reading for examples like (19), using the syntax in (23).

(23) [[QUANT three] λd [[d many] balloons] popped]

The sister of [QUANT three] is the set of numbers such that at least so many balloons popped. The effect of (23) is now simply that "3" is one of these numbers, and so the result is equivalent to what we had in (19).

To get the "exactly" reading, we optionally maximize.

(24) a. $[\![\textsc{max}]\!] = \lambda D_{\langle dt,t\rangle}\lambda P_{\langle dt\rangle}.max(P) \in \cap D$
b. $[\![\textsc{max}\ 3_{\textsc{Quant}}]\!] = \lambda P_{\langle dt\rangle}.max(P) \in \{3\}$

The MAX operator takes a set of intervals (corresponding to the quantificational version of the numeral) and returns a set of intervals as well – namely, those whose maximum is a member of the set resulting from intersection of all sets in the first argument of MAX. When MAX combines with $3_{\textsc{Quant}}$, this set will be a singleton set whose only member is 3, as spelled out in (24-b). This is, of course, the same as stating that the maximum of an interval equals 3:

(25) $[\![\textsc{max}\ 3_{\textsc{Quant}}]\!] = \lambda P_{\langle dt\rangle}.max(P) = 3$

The exactly reading for (19) is now given by the following logical form.

(26) [[MAX [QUANT three]] λd [[d many] balloons] popped]

The advantages of (this decomposed version of) Kennedy's framework become clear whenever there is an additional scope-taking operator, as with (21). We can account for the three readings of (21) using the following three logical forms.[4]

(27) a. [may [[QUANT three] [Sue eat [[d many] biscuits]]]
b. [may [[MAX [QUANT three]] [Sue eat [[d many] biscuits]]]
c. [[MAX [QUANT three]] λd [may [Sue eat [[d many] biscuits]]]]

The form in (27-c) is a case of split scope, accounted for by quantifier raising of the degree quantifier [MAX [QUANT three]]. When negative indefinites modify numerals, they enter in similar configurations. That is, in line with this analysis of numeral quantification and numeral modification, we propose that the numeral modifier occurrences of *geen* have the following lexical semantics.

(28) $[\![\text{geen}]\!] = \lambda Q_{\langle dt,t\rangle} \lambda P_{\langle dt\rangle} . P \notin Q$

The second argument of *geen* – an interval, or a set of degrees – is the degree predicate created by QR of the degree quantifier *geen n*. The first argument of *geen* – a set of intervals – corresponds to the type-shifted numeral that combines with *geen*. Here is an example, a repeat of (17) above.

(29) Nigella heeft **geen** 20 taarten gebakken.
Nigella has GEEN 20 cakes baked.
'Nigella has not baked 20 cakes.'

Depending on whether maximization takes place, there are two distinct logical forms for this example:

(30) a. [[geen [QUANT 20]] λd [Nigella baked [[d MANY] cakes]]]
b. [[geen [MAX [QUANT 20]]] λd [Nigella baked [[d MANY] cakes]]]

When 20_{QUANT} combines with *geen*, the resulting meaning states that the interval that 'geen 20_{QUANT}' takes as its argument is **not** a member of the set of intervals containing 20. In other words, 'geen 20_{QUANT}' denotes the set of intervals **not** containing 20.

(31) $[\![\text{geen } 20_{\text{QUANT}}]\!] = \lambda P_{\langle dt\rangle} . P \notin \{Q_{\langle dt\rangle} \mid Q(20)\} = \lambda P_{\langle dt\rangle} . \neg P(20)$

The effect of this is that (30-a) denotes the set of worlds in which Nigella baked fewer than 20 cakes. In contrast [geen MAX [QUANT 20]] returns the set of intervals that do not have 20 as their maximum:

[4] We leave it to the reader to check that these indeed deliver the appropriate readings. Note that the semantics of [[QUANT three] λd [may [Sue eat [[d many] biscuits]]]] is equivalent to that of (27-a).

