Restricting the scope of a relative measure*

Andrew Kato

Department of Linguistics, UC Santa Cruz
1156 High Street, Santa Cruz, CA 95060
anmkato@ucsc.edu

Abstract: Revisiting recent debate on the 'non-conservative' reading of pseudopartitives with relative measure nouns (RMs; e.g., *percent*), this paper offers an analysis for treating definite RM phrases with (i) relative clauses, (ii) prepositional modifiers, and (iii) no overt material at all as variants of an underlying semantics for maximalizing relatives (Grosu & Landman 1998, Hackl 2000, Solt 2015, Ahn & Sauerland 2015b) — given their interpretation is consistently calculated DP-internally. In so doing, I re-evaluate the leading series of work on RM phrases by Ahn & Sauerland (2015a,b, 2017) and by others in follow-up discourse (Pasternak & Sauerland 2022, Li 2022, Gehrke & Wągiel 2023, a.o.). I conclude by pointing to issues concerning the variable subject-object asymmetry attested in the non-conservative reading.

Keywords: measurement, partitivity, conservativity, numerals, degree semantics

1 Introduction

In the context of existing research on measurement, including on partitivity (e.g., Ladusaw 1982, Hoeksema 1984, de Hoop 1997, Barker 1998, Sauerland & Yatsushiro 2004, Stickney 2009, Falco & Zamparelli 2019, Wągiel 2021), comparatives (e.g., Hackl 2000, Schwarzschild 2008, Kennedy 2009, Bhatt & Takahashi 2011, Bobaljik 2012, Wellwood, Hacquard & Pancheva 2012), and portion/measure/container readings (e.g., Lønning 1987, Rothstein 2009, Partee & Borschev 2012, Rett 2014, Khrizman et al. 2015, Bale, Coon & López 2019), the topic of *relative* measurement has drawn only a comparatively newer body of work.

I adopt the term *relative* from prior literature, but, for concreteness, I use it specifically to describe measure (or, 'quantizing') nouns that always enforce a proportional reading — as in (1).[1] This excludes examples with traditional, well-studied measure nouns such as *liter* or *cup*, or various quantifiers such as *all* or *some* (see, e.g., Ch. 4 of Scontras (2014) and Seržant (2021) for English and cross-linguistic overviews, respectively).

(1) a. The recruiter interviewed [60% of the incoming applicants].
b. Skies are blue [two-thirds of the time] around here.
c. Winning a free meal means eating at least [three-quarters of the cake].

*I am grateful for feedback from a number of individuals, especially Pranav Anand, Kirby Conrod, Mia Gong, Tania Ionin, Ruth Kramer, Jess Law, Haoze Li, Roumyana Pancheva, Ivy Sichel, Maziar Toosarvandani, and Matt Wagers. Many thanks to conference audiences at the University of Washington (NWLC 40), the University of Wisconsin-Madison (WiGL 18), and the University of Illinois Urbana-Champaign (ILLS 16), and to Ilsa O'Rollins for comments on a previous draft. This research was supported by a Koret Research Scholarship ("Structural and scopal asymmetries in the syntax of relative measurements," UC Santa Cruz). Comments are welcome (see email above).

[1] I use the percent sign % interchangeably with *percent* throughout.

Literature up to Sauerland (2014),[2] with the primary exception of Ionin, Matushansky & Ruys (2006), leaves out particular consideration for pseudopartitives using relative measure (RM) expressions. The motivation for exploring them as a distinct set of constructions emerged from the observation that they can alternate in meaning.

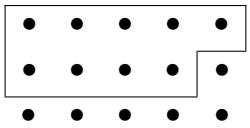
The standard case, similar in appearance to commonly observed measure expressions (e.g., *three pounds of cherries*, *six ounces of gold*), has already been shown in (1) above. It is also reflected with a corresponding paraphrase in (2) below. By contrast, an interpretively different reading can be gathered with a corresponding change in structure — shown in (3). Following Ahn & Sauerland (2017), I refer to these descriptively as conservative and non-conservative (NC), respectively. In general, the conservative RM expressions (2) cross-linguistically come with genitive case (though, see Mandarin §2.2), while the NC counterparts lack genitive morphology but mark the substance noun with prosodic focus (notated with subscripted F). Accounting for the reversed quantification that appears in the NC variety forms the basis of most recent work on RMs (Li 2018, Bayırlı 2022, Spathas & Alexiadou 2022, Gehrke & Wągiel 2023, a.o.).

(2) The fruit supplier wants to buy 60% of the apples.
⇝ Out of all the apples, the fruit supplier wants to buy 60%.

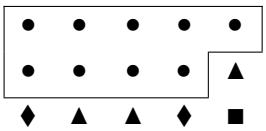
(3) The fruit supplier wants to buy 60% apples$_F$.
⇝ Out of all items (i.e., fruit) the fruit supplier wants to buy, 60% are apples.

What we can think of as the partioning of each restrictor (the set of apples versus the set of items that the supplier wants to buy) is depicted as figures in (4) and (5) below.

(4) Apples



(5) Fruit wanted



With this in mind, §2 provides background on NC RMs within a degree semantics framework, in particular, outlining their composition and existing analyses. §3 provides and pursues an analysis of the novel observation that RM phrases can exhibit a DP-internal reading under definite determiners, even in cases beyond those with relative clauses (cf. Ahn & Sauerland 2015b). I contextualize this within maximalizing-relative approaches argued for with vague quantifiers *many/few* (e.g., Hackl 2000, Solt 2015, Romero 2017). §4 discusses implications for, among other things, the subject-object asymmetry of NC readings, as seen in English (Ahn & Sauerland 2015a, Coppock 2022) and Mandarin (Li 2018, 2022). §5 concludes.

