Pre- and post-predicate degree morphemes in Vietnamese: Heads vs phrases

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Abstract Degree morphemes in Vietnamese may precede or follow their gradable predicate: e.g. *rất* 'very' precedes and *nhất* 'most' follows. We argue that these two classes of expressions differ significantly in their syntax and semantics. Pre-predicate degree morphemes are functional heads in the predicate's extended projection whereas post-predicate degree morphemes are heads of phrasal modifiers. The latter form degree quantifiers which must move to take scope; this movement must be overt and to the right, deriving their post-predicate word order. We also explain differences between the two classes of items in their ability to introduce arguments and participate in scope ambiguities, and in their behavior in descriptions of nominal quantity.

Keywords degree constructions, degree morphemes, degree semantics, rightward movement, Vietnamese

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Contents

1 Introduction

This paper investigates the syntax and semantics of degree constructions in Vietnamese. Degree constructions comment on the degree to which some measure holds, as described by a gradable predicate, and include structures such as comparatives, superlatives, excessives, and intensifiers. Each of these constructions involve the use of characteristic *degree morphemes*.

The starting point for our study is the observation that degree morphemes in Vietnamese may precede or follow their gradable predicate. More specifically, there are degree morphemes that *must precede* their predicate (e.g. *rất* 'very'), those which *must follow* their predicate (e.g. *nhất* 'most'), and those which *may precede or follow* their predicate (e.g. *quá* 'too'), as illustrated in (1). We will refer to degree morphemes in pre-predicate position as PRE and those in post-predicate position as POST. Throughout the paper, we bold degree morphemes and italicize relevant gradable predicates.[1]

(1) **Pre- and post-predicate degree morphemes with an adjectival predicate:**

a. Nó {**rất** *cao* / **cao* **rất**}.
3sg very tall / tall very
'They're very tall.'

b. Nó {***nhất** *cao* / *cao* **nhất**}.
3sg most tall / tall most
'They're the tallest.'

c. Nó {**quá** *cao* / *cao* **quá**}.
3sg too tall / tall too
'They're too tall.'

In addition to adverbs such as *cao* 'tall' in (1), the gradable predicate in a degree construction can be an adverb such as 'fast' as in (2) or a transitive verb phrase headed by a verb such as 'miss' in (3) below. Again, *rất* 'very' must precede its gradable predicate, *nhất* 'most' must follow, and *quá* too' may appear in either position.

(2) **Degree morphemes with an adverb:**

Nó chạy {**rất** / ***nhất** / **quá**} *nhanh* {***rất** / **nhất** / **quá**}.
3sg run very / most / too fast very / most / too
'They run {very fast / the fastest / too fast}.'

(3) **Degree morphemes with a transitive verb phrase:**

Nó {**rất** / ***nhất** / **quá**} *nhớ* bà {***rất** / **nhất** / **quá**}.
3sg very / most / too miss grandma very / most / too
'They miss grandma {very much / the most / too much}.'

As Vietnamese is an overwhelmingly head-initial language,[2] the linear position of POST is surprising if we treat degree morphemes as functional heads. A first, null hypothesis might then be to describe all degree morphemes as adjuncts, with similar syntax and basic compositional semantics, but with idiosyncratic lexical specifications as to whether they can be left- or right-adjoined to gradable predicates.

[1] We use singular *they* in English translations for animate uses of the gender-neutral third-singular pronoun.
[2] If not exclusively so, depending on the analysis of certain sentence-final particles. See e.g. Duffield 2013.

We will instead argue that PRE and POST degree morphemes differ substantially in both their syntax as well as semantics. Specifically, we propose that each PRE is a functional head that takes a gradable predicate as its syntactic and semantic argument, whereas each POST heads a phrasal modifier that denotes a degree quantifier of type $\langle dt, t \rangle$. To compose with the gradable predicate, degree quantifiers must move. We propose that such degree quantifier movement in Vietnamese must be overt and to the right, explaining the linear position of POST as well as various further differences between PRE and POST.

We begin by introducing the inventory of degree morphemes in Vietnamese in section 2 and then present our core proposal in section 3. We then describe the use of degree morphemes in descriptions of nominal quantity in section 4 and present evidence for the position of POST being due to overt rightward scope-taking movement in section 5. We conclude in section 6. In the Appendix, we provide a brief, concrete syntax/semantics for many of the major degree constructions in Vietnamese.

2 PRE vs POST and the inventory of degree morphemes

We begin with a brief introduction to the inventory of degree constructions in Vietnamese. In (4) below, we present a representative sample of degree morphemes in the language, organized into those which can precede or follow their gradable predicate (PRE and POST). The overlap represents items which may appear in both PRE and POST positions.

(4) **An inventory of degree morphemes:**[3]

PRE:		**POST:**
rất 'very'	*quá...* 'too'	*nhất...* 'most'
khá 'rather'	*thật* 'really'	*hơn...* 'more'
hơi 'quite'	*hết sức* 'very'	*bằng...* 'as'
đủ 'enough'	*tuyệt đối* 'absolutely'	*như...* 'like'
hoàn toàn 'completely'	*cực (kì) / vô cùng* 'extremely'	*lắm* 'very'
		phết 'quite'
	đến nỗi... 'to the extent that'	*ghê* 'so'

[3] This inventory reflects that of Northern Vietnamese, of which the second author is a native speaker. To the best of our knowledge, the core facts and generalizations presented here also hold of southern varieties. We also discuss degree demonstratives such as *bây* 'this much' (PRE) and the use of bare measure phrases (POST) in section 3.3.

We believe that the English translations that we give in in (4) and in glosses throughout are sufficient for expository purposes, but we should caution against treating them as exact translation equivalents. Each of these constructions deserve more fine-grained description in terms of their semantics and pragmatics, which we leave for future work.

Considering the inventory in (4), there does not seem to be any obvious semantic criterion which serves to predict which morphemes are allowed in which positions. For example, there are degree modifiers which invite the translation 'very' in each of the three classes: *rất* is necessarily PRE, *lắm* is exclusively POST, and *hết sức* is available in either position. There is however a syntactic generalization that holds of these items, which we motivate in this section: only degree morphemes in POST position may be syntactically complex, phrasal expressions. This generalization lays the groundwork for our proposal, in section 3 below, which claims that PRE are syntactically heads while POST form phrasal modifiers.

A number of degree morphemes introduce arguments. For example, the comparative *hơn* and equative *bằng* and *như*[4] introduce a standard of comparison, which may be a sub-sentential constituent as in (5) or of clausal size as in (6).[5] Comparative *hơn* can also introduce a differential measure.