(32) $[\![\text{geen MAX } 20_{\text{QUANT}}]\!] \begin{aligned}[t] &= \lambda P_{\langle dt \rangle}.P \notin \{Q_{\langle dt \rangle} \mid max(Q) = 20\} \\ &= \lambda P_{\langle dt \rangle}.\neg max(P) = 20\end{aligned}$

This means that (30-b) denotes the set of worlds in which Nigella did not bake exactly 20 cakes. That is, she baked some number that is different from 20. These are exactly the two reading available for (33). As with bare numerals, numerals modified by *geen* display ambiguity between (negated) unilateral and (negated) bilateral meanings.

Both readings of (33) are compatible with Nigella not baking any cakes. To make sure our analysis predicts that, we need one special assumption. In the case where Nigella didn't bake a cake, the degree predicate λd.[Nigella baked d MANY cakes] is the empty set, for there is no number d such that there is a group of cakes of cardinality d baked by Nigella. For the non-maximized case, this is fine. The sentence is true in the no-baking scenario: 20 is not a member of the empty set. But things are different for the maximized version. In that case (33) is interpreted as: 20 is not the maximum of the degree predicate. In the no-baking scenario this pans out as 20 is not the maximum of the empty set. Standard definitions of "maximum", however, have it that the maximum of an empty set is undefined. If there are no values, then there also isn't a biggest value. For the semantics to work, we will have to move away from this standard assumption and stipulate that $max(\emptyset) = 0$. This may seem unattractive, but it turns out that this assumption is needed for all downward entailing degree quantifiers. Since such quantifiers are compatible with the zero-cardinality/degree possibility, we need a way of avoiding undefinedness for such cases. We are also not the first to notice this; see Buccola and Spector (2016), Bylinina and Nouwen (2018) for discussion.[5]

What we have just described is just one of potentially many ways to achieve a compositional account of the meanings of *geen 20*. Nothing hinges on this particular implementation – and we believe our general idea to be compatible with other views on numeral modification and on maximization. What is important is that *geen* is a kind of degree negation that combines with numerals – either under a 'at least' or under 'exactly' reading.

Let's now turn to split-scope environments, where *geen* is embedded under a modal. In such an environment, the split scope reading is derived by *geen 20* QR-ing over the modal verb in a straightforward way:

[5] Bylinina and Nouwen (2018) provide an alternative to the route taken here, leaving the traditional take on maximality intact. They assume the bottom element $\perp$ is in the denotation of pluralised predicates. That is, the domain of entities contains atoms and pluralities, including the zero plurality, the entity with cardinality 0. In other words, it is a full lattice rather than a semi-lattice. To keep things as light as possible, here we chose the simpler option of redefining maximality. See Buccola and Spector (2016); Bylinina and Nouwen (2018) for extensive discussion of the options.

(33) Nigella hoeft **geen** 20 taarten te bakken.
Nigella must-NPI GEEN 20 cakes to bake
'Nigella doesn't have to bake 20 cakes.'

(34) $[\![$ [[geen 20_{QUANT}] λd [N. must bake d MANY cakes]] $]\!] =$
$[\![$[**geen 20**]$_{\geq}]\!](\lambda n.\Box\exists x[\mathbf{*bake}(\mathbf{N}, x)\ \&\ \mathbf{*cake}(x)\ \&\ \#x = n]) =$
$\neg\Box\exists x[\mathbf{*bake}(\mathbf{N.}, x)\ \&\ \mathbf{*cake}\ \&\ \#x = 20]$

(35) $[\![$ [[geen *max* 20_{QUANT}] λd [N. must bake d MANY cakes]] $]\!] =$
$[\![$[**geen 20**]$_{=}]\!](\lambda n.\Box\exists x[\mathbf{*bake}(\mathbf{N}, x)\ \&\ \mathbf{*cake}(x)\ \&\ \#x = n]) =$
$\neg max\{n \mid \Box\exists x[\mathbf{*bake}(\mathbf{N.}, x)\ \&\ \mathbf{*cake}(x)\ \&\ \#x = n]\} = 20$

The resulting readings are variants of the split-scope reading: it's not the case that Nigella has to bake 20 cakes. The versions differ in that with *max*, the requirement can be any number other than 20 – higher or lower; without the maximization operator, the requirement is lower than 20. These are indeed the readings available for (33).