2 Relative measurement

2.1 Scope-taking and composition

The general consensus among existing analyses for NC RMs is that *percent* and its numeral form a constituent prior to forming a larger one with the substance noun. This straightforwardly allows for this smaller unit (a RM phrase) to undergo quantifier raising (QR) to a higher position when it fails to compose with the substance noun *in-situ*. Such an approach is borne out in Pasternak &

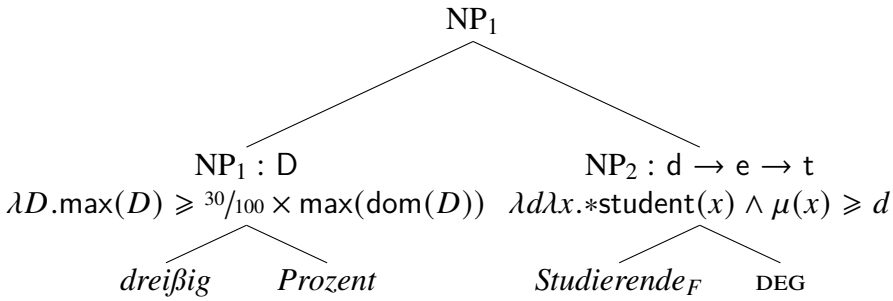
[2]Before Sauerland (2014) was also a manuscript by Ahn (2012), though this was subsequently expanded upon into their published joint analysis starting with Ahn & Sauerland (2015a,b).

Sauerland (2022) via an extensive look at German. With various revisions to the cross-linguistic theory fleshed out by Ahn & Sauerland (2015a,b, 2017),[3] *percent* is defined as in (6) as a function from numerals to quantifiers over degrees (type D: (d → t) → t). The function dom accesses the domain of its input (i.e., a degree predicate), and max, the maximal degree yielding truth (i.e., $\iota d.\forall d'[D(d') \rightarrow d' \geqslant d]$ as in Coppock (2022: p. 22)).

(6) Pasternak & Sauerland (2022: p. 251)
$[\![\text{Prozent}]\!] := \lambda n \lambda D.\max(D) \geqslant {}^{n}/_{100} \times \max(\text{dom}(D))$ n → D

The composition of a NC RM in the style of Pasternak & Sauerland (2022) is shown in (7), with the exception of the notation change of students to *student in the sense of the pluralization operator (Link 1983). The NP containing the substance noun is taken to be adjoined.

(7)



The semantics needs some way of allowing the substance noun to compose with whatever type trace is left behind by the RM phrase. On the basis that the trace is a degree, the substance noun must be turned into a gradable predicate (in other words, of type d → e → t), for which DEG is thus proposed (8).[4] The measure function μ conventionally associates entities with degrees, as extensive work on

[3]For instance, Ahn & Sauerland (2015a,b, 2017) represent the RM noun as in (i), where the distinction between conservative and NC structures depends on what entity saturates the function. For the former, building upon Ionin, Matushansky & Ruys (2006), the substance noun is fed, which is turned into an e-type element either by an overt determiner ((e → t) → e) or by a supremum operator when no determiner is present. For the latter, a focus-sensitive context set is fed, which is similarly modified by taking the supremum.

(i) $[\![\text{percent}]\!] := \lambda x \lambda n \lambda P.\dfrac{\mu(x \sqcap \oplus P)}{\mu(x)} = \dfrac{n}{100}$ e → d → Q

After composing with the entity, the resulting function maps degrees to quantifiers (Q: (e → t) → t). The numeral (type d instead of a separate numeral type n) and *percent* plus its complement are thus what form a constituent.

[4]I do not compare here the variety of proposals in recent literature that seek to account for non-gradable predicates when subject to numerals, degree modifiers, or RMs. For reference however, some existing examples besides DEG in Pasternak & Sauerland (2022) that address one or more of these cases include Rett's (2014, 2018) M-OP and Coppock's (2022) PART:

(i) a. M-OP := $\lambda P \lambda d \lambda x.P(x) \wedge \mu(x) = d$ (e → t) → d → e → t
b. PART := $\lambda P \lambda d \lambda x : \mu(x) \geqslant d.\exists y[y \sqsubseteq x \wedge \mu(y) = d \wedge P(y)]$ (e → t) → d → e → t

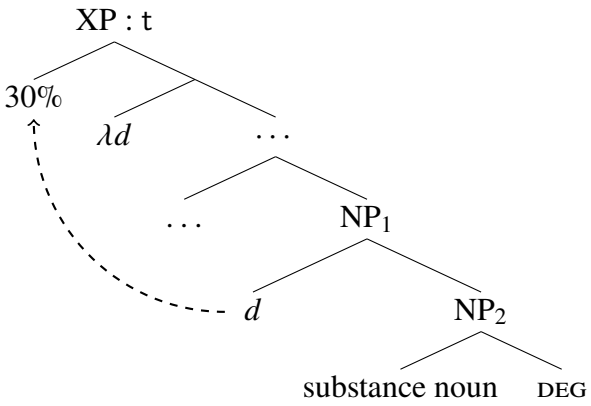
Pasternak's (2019) MUCH is another function that yields gradable predicates (ii). However, it is designed only for conservative RMs (where the input would be an entity, e.g., *the locals*), making it closer in purpose to something like Solt's (2018) *of*. The reader is referred to Coppock (2022) for extensive discussion of gradable predicates for RMs.

(ii) MUCH := $\lambda x \lambda d \lambda y : \mu(x) \geqslant d.y \sqsubseteq x \wedge \mu(y) \geqslant d$ e → d → e → t

measurement and gradability since Lønning (1987) has adopted. To exactly what extent μ as an underspecified function with a scale or dimension of measurement is semantically constrained is a topic I presently exclude (see Schwarzschild 2006, Rett 2014, Bale & Schwarz 2020, a.o.).