(5) **Phrasal standards:**

Minh *cao* {**hơn / bằng / như**} [$_{\text{standard}}$ Kim].
Minh tall more / as / like Kim
'Minh is {taller than / as tall as} Kim.'

(6) **Clausal standards:**

Minh đi bộ *nhanh* {**hơn / bằng / như**} [$_{\text{standard}}$ Kim {đi bộ / chạy}].
Minh walk fast more / as / like Kim walk / run
'Minh walks {faster than / as fast as} Kim walks/runs.'

The superlative *nhất* can introduce a noun phrase that serves as a comparison class, as in (7). *Đến nỗi* introduces a clause which is true as a result of the measured degree exceeding a particular threshold, like English 'so...that' (see e.g. Meier, 2003), as seen in (8).

(7) ***nhất* with comparison class:**

Rau ở tiệm này *rẻ* **nhất** Phố Tàu.
vegetable LOC shop this cheap most Chinatown
'The vegetables in this store are the cheapest in Chinatown.' (Nguyen, 1997: 123)

[4] We translate *như* as 'like' as it also has non-degree similative uses; see example (69) in the Appendix. In combination with a gradable predicate, however, it results in equatives that are truth-conditionally equivalent to their *bằng* counterparts. We therefore give the equative free translation with English *as* only once for both *bằng* and *như*.

[5] Lemon (2020) proposes that surface-phrasal standards as in (5) are underlyingly clausal, followed by a form of comparative deletion. We illustrate such a structure and its interpretation in section 3 below.

(8) ***Đến nỗi* result clause:**

Nó *cao* **đến nỗi** [ai cũng ngạc nhiên].
3sg tall to the extent who also amazed
'They're tall to the extent that everyone is amazed.'

Note that all of these degree morphemes that introduce arguments that we have seen so far — *hơn*, *bằng*, *như*, *nhất*, *đến nỗi* — are exclusively POST, and that their arguments follow the degree morpheme.

There is one other degree morpheme that introduces an argument: the excessive *quá*. As seen in the introduction and reflected in (4), *quá* is one of the degree morphemes that can precede or follow its gradable predicate. However, as we show in Erlewine and Nguyen 2022, the *quá*$_{\text{PRE}}$ and *quá*$_{\text{POST}}$ excessive morphemes exhibit substantial differences in both their syntax and semantics upon closer inspection. We argue there that *quá*$_{\text{PRE}}$ is a purpose-oriented excessive with truth-conditions parallel to that described for English *too* as in Meier 2003 and Schwarzschild 2008, which makes reference to a contextually determined purpose. In contrast, *quá*$_{\text{POST}}$ is a comparative with truth-conditions equal to that of the basic comparative *hơn*, but with an additional not-at-issue malefactive inference that exceeding the standard would constitute a problem. Notably for our current purposes, only the latter may introduce a standard, as seen in (9).[6]

(9) ***quá*$_{\text{POST}}$ can introduce a standard, but *quá*$_{\text{PRE}}$ cannot:**

a. Sợi dây này *dài* **quá** [$_{\text{standard}}$ 2m].
CL string this long QUÁ$_{\text{POST}}$ 2m
≈ 'The string is longer than 2m (and that's a problem).'

b. * Sợi dây này **quá** {[$_{\text{standard}}$ 2m]} *dài* {[$_{\text{standard}}$ 2m]}.
CL string this QUÁ$_{\text{PRE}}$ 2m long 2m
'The string is too long (*than 2m).'

The evaluation of PRE meanings can also be modified by specifying additional information, but this is done indirectly, by manipulating the context. For instance, the extension of gradable predicates with degree modifiers like *rất* 'very' is sensitive to contextual expectations for the scale, and can also be explicitly manipulated by specifying a comparison class, as in (10):

(10) **Specifying comparison class with *so với* 'compared with' adjunct:**

So với các bạn, Kim {**rất** / **hơi** / **khá**} *cao*.
compare with PL friend Kim very / quite / rather tall
'Compared to her friends, Kim is {very / quite / rather} tall.'

Excessive and sufficiency constructions make reference to a contextually determined purpose. Excessives then claim that the measured degree exceeds the maximum degree that would allow the purpose

[6] We also show there that there are other, non-excessive uses of *quá* which cannot be analyzed as instances of the core excessive uses, but may have historically derived from them.

to be true, whereas sufficiencies claim that the degree meets or exceeds its minimum degree. In either case, the purpose is often made explicit by use of a purpose clause headed by *để* (which we gloss as 'for') as in (11), but it can also be specified by use of a conditional as in (12) or simply by the preceding context as in (13).

(11) **Specifying purpose of excessive *quá* and sufficiency *đủ* with *để* purpose clause:**

(**Để** đặt ở phòng khách) Cái bàn này {**quá / đủ**} *to* (**để** đặt ở phòng khách).
for put LOC living-room CL table this too / enough big for put LOC living-room
'This table is {too big / big enough} (to put in the living room).'

(12) **Describing purpose of excessive *quá* with a conditional clause:**

Cái túi này **quá** *nhỏ* [nếu chúng ta dùng nó để đựng cái máy tính kia].
CL bag this too small if we use 3sg for carry CL laptop that
'This bag is too small if we use it to carry that laptop.'

(13) **Indirectly describing the purpose and threshold for excessive *quá*:**

Tớ chỉ có thể nhấc 15kg. Cái hộp này **quá** *nặng*.
I only can lift 15kg CL box this too heavy
'I can only lift 15kg. This box is too heavy.'

These expressions in (10–13) all serve to clarify the context of evaluation, which in turn manipulates the extension of the gradable predicate with PRE. These expressions all have the status of adjuncts, supporting our claim that only POST introduce arguments.

This novel generalization that we have established — that only POST introduce arguments — gives us a hint that PRE and POST differ substantially in their syntax and, in particular, POST can form syntactically complex expressions but PRE cannot. This will form the basis for our proposal, which we put forward in the following section. In the discussion that follows, we will concentrate on the gross syntactic and semantic distinctions between PRE degree morphemes as a class versus POST degree morphemes as a class, setting aside details pertaining to the syntax and semantics of individual degree morphemes. We however provide preliminary sketches of the syntax and semantics of many of the degree morphemes in the Appendix.