3.2 Bare *geen*

We propose that occurrences of *geen* that are not followed by a numeral, as in (36), are derived from the numeral modifier *geen* by semantically incorporating the numeral 'one' (Dutch: *één*). As before, *geen* gives rise to a split scope reading via degree quantifier movement above the modal verb. The split reading is achieved with an 'at least' semantics of *geen* incorporating 'one':

(36) Je hoeft **geen** stropdas te dragen.
You must-NPI GEEN tie to wear.
'You do <u>not</u> have to wear <u>a</u> tie.

(37) $[\![$geen (*bare*)$]\!] = [\![$geen 1 QUANT$]\!] = \lambda P_{\langle dt\rangle}.\neg P(1)$

(38) $[\![$You must wear **geen** tie$]\!] =$
$[\![$geen 1 QUANT$]\!](\lambda n.\Box\ \exists x[\mathbf{*wear}(\mathbf{u}, x)\ \&\ \mathbf{*tie}(x)\ \&\ \#x = n])$
$= \neg\Box\exists x[\mathbf{*wear}(\mathbf{u}, x)\&\mathbf{*tie}(x)\&\#x = 1]$

(38) expresses the lack of obligation to wear a tie, as desired. Potentially, we could have a maximized version of (37):

(39) $[\![$geen MAX 1 QUANT$]\!] = \lambda P_{\langle dt\rangle}.max\{m|P(m)\} \neq 1$

However, bare *geen* only has the 'at least' reading – that is, (36) only has (38) as a reading. Using (39) in (38) would amount to the lack of obligation to wear exactly one tie. This reading is not attested. Similarly, 'I have **geen** book(s)' with (39) would be a statement that is true in a situation where I have no books or two books, or three books, etc. Once more, such a reading is not attested.

We believe that the reason why bare *geen* does not express the quantificational concept in (39) has to do with conditions on maximization. Under the assumption that maximization is a focus-sensitive operation, it would be natural to think that it is only available when a scalar item can be focussed (for discussion see Krifka 1999; Spector 2013; Blok 2019). This works fine when the numeral is phonologically overt and thus can bear focus. In the case of the incorporated numeral, arguably, focussing is not possible – and therefore, maximization is not applicable.

An indirect indication of this restriction comes from *geen* in combination with overt numeral 'one': *geen één* ('**geen** one'). With normal prosody, this combination does get the 'geen MAX 1 QUANT' interpretation that is unavailable for bare *geen*. However, when 'one' is deaccented and forms a prosodic unit with *geen*, the 'exactly'-interpretation becomes unavailable:

(40) Ze heeft geen één boek gelezen, maar twee.
She has GEEN one book read but two
'She didn't read one book, she read two'.

(41) Ze heeft geen-één boek gelezen, #maar twee.
She has GEEN-one book read but two
'She didn't read one book, she read two'.

So far, our predictions are exactly as desirable. By taking negative indefinites of the *geen* kind to be degree quantifiers, we can account for split scope in exactly the same way as accounts of split scope with (other) degree quantifiers. Numeral modifying as well as bare occurrences of *geen* form modified numerals and thus take scope the way modified numerals do.

Our interpretation for modifier *geen* is, however, broader than *numeral* negation: it is *degree* negation. Nothing forces us then to take bare *geen* to have incorporated a numeral. In fact, we will now propose a minor adjustment of the analysis we just introduced. This adjustment is needed because of case like (42) or (43), where it is untenable to assume that "geen" is operating in a domain of cardinalities.