(8) Pasternak & Sauerland (2022: p. 255)
$[\![\text{DEG}]\!] := \lambda P \lambda d \lambda x . P(x) \wedge \mu(x) \geqslant d$ $\quad (\mathsf{e} \to \mathsf{t}) \to \mathsf{d} \to \mathsf{e} \to \mathsf{t}$

Standard degree abstraction occurs following the movement of *percent* and its numeral to a higher position (e.g., S/TP in Ahn & Sauerland (2017), *v*P in Pasternak & Sauerland (2022)):

(9)


These are the basic mechanics I adopt for this paper, though they are not without their share of challenges for a cross-linguistic treatment (see §4).

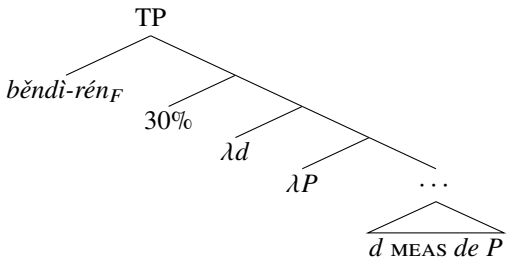
2.2 Focus and alternatives

It is worth addressing that the extent to which focus-marking serves a significant role varies depending on the language and the corresponding analysis. For Mandarin, where it is observed that the only overt (broadly construed) distinction between conservative and NC RM expressions is focus on the substance noun (10), Li (2022) takes this to be a crucial prerequisite for deriving the NC reading. Under a movement-based approach to focus, QR of the RM phrase is parasitic (in the sense of Barker 2007) on the covert scope-taking of the focused substance noun (11).

(10) Mandarin: Li (2022)

a. bǎifēnzhī sānshí de běndì-rén$_F$
percent thirty DE local-people
'30% locals$_F$'

b. bǎifēnzhī sānshí de běndì-rén
percent thirty DE local-people
'30% of the locals'

(11)


By contrast, Ahn & Sauerland (2017) and Pasternak & Sauerland (2022) capture focus-marking via the Roothian approach (Rooth 1985, 1992) of alternatives (Hamblin 1973). In the case of NC RMs, this means that the constituent containing the RM construction varies in the place of the substance noun. The raised RM phrase (numeral plus *percent*) quantifies over this set of alternatives now serving as its intended restrictor. Focus is encoded as a partial function (i.e., presupposing focus alternatives for which disjunction can be taken) FPRE (12) by Pasternak & Sauerland (2022) and as

a standard set of properties with the focus operator ~ (13) by Ahn & Sauerland (2015b, 2017).

(12) FPRE := $\lambda X : \bigvee [\![X]\!]_f . [\![X]\!]$

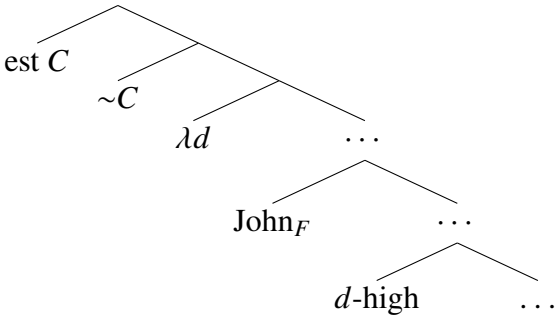
(13) [30% C] ~C λx . . . [x students$_F$]

Relying on focus semantics to access alternatives (for RMs: the other parts of the proportion as in (14)), is similarly done in analyses of, for instance, relative superlatives.

(14) $[\![\ldots \text{ apples}_F]\!]_f$ ⇢ {the fruit supplier wants to buy d apples, the fruit supplier wants to buy d kiwis, the fruit supplier wants to buy d lemons, …}

The motivation with superlatives under a scope-taking analysis (15), whether DP-internal or clausal (see, e.g., Heim 1999, Tomaszewicz 2015, Bumford 2018), is that the focus variation allows for comparison between the original element and its possible alternatives (e.g., mountain climbers out of whom someone climbed the highest).

(15) Focus and degree abstraction in the superlative



Minimally, the availability of focus alternatives for NC RM constructions becomes a tool for obtaining the whole from which the linear adjacent to the RM phrase denotes the part (fruits versus apples).

3 Definite relative measures

3.1 Vague quantifiers and their proportional readings

It is well known that the vague quantifiers *many* and *few* can be three-way ambiguous in their determiner-like use. The classic case is the '*many Scandinavians*' example from Westerståhl (1985):

(16) (many S) N

a. Many Scandinavians have won the Nobel Prize in literature.
   - ⇝ $|S \cap N| \geqslant n$ (cardinal)
   - ⇝ $|S \cap N| / |S| \geqslant n$ (proportional)

b. Many Scandinavians$_F$ have won the Nobel Prize in literature.
   - ⇝ $|S \cap N| / |N| \geqslant n$ ('focus-affected' as in Herburger 1997)

Readings like those in (16b), serve as apparent instances of non-conservativity, with the intended reading is that, out of all Nobel Prize winners in literature (N), the number of Scandinavians (i.e., members of both the Scandinavians set S and N) is equal to or above some contextual threshold (n

in (16)). The semantic restrictor of the quantifier is thus *not* the set of Scandinavians, contrary to what the conservative proportional reading in (16a) reflects. In this respect, RM uses parallel those of *many* and *few*:[5]

(17) (30% *L*) *H*

a. The company office hired 30% of the locals
$\rightsquigarrow {}^{|L \cap H|}/_{|L|} \geqslant n$ (conservative)

b. The company office hired 30% locals$_F$.
$\rightsquigarrow {}^{|L \cap H|}/_{|H|} \geqslant n$ (non-conservative)

The same manner of paraphrasing originally used for (2)-(3) in §1 apply, where the relation is between locals *L* and office hirees *H* — and, again, the restrictor is not internal to the nominal. With emphasis on the substance noun *locals*, this reading patterns as *focus-affected* in the sense of Herburger's (1997) investigation of *many* and *few*, or as *relative proportional* in the sense of Cohen's (2001), though I will continue to maintain the terminology of 'non-conservative' for RMs specifically.