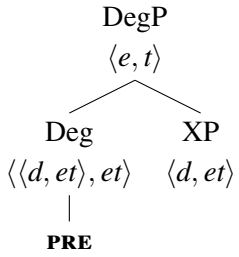
3 Proposal

We now present our proposal, which fleshes out our core claim that PRE and POST do not simply vary in their linear position but in fact differ substantially in their syntax. Specifically, we propose that PRE are functional heads that take their gradable predicate as their syntactic and semantic argument (14a)

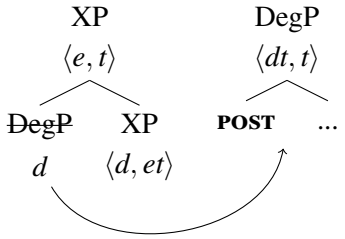
whereas POST form phrasal modifiers (14b).[7] These POST-phrases semantically denote degree quantifiers of type $\langle dt, t\rangle$ and therefore must move for their semantic interpretation. We propose that this movement must be overt and to the right, as in (14b), deriving their post-predicate position in a manner consistent with the head-initial syntax of the language.

(14) **The structure of PRE vs POST:**

a.



b.



For concreteness, we will illustrate the structures in example (15) with *rất* 'very' as representative of PRE and example (16) with *hơn* 'more' and a phrasal standard as representative of POST. The gradable predicate in both cases is the gradable adjective *cao* 'tall,' which serves as the main predicate of the sentence.

(15) **PRE example with *rất* 'very':**

Minh **rất** *cao*.
Minh very tall
'Minh is very tall.'

(16) **POST example with *hơn* 'more':**

Minh *cao* **hơn** Kim.
Minh tall more Kim
'Minh is taller than Kim.'

We adopt a standard degree-based semantics for gradable predicates as relations between degrees (type d) and individuals (type e) (Cresswell, 1976). Denotations for gradable adjectives are of type $\langle d, et\rangle$, as illustrated in (17) for *cao* 'tall,' relating degrees with individuals whose height meets or exceeds them.[8][9]

(17) $[\![cao \text{ 'tall'}]\!] = \lambda d\ .\ \lambda x\ .\ \textsc{height}(x) \geq d$ (type $\langle d, et\rangle$)

[7] Morzycki (2015: ch. 4) refers to these two structural options as "big DegP" and "small DegP" structures, respectively. Following Neeleman, Van de Koot, and Doetjes 2004, which argues that degree morphemes in an individual language (considering English and Dutch) may include both heads and phrases, we use the category label Deg in both cases: PRE is a Deg head which projects an extended projection of the gradable predicate whereas POST heads a DegP which does not project further. Our analysis is compatible with these two category labels being distinct, just as Neeleman et al. (2004: fn 3) also note.

[8] Lemon 2020 shows that conceptually gradable predicates in Vietnamese vary in whether they compose directly with degree morphemes or else require the introduction of the adverb *nhiều* 'much' for the description of their degree. See Lemon 2020 for detailed discussion and a proposal. We set this issue aside and assume here that gradable predicates directly expose their degree argument.

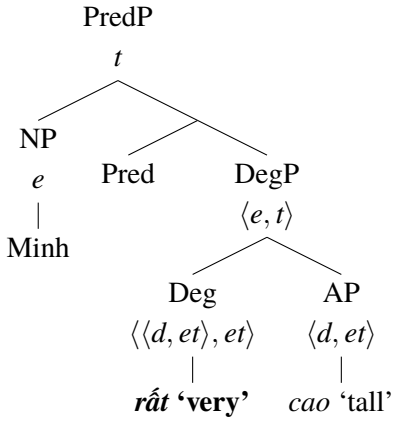
[9] Where there is no degree morpheme, the predicate is interpreted as requiring the measured degree to exceed a contextual standard. We assume the use of a null POS morpheme or corresponding type shifter in such cases. Note that gradable adjectives require an overt degree morpheme in many environments (Nguyen, 1996), leading to the frequent use of *rất* to express the positive form. See Grano 2012 for discussion of a similar phenomenon in Mandarin Chinese. We leave the description of the distribution of bare positive adjectives in Vietnamese for future work.

We first consider the syntax and semantics of PRE. Each PRE instantiates a functional head which selects for a complement that is a gradable predicate: syntactically, this may be an AP, AdvP, or VP, as long as it is semantically of type $\langle d, et\rangle$.[10] [11] This follows a widely adopted approach to degree morphemes as functional heads in the extended projection of AP; see e.g. Abney 1987; Corver 1990; Kennedy 1999; Grimshaw 2000. Each PRE takes its gradable predicate sister of type $\langle d, et\rangle$ and returns a non-gradable predicate of type $\langle e, t\rangle$. Concretely, we assume a denotation for the PRE intensifier *rất* 'very' as in (18). Given a gradable predicate G and individual x, $[\![rất]\!]^c\,(G)(x)$ claims that there is a degree that G holds of x that significantly exceeds the contextual standard, s_c.

(18) $[\![rất \text{ 'very'}]\!]^c = \lambda G_{\langle d,et\rangle}\,.\,\lambda x\,.\,\max\,(\lambda d\,.\,G(d)(x)) \gg s_c$ (type $\langle\langle d, et\rangle, et\rangle$)
where $\gg$ is 'significantly exceeds' (see Fara 2008; Morzycki 2015: 119)

The structure of the predicate in example (15) is illustrated in (19) below. We assume that in clauses with non-verbal predicates, the subject is introduced syntactically as the specifier of a functional head such as Pred (see e.g. Bowers, 2001). The interpretation of branching nodes in (19) is given in (20), assuming here for presentational purposes that the Pred head is semantically inert. The subject in (15) then moves from its predicate-internal base position to the high, canonical subject position.[12]

(19) **The structure of PRE (15):**



[10] We note that all degree morphemes in Vietnamese combine with gradable predicates of any syntactic category. This is unlike the inventory of degree morphemes in some other languages, where particular items may be limited in the syntactic category that they can select for (see e.g. Neeleman et al., 2004; Doetjes, 2008). This may in turn reflect a more general fact that there is no clear distinction in category between adjectives and verbs in the language, and therefore what we refer to as adjectives here may just as well be described simply as intransitive stative verbs (Thompson 1987: 217–226; Nguyen 1996). In addition, in section 4, we propose that PRE can take a NumP complement in a nominal extended projection, again of type $\langle d, et\rangle$.

[11] For gradable adverbs, PRE denotations will have to be systematically type-shifted to compose directly with the adverb. For instance, taking manner adverbs to be predicates of events (type v) (see e.g. Davidson, 1967; Parsons, 1990), if a gradable manner adverb has type $\langle d, vt\rangle$, corresponding PRE meanings must be $\langle\langle d, vt\rangle, vt\rangle$. Note that POST meanings need not type-shift for composing with gradable adverbs.