(42) Nigella heeft geen soep gemaakt.
N. has no soup made.
'Nigella didn't make soup'

(43) Hij is geen genie
He is GEEN genius
'He is not a genius'

We can all such cases by moving from a discrete cardinality scale as the domain of *geen* to a more general understanding of the scale involved. Rather than saying that *geen* incorporates "1", we will now say that it incorporates whatever is the minimal (non-zero) value on the relevant scale. To capture this, we define the abstract operator $\mathbb{E}$.

(44) $[\![\boldsymbol{E}]\!] = \lambda P_{\langle dt \rangle}.\exists d[d \neq 0 \ \wedge \ P(d)]$

Note that if the relevant scale is that of cardinality, then $\boldsymbol{E}$ is equivalent to the interpretation of 1_{QUANT}. To make our analysis more generally applicable, we propose that bare *geen* does not incorporate numeral 1, but rather the more general bottom of the scale quantifier $\boldsymbol{E}$.

(45) $[\![\text{geen } (\textit{bare})]\!] = [\![\text{geen } \boldsymbol{E}]\!] \ = \lambda P_{\langle dt \rangle}.P \notin \mathbb{E}$
$= \lambda P_{\langle dt \rangle}.\neg\exists d[d \neq 0 \ \wedge \ P(d)]$

In the case of (43), the domain of bare *geen* is a dense domain consisting of degrees of geniusness. In this case (45) will negate that the subject possesses any non-zero degree of geniusness. Crucially, like the cases discussed above, such non-quantificational negative indefinites split in Dutch/German, but not in English.

(46) Jan hoeft geen genie te zijn.
Jan needs no genius to be.
'Jan doesn't need to be a genius.'

(47) Jan has to be no genius. (*no split reading*)

One way to see our proposal is that it accounts for this contrast by taking *geen* / *kein* to be *negative degree indefinites*, rather than regular negative indefinites (such as *no* in English).

4 Conclusion

We explored the idea that split scope reduces to degree quantifier movement. According to this suggestion, all split scope expressions form one single natural class. This meant that our analysis of negative indefinites in languages like Dutch and German made them proper degree quantifiers. At the same time, English *no* did not qualify as degree quantifier: it doesn't combine with numerals and split scope readings are not as freely available as in other languages. Exploring our hypothesis has unearthed a hitherto undiscovered dichotomy between negative indefinites in Germanic languages and it has also allowed us to account for the ability of some of the "indefinites" to modify numerals. Building on this hypothesis, we formulated a uniform analysis for what initially seemed to be a phenomenon involving a heterogeneous class of expressions. That said, we see two important limitations brought on by the reductive hypothesis.

First of all, we have not said anything about cases when split readings of *geen* occur with quantifiers over individuals under hat contour. Such examples are problematic for a degree view on split scope since the readings involved break with the Heim-Kennedy generalization.[6]

(48) /JEDER Arzt hat KEIN\ Auto
every doctor has no car
'Not every doctor has a car'

Second, since the reductive hypothesis attributes all split scope to degree quantification, it excludes any option of accounting for cases when English *no does* give rise to split scope, as was the case for (3), repeated here as (49).

(49) The company need fire **no** employees. $\neg > \Box > \exists$
'It is not the case that the co. is obligated to fire an employee.'

An approach as the one explored above would have to say that the mechanism involved in these example must be different from what we suggest for *geen* and other degree quantifiers. Rather ironically then, the approach taken here suggests then that the *true* split scope puzzle is found not in languages like Dutch or German, where split scope examples involve a rather humdrum form of degree quantifier raising, but rather in languages like English, where in a very restricted set of contexts non-degree negative indefinites appear to split their scope.

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[6] In fact, de Swart (2000) takes such examples to indicate that scope splitting is not a phenomenon restricted to intensional operators. Note, however, that examples like (48) do not generalise to other nominal quantifiers, like for instance *most*.

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