Existing analyses intending to capture these readings for *many* and *few* differ primarily in reliance on lexical ambiguity (i.e., multiple *many*'s), standards of comparison, and structural differences (see Bale & Schwarz 2020 for discussion and comparison). The third point is very much fleshed out for RMs — recall the differences in composition and scope-taking between NC and conservative versions in §2. Rather than rely on multiple entries for the reverse proportional and proportional *many/few*, Romero (2015, 2017, 2021) decomposes the two into a determiner (MANY/FEW) plus a degree operator (POS), where the readings vary based on focus and the comparison class of alternatives in the scope of the operator (see also Penka 2018). The semantics of POS has roots going back to at least Cresswell (1977), and it's usage is as a covert degree morpheme for positive uses of gradable predicates (Kennedy 2007, von Stechow 2009, Solt 2015, a.o.). The corresponding lexical entries for these three items in Romero's (2021) system are given in (18).[6]

(18) Vague quantifiers per Romero (2021)

a. $[\![\text{MANY}_{\text{prop}}]\!] := \lambda d \lambda P \lambda Q.(|P \cap Q| : |P|) \geqslant d$ $\quad \mathsf{d} \rightarrow (\mathsf{e} \rightarrow \mathsf{t}) \rightarrow \mathsf{Q}$

b. $[\![\text{FEW}_{\text{prop}}]\!] := \lambda d \lambda P \lambda Q.(|P \cap Q| : |P|) < d$ $\quad \mathsf{d} \rightarrow (\mathsf{e} \rightarrow \mathsf{t}) \rightarrow \mathsf{Q}$

c. $[\![\text{POS}]\!] := \lambda \mathscr{D} \lambda D.L(\mathscr{D}) \subseteq D$ $\quad \mathsf{D} \rightarrow \mathsf{D}$

This represents one such attempt to collapse the lexical ambiguity of *many/few*, at least for the two proportional readings, though the reader is referred to Romero (2021: §7) for an extensive discussion of prior influential proposals, e.g., Büring (1996), Herburger (1997), and Solt (2009).

3.2 Within the DP

Further similar to *many/few* is the pattern that RM expressions can appear with a relative clause (RC) and yield a distinct intepretation from the rest of the outer clause. In such cases, both the

[5]The cardinal reading from (16) is of course unavailable for (17), given the relative measure noun in the first place.

[6]I modify the original notation of Romero (2021) for consistency with the rest of this paper. Quantificational arguments are in cursive script (e.g., $\mathscr{D}$ for a degree quantifier), rather than being represented as **Q**. Per Romero (2021), *L* is a function that maps comparison classes to neutral intervals (in other words, degree predicates), making it type D → d → t. A neutral interval would be one for which neither positive nor negative gradable predicates are true for the comparison elements (e.g., neither *tall* nor *short*). The ratio symbol is preserved instead of a fractional representation.

restrictor and the scope of the RM phrase, *60%* in (19), are calculated DP-internally. The intended reading of (19) is that 60% of what the fruit supplier bought were apples, and every one of the apples rotted (recall §1). This type of configuration is also attested in German and Korean (Ahn & Sauerland 2015b, Pasternak & Sauerland 2022).

(19) The 60% apples$_F$ that the fruit supplier bought (all) rotted.

I follow the arguments given in Hackl (2000) and Solt (2015), characterizing the vague quantifiers and comparatives with relative clauses as housing a covert existential relative:

(20) Solt (2015: p. 260)

a. the few students (that there were) who attended

b. $\forall d \in N_{\#}[\neg\exists x[*\text{student}(x) \wedge \mu(x) \geqslant d \wedge \text{attended}(x)]]$

The representation in (20b) corresponds to the embedded TP following QR of *few* and degree abstraction (*there were d* MEAS *students who attended*). In other words, for any degree d, it's not the case that there exists some plurality of students who attended, such that the measure of the plurality is greater than d. Under Solt's 2015 account, attributive *many* and *few* ('Q(uantity)-adjectives') form a constituent with POS. This constituent QRs and POS subsequently subextracts. The MEAS operator is defined as below, though it is not crucial to adopting an analysis for corresponding RM constructions given we already have DEG for combining with substance nouns.

(21) Solt (2009, 2015)

$[\![\text{MEAS}]\!] := \lambda x \lambda d.\mu(x) \geqslant d$ $\quad \mathsf{e} \longrightarrow \mathsf{d} \longrightarrow \mathsf{t}$

The availability of RMs as attributives with relative clauses is also attested for English by Ahn & Sauerland (2015b), but I present here the novel observation that RMs can also be used with PPs,[7] and with no overt modifier/relative clause at all (underspecified):

(22) *Context: A fruit supplier's purchase consists of 60% apples and 40% olives.*

a. The 40% olives from Greece made for a good supply of olive oil. (PP)

b. The 60% apples$_F$ fell prey to infestation. (underspecified)

Crucially, these cases support further adaptation of Solt (2015) and Hackl (2000). Just as Hackl (2000) argues with respect to comparative forms such as *more* (23), embedding the RM phrase under a definite determiner evokes DP-internal resolution. The definite is a symptom of the covert relative.

(23) Hackl (2000: p. 180)

a. The more than three students that there were were the team that won the cup.

b. ??More than three students were the team that won the cup.

Discussion of amount relatives goes back to at least Carlson (1977), with especially relevant work since then including Grosu & Landman (1998, 2017), McNally (2006), Herdan (2008), and Mendia

[7] I do not mark for focus in (22a), given that focus can be placed on different elements and yield different meanings. Broad focus as in [*olives from Greece*]$_F$ would convey that all the olives are from Greece, while, e.g., *olives*$_F$ *from Greece* would evoke alternative fruits from Greece.