[12] On the organization of the higher clausal spine in Vietnamese, see e.g. Duffield 2007; Phan and Duffield 2018, 2022.

(20) a. $[\![\text{DegP}]\!]^c = [\![\textit{rất}]\!]^c\,([\![\textit{cao}]\!])$

$= \lambda x\,.\,\max\,(\lambda d\,.\,\textsc{height}(x) \geq d) \gg s_c$

$= \lambda x\,.\,\textsc{height}(x) \gg s_c$

b. $[\![\text{PredP}]\!]^c = [\![\text{DegP}]\!]^c\,(\text{Minh})$

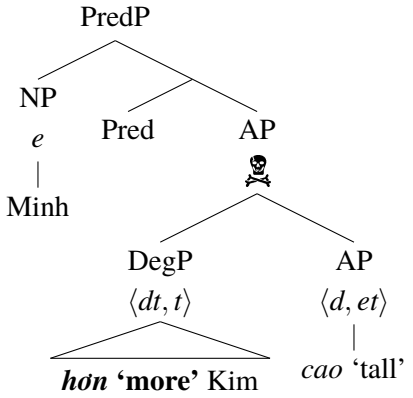
$= 1$ iff $\textsc{height}(\text{Minh}) \gg s_c$

"Minh's height significantly exceeds the contextual standard."

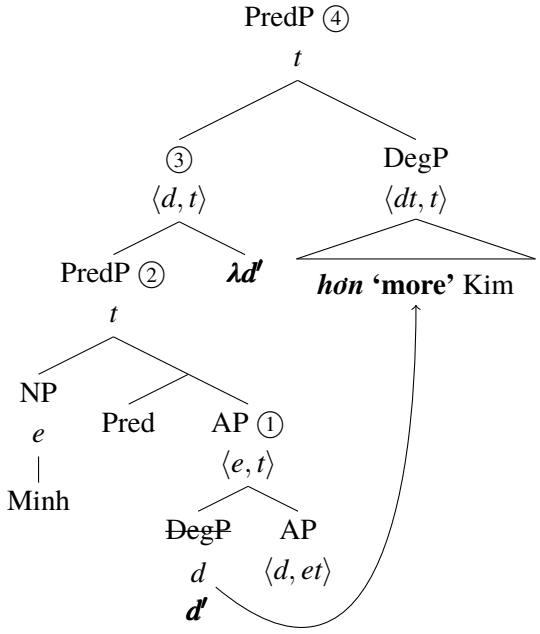
Next we turn to the syntax and semantics of POST, illustrating with the comparative in (16) above. We argue that each POST forms a phrase with the arguments it introduces, if any. We give this projection the label DegP, with Neeleman, Van de Koot, and Doetjes 2004, but this choice of category label is not crucial for our account; see footnote 7. POST DegPs may be adjoined to their gradable predicate or be its specifier, as in Jackendoff 1977; in either case, we illustrate its base position to the left in (21a) below. We propose that POST DegPs necessarily move from their base position, overtly and to the right, deriving their consistent post-predicate position.

(21) **The structure of POST (16):**

a.



b.



This movement of DegP has a semantic motivation. POST DegPs denote degree quantifiers of type $\langle dt, t\rangle$. Similar to the familiar problem of quantifiers in object position (see e.g. Heim and Kratzer, 1998: ch. 7), a degree quantifier (type $\langle dt, t\rangle$) cannot directly compose with a gradable predicate (type $\langle d, et\rangle$) — making the structure in (21a) uninterpretable — but this problem is resolved by movement of DegP to a node of propositional type. The trace of DegP in (21b) is interpreted as a variable d' of type d, with a corresponding λ-binder adjoined just below the landing site of movement.[13] This resolves the

[13] The availability of "degree abstraction" via movement with a degree type trace has been argued to be a point of cross-linguistic

problem of semantic composition. We give the denotation of select branching nodes in (21b) in (22) and return to the interpretation of the full PredP structure (④) below.

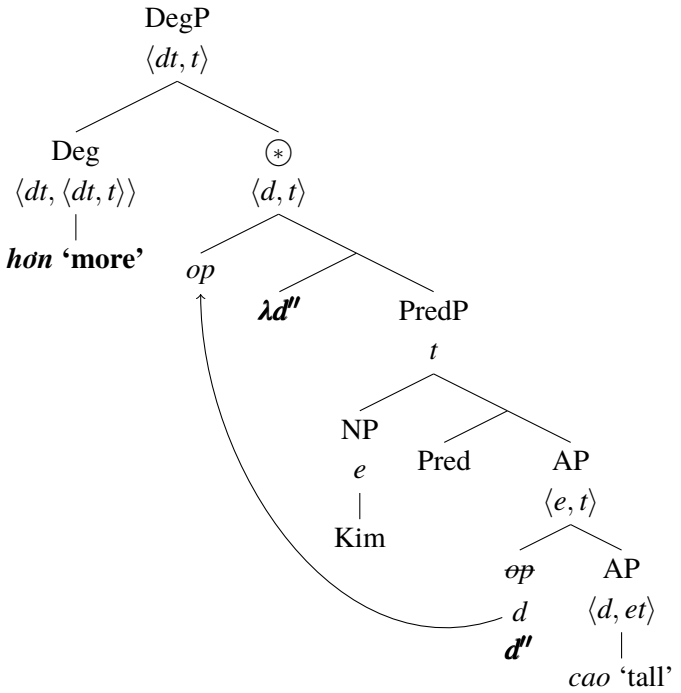
(22) a. $[\![\text{AP } ①]\!] = [\![cao]\!]\,(d') = \lambda x\,.\,\textsc{height}(x) \geq d'$

b. $[\![\text{PredP } ②]\!] = [\![\text{AP } ①]\!]\,(\text{Minh}) = 1$ iff $\textsc{height}(\text{Minh}) \geq d'$

c. $[\![③]\!] = \lambda d'\,.\,[\![\text{PredP } ②]\!] = \lambda d'\,.\,\textsc{height}(\text{Minh}) \geq d'$

We follow Lemon 2020 in the view that all comparative standards in Vietnamese are underlyingly clausal. (See the Appendix for further discussion of the syntax of standards.) A simplified structure for *hơn* 'more' and its standard is illustrated in (23).[14] A null operator of degree type saturates the argument of the gradable predicate — *cao* 'tall,' as in the main clause — and then moves (as in Chomsky, 1977), to yield a degree predicate denotation of type $\langle d,t\rangle$. As Lemon (2020) has argued, the predicate is required to undergo ellipsis within the standard clause (obligatory comparative deletion; see also Kennedy 2002; Corver 2006a), resulting in this case in a standard of superficially NP size.