(2017, 2018). With RMs, we can show the status of their use with relative clauses as maximalizing relatives with the definiteness diagnostic (Grosu & Landman 2017) in (24). Indefinite determiners preceding the attributive RM phrase are prohibited, for instance.

(24) It would take the harvester a year to grow back {the, #some, #∅} 60% apples$_F$ that rotted.

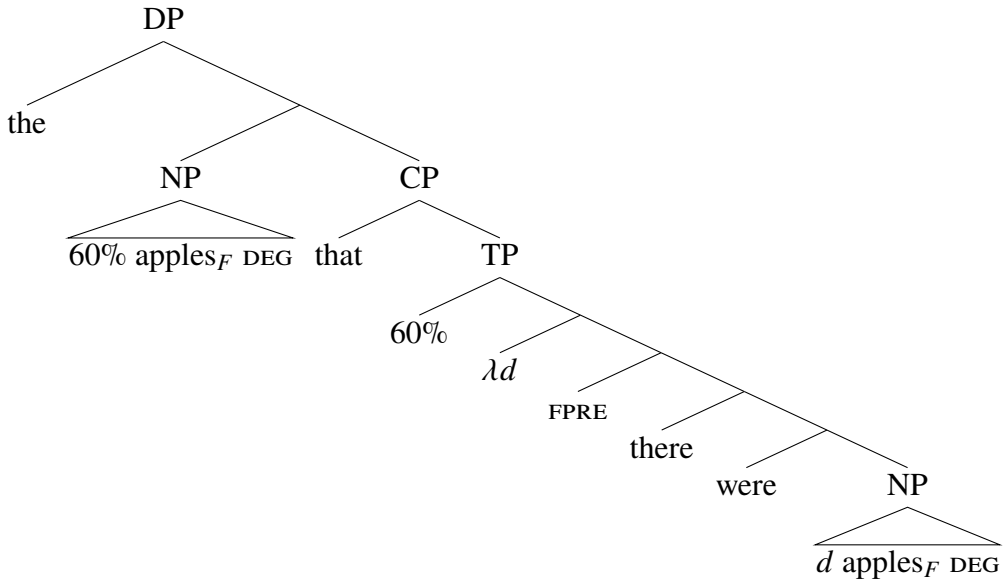
The RC-internal meaning of the example in (24) is that 60% of all things that rotted were apples. For Grosu & Landman (1998), maximalization yielding a predicate must apply to the CP prior to further semantic composition — thus why the above examples have an exhaustive or maximal interpretation (e.g., *all* of the 60% apples fell prey to infestation in (22b)). This maximalizing interpretation fails to obtain without the definite determiner.

Given the theory of RMs sketched in §2 based on Pasternak & Sauerland (2022), the novel cases seen here without overt relative clauses have the head RM expression reconstruct into its original position (under a raising analysis), from which the RM undergoes QR as normally expected due to the NP-internal type mismatch (25). This original position is understood to be the object of a covert existential relative, just as what Solt (2015) assumes for vague quantifiers with overt RCs (recall (20)) and Ahn & Sauerland (2015b) for RMs with overt RCs (with a theory of RMs different from the one adopted here).

(25) the __ [that [60% [there were [d apples$_F$ DEG]]] (PP)]

The head position post-reconstruction takes a covert pro-form (e → t) encoding properties from the embedded clause depending on the material, underspecified versus RC versus PP (see Romero 2017 for proposed revisions to this approach for *many/few*). I present the DP-internal picture in (26), modulo pro-form insertion. Rather than assume QR and the partial function FPRE target *v*P, I show them in the projection of TP.

(26)



With the head NP in lower position as object of the existential relative, the RM phrase (numeral plus *percent*) leaves behind a degree trace that is abstracted over. On the basis that the corresponding

conservative version (i.e., with genitive structure) would not exhibit type mismatch in the substance noun (e.g., *the 60% of the apples*), this step would not occur. Pasternak & Sauerland (2022: fn. 23) observe, but set aside, the availability of PPs in definite RM constructions. While PPs may indeed seem to complicate the pattern of DP-internal readings, their interpretation follows as expected by way of contributing additional information to the pro-form, or serving as a separate site of focus-marking ([*olives from Greece*]$_F$ versus *olives*$_F$ *from Greece* versus *olives from Greece*$_F$; see also fn. 7 from earlier).

4 Implications and other desiderata

4.1 Subjects versus objects

It is unclear where a unifying treatment of definite RMs with respect to *many/few* leaves their attested subject-object asymmetry in the NC reading. English (27) is an outlier along with Mandarin (28) in that a NC interpretation may be degraded for RM constructions in subject position:

(27) a. 60% ?/??(of the) boys$_F$ failed the exam.
b. 60% ?/??(of the) first-years$_F$ accepted the promotion offers.
c. 60% ?/??(of the) fruit$_F$ went unsold at the farmers' market.

(28) Adapted from Li (2022: p. 33)

a. Bǎifēnzhī sānshí de kuàgúo gōngsī gù-le běndì-rén.
percent thirty DE international companies hire-PRF local-people
⇝ '30% of the international companies hired locals' (conservative)
⇝ #'30% of the companies hiring locals were international.' (non-conservative)

b. Bǎifēnzhī sìshí de běndì-rén bèi Huáwéi gù-le.
percent fourty DE local-people PSV Huawei hire-PRF
⇝ '40% of the locals have been hired by Huawei.' (conservative)
⇝ #'40% of people hired by Huawei were locals.' (non-conservative)

The NC versions in (28) would exhibit focus (*kuàguo*$_F$ 'international' and *běndi-rén*$_F$ 'locals'; recall §2.2), though Li (2022) does not mark it in these particular examples. Li (2022) argues that the asymmetry follows from pre-verbal indefinites in Mandarin being presuppositional and thus blocking extraction (which supports the covert movement-based approach for focus), and Li (2018) offers a different explanation, in an event-semantics framework, based on type mismatch with VP.

Similar to Li (2022), Gehrke & Wągiel (2023) also resort to structural height as a possible explanation by arguing that NC RMs are never true, high subjects. Looking at German and Slavic constructions in relation to English, they argue that NC RMs can only be used in VP-internal positions or in existentials/passives. This conclusion responds to and disagrees with the theory of RMs furthered by Pasternak & Sauerland (2022), who do not point to any subject-object asymmetry or ways around one in the German data attested.[8]

Literature on weak vague quantifiers has not assumed any such corresponding asymmetry (e.g., *many Scandinavians*$_F$ . . . , *few cooks*$_F$ . . .). It might then seem unexpected that embedding a NC

[8] Pasternak & Sauerland (2022) do, however, assume that the QR exhibited by NC RMs lands in *v*P, though they mention it only as an expository choice. I explicitly set this decision aside in §3.2, and it appears unclear whether or not it would be accurate to say that German NC RM subjects are *always* low as a means to bypass any freezing-related degradation (for subject extraction in German low/high subjects, see, e.g., Diesing 1992, Jurka 2009, 2010a,b). While English subjects can be considered topic-like or subject to freezing effects (e.g., Rizzi 2006, Corver 2017), the NC reading is still available (see (29b), (29c)).

RM under a definite determiner obviates subject degradation unless *many/few* and RMs are particularly distinct in their indefinite attributive uses. Additionally, existing judgements do not support a consensus on the (un)grammaticality of subject NC RMs. To demonstrate, (29) provides differing grammaticality judgements for passive subjects:

(29) Passive subjects: Judgement notation preserved

a. #30% women$_F$ were hired last year. (Ahn & Sauerland 2015a: p. 4)
b. ?75% women$_F$ were hired by the committee. (Coppock 2022: p. 14)
c. 75% women$_F$ were hired by the company. (Wilson 2019: p. 114)

Ahn & Sauerland (2015a,b, 2017) report ungrammaticality for subjects across the board for most speakers, making no distinction between different kinds of subjects (e.g., active/passive, unergative, unaccusative). Coppock (2022: p. 14), by contrast, judges subject use to be grammatical and provides corpus examples, though reporting "slight degradation" in various cases that can worsen depending on the predicate.[9] Wilson (2019) attests that passive subjects are acceptable and unmarked, while active subjects are degraded.

Given that the NC reading for a RM construction also seems to be less acceptable elsewhere, e.g., in double-object constructions (30),[10] it may be the case that intervening factors such as salience of alternatives, freezing effects, or speaker variation/construction frequency are at play, which future experimental evidence will need to disambiguate.

(30) a. ?The office offered 75% women$_F$ (and 25% men$_F$) raises.
b. ?The fruit supplier sent the market 60% apples$_F$ (and 40% oranges$_F$).

4.2 Definiteness

The overt indicator relating all three cases with underlying relatives discussed in §3 is the obligatory definite determiner, as in (31).

(31) a. The fruit supplier handed me the 30% olives$_F$ she bought. (overt RC)
b. Out of all the incoming dignitaries at the dinner, newspapers applauded the arrival of the 30% ambassadors to France$_F$. (PP/modifier)
c. Half of the responses were *yes* and the other half were *no*, but the 50% *yes*'s$_F$ had too short of response times to be kept in the end. (underspecified)

Future research will be needed to outline the full extent of RMs with underlying relatives in languages without overt determiners, e.g., Mandarin, or with extensive debate on DP status, e.g., Vietnamese (32) (e.g., Kirby 2006, Cheng 2013, Phan & Lander 2015).

(32) Tôi gặp [10% phụ nữ (mà) đến từ nước Pháp].
1SG meet 10% woman C come from country France
'I met the 10% women from France.' (p.c. Quynh-Giang Dang)

[9] Coppock (2022) indicates that a predicate such as *dislike* elicits lower grammaticality than *hire* in both active and passive versions of NC RM constructions, possibly due to the use of *dislike* as an 'entity-introducing verb' in the terminology of Coppock & Beaver (2015). Similarly, Li (2018) and Bayırlı (2022) point to distinctions between individual- and stage-level predicates types that crucially form their proposals for how the NC reading is derived.

[10] To my ears, NC RMs in dative position sound more acceptable (e.g., *the office offered raises to 75% women$_F$).*

5 Concluding discussion

I have demonstrated that the 'non-conservative' readings for both weak vague quantifiers (*many/few*) and relative measures (in particular, *percent*) can receive similar treatments across definite contexts. While there is much left to be fully addressed for RMs — including the variable subject-object asymmetry, the role of definiteness, and the reliance on focus semantics — the proposal outlined here sheds light on the underlying material of a RM when the NC reading's scope is restricted to the DP itself. With the novel observation that the NC reading is available for definite RM expressions with PPs (*the 60% apples$_F$ from the orchard*) and with only the definite determiner (*the 60% apples$_F$*), I extend a covert maximalizing-relative approach (Hackl 2000, Solt 2015, Ahn & Sauerland 2015b) without requiring additional semantic tools. This pulls RM constructions closer to the vague quantifiers, but further work on this topic will be crucial in examining the scope and remaining implications of these data in a cross-linguistic comparison.

References

Ahn, Dorothy. 2012. Reverse quantification in Korean. Unpublished manuscript, Harvard University.

Ahn, Dorothy & Uli Sauerland. 2015a. Non-conservative quantification with proportional quantifiers: Crosslinguistic data. In Thuy Bui & Deniz Ozyıldız (eds.), *Proceedings of NELS 45*, 1–11.

Ahn, Dorothy & Uli Sauerland. 2015b. The grammar of relative measurement. In Sarah D'Antonio, Mary Moroney & Carol Rose Little (eds.), *Proceedings of SALT 25*, 125–142.

Ahn, Dorothy & Uli Sauerland. 2017. Measure constructions with relative measurements: Towards a syntax of non-conservative construals. *The Linguistic Review* 34. 215–248.