(23)



For *hơn* 'more,' we adopt a standard two-place denotation for the comparative operator in (24a). We then compute the denotation of the standard, the full POST DegP (*hơn Kim*), and the denotation for the full structure (PredP ④) in (21b) in (24b–d).[15]

variation (Beck et al., 2004, 2009). Our analysis firmly establishes the existence of degree abstraction in Vietnamese, as Lemon 2020 has independently argued based on the study of clausal standards, as sketched in (23) below.

[14] In particular, we assume that standards are full clauses, but for illustration purposes we do not illustrate the higher tense/aspect layers of the clause.

[15] Alternatively, we might imagine treating *hơn* as simply a standard marker, with the semantics of the comparative itself being introduced separately by a null degree morpheme. See e.g. Alrenga, Kennedy, and Merchant 2012 on the syntax and semantics of standard markers versus comparative morphemes. This would allow us to think of the obligatory rightward position of *hơn*-phrases on a par with the obligatory rightward position of *than*-phrases in English (see e.g. Bhatt and Pancheva 2004 and

(24) a. $[\![\textit{hơn}\text{ 'more'}]\!] = \lambda D_{2,\langle d,t\rangle}\,.\,\lambda D_{1,\langle d,t\rangle}\,.\,\max(D_1) > \max(D_2)$ (type $\langle dt,\langle dt,t\rangle\rangle$)

b. $[\![\circledast]\!] = \lambda d''\,.\,\textsc{height}(\text{Kim}) \geq d''$

c. $[\![\text{DegP}]\!] = [\![\textit{hơn}\text{ 'more'}]\!]\,([\![\circledast]\!])$
$= \lambda D_{1,\langle d,t\rangle}\,.\,\max(D_1) > \max(\lambda d''\,.\,\textsc{height}(\text{Kim}) \geq d'')$
$= \lambda D_{1,\langle d,t\rangle}\,.\,\max(D_1) > \textsc{height}(\text{Kim})$

d. $[\![\text{PredP}\ \textcircled{4}]\!] = [\![\text{DegP}]\!]\,([\![\textcircled{3}]\!])$
$= 1$ iff $\max(\lambda d'\,.\,\textsc{height}(\text{Minh}) \geq d') > \textsc{height}(\text{Kim})$
$= 1$ iff $\textsc{height}(\text{Minh}) > \textsc{height}(\text{Kim})$

"Minh's height exceeds Kim's height."

Our illustrations of the syntax of (15) with PRE *rất* 'very' and (16) with POST *hơn* 'more' above — notwithstanding the discussion of the internal syntax/semantics of the standard of *hơn* — reflect the characteristic syntax and semantics of all PRE and POST degree morphemes in Vietnamese. PRE are functional heads of type $\langle\langle d, et\rangle, et\rangle$, always immediately preceding their gradable predicate and composing directly with it, whereas POST form phrasal degree quantifiers of type $\langle dt, t\rangle$, always undergoing overt rightward movement for scope-taking. We discuss further details of the syntax and semantics of specific degree morphemes in the Appendix.

In the remainder of this section, we provide further evidence for our analysis from coordination and other combinations of multiple degree morphemes (§3.1) and from extraction restrictions (§3.2) and discuss the nature of POST-phrase movement (§3.3). We then turn to the use of degree morphemes with descriptions of nominal quantity (§4) and discuss the position and scope of degree morphemes (§5), which both provide further evidence for our analysis for POST involving overt rightward scope-taking movement, in contrast to PRE as a functional head in the extended projection of the gradable predicate.

3.1 Combining multiple degree morphemes

Support for our account comes from the patterns of possible and impossible combinations of multiple degree morphemes. First, we note that PRE and POST degree morphemes cannot simultaneously apply to a single gradable predicate. Consider the basic examples with PRE (*rất*/*quá*) and POST (*hơn*) degree morphemes in (25), which are all grammatical and felicitous and true in the context described. However, it is not possible for PRE and POST expressions to cooccur, as seen in the examples in (26) which are judged as ungrammatical, even in the same context where their component meanings are true.

citations there). However, we do not pursue such an analysis because POST degree morphemes are not all standard-introducing and include various degree modifiers such as *lắm* 'very' and *nhất* 'most,' not just comparatives, thus motivating the possibility of degree morphemes themselves — not just standard markers — being on the right.

(25) **Grammatical and true baseline sentences:**

Context: We need an actor less than 1.5m tall. Minh is 1.8m tall and Kim is 1.6m tall.

a. Minh **rất** cao.
Minh very tall
'Minh is very tall.'

b. Minh **quá** cao.
Minh too tall
'Minh is too tall.'

c. Minh cao **hơn** Kim.
Minh tall more Kim
'Minh is taller than Kim.'

(26) **PRE and POST cannot cooccur:**

a. * Minh **rất** cao **hơn** Kim.
Minh very tall more Kim
Intended: *'Minh is very taller than Kim.'

b. * Minh **quá** cao **hơn** Kim.
Minh too tall more Kim
Intended: *'Minh is too taller than Kim.'

Our proposal predicts this inability for PRE and POST to cooccur. Although PRE is a functional head and POST is an adjunct or specifier to the gradable predicate, both serve semantically to saturate the degree argument of the predicate. Given a gradable predicate of type $\langle d, et\rangle$, the trace of a POST DegP saturates its degree argument and results in a non-gradable predicate denotation of type $\langle e, t\rangle$, which cannot then combine with a PRE Deg head. Similarly, composing a gradable predicate with a PRE Deg head also returns a non-gradable predicate, which cannot then compose with a POST DegP. We therefore correctly predict the inability of such expressions to simultaneously describe a single gradable predicate's degree.

Next, we consider combinations of multiple degree morphemes on the same side of the predicate. Multiple conjoined POST expressions can be used to describe a single gradable predicate, as illustrated in (27). These examples support our analysis, where each POST and its arguments (e.g. the standards of *hơn* in (27), if any) forms a phrasal constituent.

(27) **POST-phrases can be conjoined:**

a. Sâm *cao* [**hơn** Kim], [**hơn** Hoa], và [**hơn** Mai].
Sâm tall more Kim more Hoa and more Mai
'Sâm is taller than Kim, taller than Hoa, and taller than Mai.'

b. Minh *cao* [**cực kì**], (?và / còn) [**hơn** cả Kim].
Minh tall extremely and / and.even more even Kim
'Minh is extremely tall and even taller than Kim.'