Bale, Alan, Jessica Coon & Nicolás Arcos López. 2019. Classifiers, partitions, and measurements: exploring the syntax and semantics of sortal classifiers. *Glossa: A journal of general linguistics* 4. 1–30.

Bale, Alan & Bernhard Schwarz. 2020. Proportional readings of *many* and *few*. *Linguistics & Philosophy* 43. 673–699.

Barker, Chris. 1998. Partitives, double genitives and anti-uniqueness. *Natural Language & Linguistic Theory* 16. 679–717.

Barker, Chris. 2007. Parasitic scope. *Linguistics & Philosophy* 30. 407–444.

Bayırlı, İsa Kerem. 2022. Proportionality and conservativity: the view from Turkish. *Glossa: A Journal of General Linguistics*.

Bhatt, Rajesh & Shoichi Takahashi. 2011. Reduced and unreduced phrasal comparatives. *Natural Language & Linguistic Theory* 29. 581–620.

Bobaljik, Jonathan David. 2012. *Universals in comparative morphology: Suppletion, superlatives, and the structure of words*. MIT Press.

Bumford, Dylan. 2018. Binding into superlative descriptions. In Sireemas Maspong, Brynhildur Stefánsdóttir, Katherine Blake & Forrest Davis (eds.), *Proceedings of SALT 28*, 325–344.

Büring, Daniel. 1996. A weak theory of strong readings. In Teresa Galloway & Justin Spence (eds.), *Proceedings of SALT 6*, 17–34.

Carlson, Gregory. 1977. Amount relatives. *Language* 53. 520–542.

Cheng, Hsu-Te. 2013. *Argument ellipsis, classifier phrases, and the DP parameter*. University of Connecticut dissertation.

Cohen, Ariel. 2001. Relative readings of *many*, *often*, and generics. *Natural Language Semantics* 9. 41–67.
Coppock, Elizabeth. 2022. Part-introducing *percent* in English. *Glossa: A Journal of General Linguistics* 7. 1–38.
Coppock, Elizabeth & David Beaver. 2015. Definiteness and determinacy. *Linguistics & Philosophy* 38. 377–435.
Corver, Norbert. 2017. Subextraction. In Michael Everaert & Henk C. Riemsdijk (eds.), *The Wiley Blackwell companion to syntax, second edition*, 1–51. Wiley.
Cresswell, Max J. 1977. The semantics of degree. In Barbara Partee (ed.), *Montague grammar*, 261–292. Academic Press.
Diesing, Molly. 1992. *Indefinites*. MIT Press.
Falco, Michelangelo & Roberto Zamparelli. 2019. Partitives and partitivity. *Glossa: A journal of general linguistics* 4. 1–49.
Gehrke, Berit & Marcin Wągiel. 2023. On word order and non-conservative percentage quantification in Slavic and German. *Glossa: A Journal of General Linguistics* 8. 1–48.
Grosu, Alexander & Fred Landman. 1998. Strange relatives of the third kind. *Natural Language Semantics* 6. 125–170.
Grosu, Alexander & Fred Landman. 2017. Amount relatives. In Michael Everaert & Henk van Riemsdijk (eds.), *The wiley-blackwell companion to syntax*, 2nd edition, Ch. 7. Wiley-Blackwell.
Hackl, Martin. 2000. *Comparative quantifiers*. MIT dissertation.
Hamblin, C.L. 1973. Questions in Montague English. *Foundations of Language* 10. 41–53.
Heim, Irene. 1999. Notes on superlatives. Manuscript, MIT.
Herburger, Elena. 1997. Focus and weak noun phrases. *Natural Language Semantics* 5. 53–78.
Herdan, Simona. 2008. A superlative theory of amount relatives. In Charles B. Chang & Hannah J. Haynie (eds.), *Proceedings of WCCFL 26*, 234–242.
Hoeksema, Jacob. 1984. Partitives. Manuscript, University of Groningen.
de Hoop, Helen. 1997. A semantic reanalysis of the partitive constraint. *Lingua* 103. 151–171.
Ionin, Tania, Ora Matushansky & E. G. Ruys. 2006. Parts of speech: toward a unified semantics for partitives. In Christopher Davis, Amy Rose Deal & Youri Zabbal (eds.), *Proceedings of NELS 36*, 357–370.
Jurka, Johannes. 2009. Gradient acceptability and subject islands in German. Manuscript.
Jurka, Johannes. 2010a. Subject islands in German revisited. In Jon Sprouse & Norbert Hornstein (eds.), *Experimental syntax and island effects*, 265–285. Cambridge University Press.
Jurka, Johannes. 2010b. *The importance of being a complement CED-effects revisited*. University of Maryland dissertation.
Kennedy, Christopher. 2007. Vagueness and grammar: the semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy* 30. 1–45.
Kennedy, Christopher. 2009. Modes of comparison. In Malcolm Elliott, James Kirby, Osamu Sawada, Eleni Staraki & Suwon Yoon (eds.), *Papers from the 43rd regional meeting of the Chicago Linguistic Society*, 141–165. Chicago Linguistic Society.
Khrizman, Keren, Fred Landman, Suzi Lima, Susan Rothstein & Brigitta R. Schvarcz. 2015. Portion readings are count readings, not measure readings. In Thomas Brochhagen, Floris Roelofsen & Nadine Theiler (eds.), *Proceedings of the 20th Amsterdam Colloquium*, 197–206.
Kirby, James. 2006. Vietnamese and the structure of NP. Manuscript, University of Chicago.

Ladusaw, William. 1982. Semantic constraints on the English partitive construction. In *Proceedings of WCCFL*, 231–242. CSLI.

Li, Haoze. 2018. Event-related relative measurement. In Robert Truswell, Chris Cummins, Caroline Heycock, Brian Rabern & Hannah Rohde (eds.), *Proceedings of Sinn und Bedeutung 21*, 801–818.

Li, Haoze. 2022. Relative measurement and scope in Mandarin. *Glossa: A Journal of General Linguistics* 7. 1–40.

Link, Godehard. 1983. The logical analysis of plural and mass terms: A lattice-theoretical approach. In Rainer Bäuerle, Christoph Schwarze & Arnim von Stechow (eds.), *Meaning, use and interpretation of language*, 302–323. De Gruyter.

Lønning, Jan Tore. 1987. Mass terms and quantification. *Linguistics and Philosophy* 10. 1–52.

McNally, Louise. 2006. DP-internal *only*, amount relatives, and relatives out of existentials. *Linguistic Inquiry* 39. 161–169.

Mendia, Joe Ander. 2017. *Amount relatives redux*. University of Massachusetts, Amherst dissertation.

Mendia, Joe Ander. 2018. Some kind of relative clause. In Uli Sauerland & Stephanie Solt (eds.), *Proceedings of Sinn und Bedeutung 22*, 163–180.

Partee, Barbara H. & Vladimir Borschev. 2012. Sortal, relational, and functional interpretations of nouns and Russian container constructions. *Journal of Semantics* 29. 445–486.

Pasternak, Robert. 2019. Unifying partitive and adjective-modifying *percent*. *Snippets* 37. 77–79.

Pasternak, Robert & Uli Sauerland. 2022. German measurement structures: Case-marking and non-conservativity. *Journal of Germanic Linguistics* 25. 221–272.

Penka, Doris. 2018. One *many*, many readings. In Robert Truswell, Chris Cummins, Caroline Heycock, Brian Rabern & Hannah Rohde (eds.), *Proceedings of Sinn und Bedeutung 21*, 933–950.

Phan, Trang & Eric T. Lander. 2015. Vietnamese and the NP/DP parameter. *Canadian Journal of Linguistics/Revue canadienne de linguistique* 60. 391–415.

Rett, Jessica. 2014. The polysemy of measurement. *Lingua* 143. 242–266.

Rett, Jessica. 2018. The semantics of *many*, *much*, *few*, and *little*. *Language and Linguistics Compass* 12. 1–18.

Rizzi, Luigi. 2006. On the form of chains: Criterial positions and ECP effects. In Lisa Lai-Shen Cheng & Norbert Corver (eds.), *Wh-movement: Moving on*, 97–134. MIT Press.

Romero, Maribel. 2015. The conservativity of *many*. In Thomas Brochhagen, Floris Roelofsen & Nadine Theiler (eds.), *Proceedings of 20th Amsterdam Colloquium*, 20–29.

Romero, Maribel. 2017. Attributive uses of *many*. In Dan Burgdorf, Jacob Collard, Sireemas Maspong & Brynhildur Stefánsdóttir (eds.), *Proceedings of SALT 27*, 480–503.

Romero, Maribel. 2021. The many readings of *many*: POS in the reverse proportional reading. *Linguistics & Philosophy* 44. 281–321.

Rooth, Mats. 1985. *Association with focus*. University of Massachusetts, Amherst dissertation.

Rooth, Mats. 1992. A theory of focus interpretation. *Natural Language Semantics* 1. 117–121.

Rothstein, Susan. 2009. Measuring and counting in Modern Hebrew. *Brill's Annual of Afroasiatic Languages and Linguistics* 1. 106–145.

Sauerland, Uli. 2014. Surface non-conservativity in German. In Christopher Piñón (ed.), *Empirical issues in syntax and semantics 10*, 125–142.

Sauerland, Uli & Kazuko Yatsushiro. 2004. A silent noun in partitives. In Keir Moulton & Matthew Wolf (eds.), *Proceedings of NELS 34*, 101–112.

Schwarzschild, Roger. 2006. The role of dimensions in the syntax of noun phrases. *Syntax* 9. 67–110.

Schwarzschild, Roger. 2008. The semantics of comparatives and other degree constructions. *Language and Linguistics Compass* 2. 308–331.

Scontras, Gregory. 2014. *The semantics of measurement*. Harvard University dissertation.

Seržant, Ilja A. 2021. Typology of partitives. *Linguistics* 59. 881–947.

Solt, Stephanie. 2009. *The semantics of adjectives of quantity*. NYU dissertation.

Solt, Stephanie. 2015. Q-adjectives and the semantics of quantity. *Journal of Semantics* 32. 221–273.

Solt, Stephanie. 2018. Proportional relatives and comparative scales. In Robert Truswell, Chris Cummins, Caroline Heycock, Brian Rabern & Hannah Rohde (eds.), *Proceedings of Sinn und Bedeutung 21*, 1123–1140.

Spathas, Giorgios & Artemis Alexiadou. 2022. On the source of proportionality in nominal measurement. *Glossa: A Journal of General Linguistics* 43.

von Stechow, Arnim. 2009. The temporal degree adjectives *früher*/*später* 'early(er)'/'late(r)' and the semantics of the positive. In Anastasia Giannakidou & Monika Rathert (eds.), *Quantification, definiteness and nominalization*, 214–233. Oxford University Press.

Stickney, Helen. 2009. *The emergence of DP in the partitive structure*. University of Massachusetts, Amherst dissertation.

Tomaszewicz, Barbara. 2015. Relative readings of superlatives: Focus or scope? In Sarah D'Antonio, Mary Moroney & Carol Rose Little (eds.), *Proceedings of SALT 25*, 452–470.

Wągiel, Marcin. 2021. *Subatomic quantification*. Language Science Press.

Wellwood, Alexis, Valentine Hacquard & Roumyana Pancheva. 2012. Measuring and comparing individuals and events. *Journal of Semantics* 29. 207–228.

Westerståhl, Dag. 1985. Logical constraints in quantifier languages. *Linguistics and Philosophy* 8. 387–413.

Wilson, E. Cameron. 2019. Constraints on non-conservative readings in English. *Snippets* 37. 114–116.