Our proposal can derive the correct interpretation for such examples as well. Each POST DegP is a degree quantifier of type $\langle dt, t\rangle$, which can be conjoined by a high type conjunction, similar to the conjunction of quantificational noun phrases of type $\langle et, t\rangle$; see e.g. Partee and Rooth 1983.

In contrast, multiple PRE cannot be conjoined. Consider a context where the subject is both tall enough for a contextually salient purpose and also contextually very tall, which allows for the simultaneous expression of *đủ* 'enough' and *rất* 'very' in separate, conjoined predicates (28a). The conjunction or juxtaposition of these two PRE before the same predicate is ungrammatical, as in (28b).

(28) **PRE cannot be conjoined:**

Q: Are they tall enough to play basketball?

a. Nó **đủ** *cao*, thực ra là **rất** *cao*.
3sg enough tall in fact very tall
'They're tall enough; in fact, very tall.'

b. * Nó **đủ** (và) **rất** *cao*.
3sg enough and very tall
Int.: 'They're tall enough and very tall.'

The ungrammaticality of multiple PRE but possibility of conjoining multiple POST further supports our claim that PRE and POST fundamentally differ in their syntax and semantics: specifically, POST form phrases that denote degree operators, whereas PRE are functional heads in the extended projection of the gradable predicate.

3.2 Evidence from extraction

Our proposal for the derivation of constructions with POST degree morphemes involves rightward movement of POST-phrases. Phrasal movement is cross-linguistically frequently leftward, with many instances of purported rightward movement also being reanalyzed as involving sequences of leftward movements; see for example Kayne 1994. We therefore may also consider an alternative involving fronting of the gradable predicate around POST and its arguments, as schematized in (29). On such an account, POST and its arguments are stationary throughout the derivation, whereas the pronounced predicate is in a derived position.

(29) ... predicate [[POST...] ~~predicate~~]

Evidence against such a derivation comes from the availability of movement out of the gradable predicate but not out of a clausal standard. We demonstrate this contrast using the baseline sentence in (30):

(30) ***hơn* comparative with clausal standard:**

Hoa hát bài hát này *hay* **hơn** nó hát bài hát kia.
Hoa sing CL song this skillful more 3sg sing CL song that
'Hoa sang this song more skillfully than she sang that song.'

Topicalization of the object of Hoa's singing is grammatical, but topicalization of the object out of the clausal standard is not:

(31) **Topicalization possible out of the predicate but not out of the clausal standard:**

a. *Bài hát này* thì Hoa hát ____ *hay* **hơn** nó hát bài hát kia.
CL song this TOP Hoa sing skillful more 3sg sing CL song that
'This song, Hoa sang ____ more skillfully than she sang that song.'

b. * *Bài hát kia* thì Hoa hát bài hát này *hay* **hơn** nó hát ____.
CL song that TOP Minh sing CL song this skillful more 3sg sing
'That song, Hoa sang this song more skillfully than she sang ____.'

The same contrast is seen with relativization in (32). Here, relativization of the main predicate's object in (32a) is also somewhat marked, but extraction out of the standard in (32b) is clearly worse.

(32) **Relativization possible out of the predicate but not out of the clausal standard:**

a. ? Bài hát [mà Hoa hát ____ *hay* **hơn** nó hát bài hát kia] là bài này
CL song REL Hoa sing skillful more 3sg sing CL song that is CL this
'The song [that Hoa sang ____ more skillfully than she sang that song] is this one.'

b. * Bài hát [mà Hoa hát bài hát này *hay* **hơn** nó hát ____] là bài kia.
CL song REL Hoa sing CL song this skillful more 3sg sing is CL that
'The song [that Hoa sang this song more skillfully than she sang ____] is that one.'

The inability to extract out of a clausal standard may be attributed to a freezing effect (see e.g. Corver, 2006b; Hartmann et al., 2018): movement of the POST DegP renders its contents frozen for further movement.[16] The observed extraction profile is the opposite of what would be predicted if the gradable predicate instead moves around the clausal standard to derive this word order, as schematized in (29) above. Furthermore, the asymmetric nature of the availability of extraction in (31–32) also forms an argument against POST structures such as (30) involving a form of coordination between the main clause and the standard clause.

These facts support the view that POST degree constructions in Vietnamese are best analyzed as involving rightward movement of POST and its arguments. Here we do not offer a definitive, deeper explanation for why this movement is obligatorily rightward, and instead concentrate on further motivating our proposal, which in turn supports the idea of the existence of rightward movement in natural language. We then return to the issue of rightward movement in the conclusion.

3.3 On the motivation for POST-phrase movement

Taking the rightward nature of DegP movement for granted for the moment, in this section, we briefly discuss why such overt movement is obligatory.

We first consider the possibility that the difference in linear position between PRE and POST is motivated by their independent difference in structural size. We have argued, through the ability of POST to introduce arguments and be conjoined, that POST form syntactic phrases unlike PRE which are heads. There are other domains where certain expressions are allowed to be on the left if simplex but must be on the right if complex; for instance, Williams (1982) describes "a constraint barring post-head material

[16] As the standard of *hơn* is optional, it may also constitute an adjunct clause island.

in prenominal modifiers" — the *Head-Final Filter* — which descriptively accounts for the prenominal position of *proud* in *a proud man* versus its postnominal position in *a man [proud of his family]*, cf **a [proud of his family] man*; see also Grosu and Horvath 2006. Many similar alternations have been documented beyond the domain of nominal modifiers and described as due to the Final over Final Condition (Holmberg, 2000; Biberauer et al., 2014; Sheehan et al., 2017, a.o.) or the Left Edge Ban (Branan, to appear). Such effects suggest an analysis for the movement of POST expressions being motivated by such a restriction on the shape of syntactic structures which would be violated if POST did not undergo movement.

A problem for such an approach is the fact that POST degree morphemes can also be monomorphemic, when not introducing an argument, and they retain their post-predicate position in such cases. (POST without arguments appear in examples (1–3) above.) Moreover, there are a number of degree morphemes which appear in either PRE or POST position (see (4) above), with no discernible difference in their syntactic size or prosodic phrasing between the two positions. We conclude that the obligatory rightward position or movement of POST cannot be explained by its phrasal status. The correct description is that POST are phrasal and obligatorily move, without a causal link between these two properties.

Another independent difference between PRE and POST under our analysis is in their semantic types, with POST DegPs denoting degree operators which must move to adjoin to a propositional node to take scope, which we further motivate in subsequent sections. However, there is evidence to suggest that the needs of semantic composition may not entirely account for the position of POST. Such evidence comes from the fact that bare measure phrases also must follow their gradable predicate, as seen in (33):

(33) **Bare measure phrases must be POST, not PRE:**

Minh {*1.8m} *cao* {1.8m}.
Minh tall 1.8m
'Minh is 1.8m tall.'

Measure phrases such as *1.8m* are syntactically complex but can be analyzed as expressions of type *d*, directly denoting a degree.[17] Such measure phrases then need not move to compose with the gradable predicate. The fact that they necessarily appear to the right as in (33), then, motivates a syntactic requirement for POST phrases to necessarily follow their predicate after all.

In their work on the cross-linguistic typology of degree constructions, Beck et al. (2009) proposes that languages may simply vary in the availability of overt material saturating the degree arguments of gradable predicates. They call this the Degree Phrase Parameter, stated in (34). We may conclude that Vietnamese has the negative setting of the DegP parameter, taken as a filter on the final, surface structure

[17] There are, however, also accounts of measure phrases that take them to denote degree operators as well. See e.g. Schwarzschild 2005.

of degree constructions. This forces POST DegPs and bare measure phrases to obligatorily move out of their base positions.[18]

(34) **Degree Phrase Parameter:** (Beck et al., 2009: 24)

The degree argument position of a gradable predicate {may/may not} be overtly filled.

There is evidence that suggests that, at a prior stage of the language, at least a limited class of degree-denoting expressions could in fact directly precede gradable predicates. These are the amount demonstratives *bao* 'how much,' *bây* 'this much,' and *bấy* 'that much.' These expressions combine the abstract amount-denoting initial *b-* with the three rhymes for *wh*, proximal, and distal expressions that are observed in other demonstratives in the language as well: cf individual-referring demonstratives *nào/này/nấy* 'which/this/that' and locative demonstratives *đâu/đây/đấy* 'where/here/there' (Nguyen, 1997: 29–30). *Bao*, *bây*, and *bấy* appear with some gradable predicates and precede them when doing so, but these combinations are very restricted in the modern language, for example forming *bao xa* 'how far' but not **bây xa* / **bấy xa* (Nguyen, 1997: 30), and being unable to combine with most other gradable predicates, such as *cao* 'tall': **bao cao* / **bây cao* / **bấy cao*. One common collocation is *bao nhiêu* 'how many,' which can be used to form degree questions, but note that this is not the transparent combination of *bao* with *nhiều* 'many,' as there is a change in tone in the second syllable. In particular, this tonal alternation parallels that in certain high-frequency compounds such as *hai* 'two' + *mười* 'ten' (falling tone) > *hai mươi* 'twenty' (level tone); see Nguyen 1997: 42. For these reasons, we hypothesize that these expressions involving the degree demonstratives *bao*, *bây*, and *bấy* are calcified expressions in the modern Vietnamese lexicon. However, they do serve to suggest that, at a prior stage of the language, some degree-denoting expressions could appear in situ as the specifier of gradable predicates, preceding them. The synchronic grammar of Vietnamese, however, disallows such structures, which we can again attribute to the negative setting of the Degree Phrase Parameter (34).

4 Expressions of nominal quantity

Thus far we have focused on the use of PRE and POST to describe the degree of gradable predicates that describe the predicate of the clause itself. PRE and POST degree morphemes can also be used to describe the quantity of a noun phrase introduced by 'many/much' *nhiều* or 'few/little' *ít*, as illustrated in (35) below.

[18] The discussion in Beck et al. (2009) suggests that they take traces of movement to count as "overtly filling" degree argument positions as well. We instead take the negative setting of the DegP parameter to hold at PF in Vietnamese.

(35) **PRE and POST describing the quantity of an object noun phrase:**

Minh mua {**rất / hơi / đủ / quá**} *nhiều* sách {**quá / lắm / nhất / hơn** Kim / **như** Kim}.
Minh buy very quite enough too many book too very most more Kim like Kim
'They bought {very many / quite many / enough / too many / very many / the most / more / as many} books (than/as Kim).'

Examples such as in (35) alone appear to be compatible with the view that we argue against, that PRE and POST adjoin to the left and right of the maximal projection headed by a gradable predicate, here being the noun phrase. Instead, we argue in this section that PRE and POST degree morphemes in descriptions of nominal quantity in fact differ substantially in their structural positions, in a manner predicted by our account: PRE morphemes in such cases are NP-internal, whereas corresponding POST expressions are NP-external, adjoined to the right edge of a clausal projection such as VP.[19] The possible positions of PRE and POST in examples of the form in (35) is thus as schematized in (36). We will also discuss the structure and semantic composition of such structures below.

(36) subject (*PRE) [$_{VP}$ V [$_{NP}$ (**PRE**) many/few (*POST) N ... (*POST) ...] ...] (**POST**)

We substantiate this contrast between PRE and POST first by building on example (35) above, which describes the quantity of an object noun phrase. First, we note that other predicate-internal material can intervene between the object and its corresponding POST expression, as we see with a purpose adjunct in (37). In contrast, the position of PRE in such structures is fixed, always immediately preceding *nhiều/ít* at the left edge of the noun phrase. For example, PRE cannot be at the left edge of the VP as in (38).

(37) **POST separated from an object *nhiều* noun phrase by purpose adjunct:**

Minh [$_{VP}$ mua [$_{NP}$ *nhiều* sách] [để cho Mai]] {**quá / lắm / nhất / hơn** Kim / **như** Kim}.
Minh buy many book for give Mai too very most more Kim like Kim
'Minh bought {too many / very many / the most / more / as many} books to give Mai (than/as Kim did).'

(38) **PRE cannot be separated from its *nhiều* noun phrase:**

* Minh {**rất / hơi / đủ / quá**} [$_{VP}$ mua [$_{NP}$ *nhiều* sách] (để cho Mai)].
Minh very quite enough too buy many book for give Mai
Intended: 'Minh bought {very many / quite many / enough / too many} books (to give Mai).'

We argue that POST expressions describing a noun phrase's quantity in fact never form a constituent with their corresponding noun phrase. Evidence for this claim comes from examples describing the quantity of subject noun phrases. As we see in (39), POST cannot immediately follow or be at the right edge

[19] Here we use the labels VP and NP to refer to the entire extended projections of verbs and nouns. Adopting the VP-internal subject hypothesis (for Vietnamese, see Trinh 2007), we take VP to be a node of propositional type. We discuss the structure and interpretation of Vietnamese noun phrases in detail below.

of the subject noun phrase being described and instead must be at the right edge of the entire clause, following the verb phrase. This is explained straightforwardly by our account where all POST must move rightward to a scope-taking position.

(39) **POST of subject quantity must be separated from the subject:**[20]

a. (Có) [$_{NP}$ *Nhiều* (bạn) học sinh] nghỉ học hôm nay {**quá / lắm / nhất / hơn** hôm qua / **như** hôm qua}.
have many CL student skip study today too very most more yesterday like yesterday
'{Too many / very many / the most / more / as many} students skipped class today (than/as yesterday).'

b. * (Có) [$_{NP}$ *Nhiều* (bạn) học sinh {**quá / lắm / nhất / hơn** hôm qua / **như** hôm qua}] nghỉ học hôm nay.
have many CL student too very most more yesterday like yesterday skip study today

Note that it is not entirely impossible for POST expressions to appear in this type of clause-medial position, at the right edge of the subject. See for example the superlative *nhất* in (40). What is important here is that *nhất* is in fact at the right edge of a node of propositional type where it takes scope, inside the relative clause. In contrast, for POST describing the quantity of a noun phrase with *nhiều* or *ít* as in (39), there is no node of propositional type within the higher layers of the extended noun phrase where POST may move to take scope, as we show below. POST in (39) therefore must move to the right edge of a clausal projection and therefore cannot immediately follow the subject.

(40) **POST *nhất* in a nominal modifier, within the noun phrase:**[21]

[$_{NP}$ Đỉnh núi [(mà) *cao* **nhất**]] là đỉnh Everest.
peak mountain REL tall most is peak Everest
'The tallest mountain is Mount Everest.'

In contrast, when describing the quantity of a subject noun phrase, PRE expressions immediately precede *nhiều/ít*, as in (41). Following our analysis above, PRE is interpreted in-situ and therefore we argue is here a part of the extended noun phrase.

[20] We briefly discuss the optional, sentence-initial existential verb *có* later in this section.

[21] POST cannot move out of a postnominal modifier or relative clause, and consistently take scope within the nominal description. Superlatives of this form therefore consistently yield absolute superlative readings. Relative superlatives require *nhất* modifying a non-attributive predicate instead; see examples in (71) in the Appendix. On readings of superlatives, see Szabolcsi 1986 and Heim 1999.

(41) **PRE in subject noun phrase:**

(Có) [$_{NP}$ {**Rất / Khá / Quá / Cực kì**} *nhiều* (bạn) học sinh] nghỉ học hôm nay.
have very quite too extremely many CL student skip study today
'{Very / quite / too / extremely} many students skipped class today.'

This contrast between PRE and POST in their structural positions is also observed when a noun phrase is moved. Consider example (42a) below, which describes the quantity of an object noun phrase. Here we specifically choose three degree morphemes which can appear in both PRE and POST positions from the inventory in (4) above. Passivizing this object, PRE degree morphemes are moved together with the noun phrase in (42b) as they are a part of the noun phrase. In contrast, POST degree morphemes cannot be moved together with the noun phrase (42c) and instead must continue to appear at the right edge of the clause in (42d).

(42) **Passivization of noun phrase includes PRE but not POST:**

a. Nó xé (rách) {**quá / thật / vô cùng**} *nhiều* (quyển) sách {**quá / thật / vô cùng**}.
3sg tear torn too / really / extremely many CL book too / really / extremely
'They tore {too/really/extremely} many books.'

b. (Có) [$_{NP}$ {**Quá / Thật / Vô cùng**} *nhiều* (quyển) sách] bị (nó) xé (rách) ____.
have too / really / extremely many CL book PASS 3sg tear torn
'{Too/Really/Extremely} many books were torn (by them).'

c. * (Có) [$_{NP}$ *Nhiều* (quyển) sách {**quá / thật / vô cùng**}] bị (nó) xé (rách) ____.
have many CL book too / really / extremely PASS 3sg tear torn

d. (Có) [$_{NP}$ *Nhiều* (quyển) sách] bị (nó) xé (rách) ____ {**quá / thật / vô cùng**}.
have many CL book PASS 3sg tear torn too / really / extremely
'{Too/Really/Extremely} many books were torn (by them).'

This contrast in (42) is again predicted by our analysis. In nominal quantity constructions, PRE is part of the extended noun phrase, whereas POST must move overtly to a clausal projection for its interpretation and therefore cannot a part of the noun phrase. Passivization of the noun phrase will therefore include its PRE but not POST.[22] This systematic difference in the position of PRE versus POST degree morphemes in nominal quantity constructions is explained by — and in turn further motivates — our overall proposal for the syntax and semantics of PRE and POST expressions.

In the remainder of this section, we extend our analysis in section 3 above to the structure and interpretation of such nominal quantity constructions. We begin by discussing the syntax and semantics of the

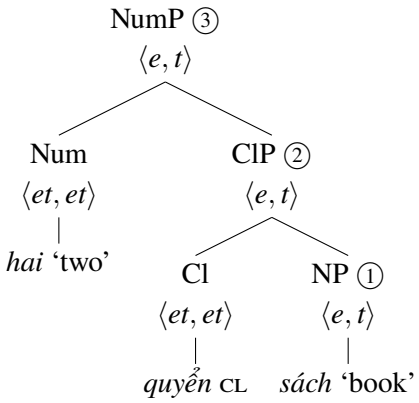
[22] We note that there is a debate regarding the analysis of Vietnamese passives. Simpson and Hồ 2013 analyzes the *bị* passive as a movement construction, as it may strand material and is island-sensitive; see also Simpson and Ngo 2018: fn 15. However, Bruening and Tran 2015 argues against such a movement analysis, presenting examples of gapless *bị* passives and disputing Simpson and Hồ's island sensitivity facts. On either analysis, we can treat the POST expression as moving rightward from the noun phrase's surface position, whether derived via movement or base-generated high.

extended noun phrase. Vietnamese is a numeral classifier language, with nouns exhibiting idiosyncratic variation in whether they require a classifier, optionally involve a classifier, or take no classifier when appearing with a numeral; see e.g. Simpson and Ngo 2018. We follow Trinh 2011b, Simpson and Ngo 2018, and Phan, Trinh, and Phan 2021 in adopting a semantics for classifier languages à la Chierchia 1998, whereby all nouns themselves denote cumulative predicates (mass noun denotations) and classifiers take such denotations and return a predicate of their countable atoms.[23] Classifiers form a constituent with the NP, projecting ClP and denoting a predicate of atoms of type $\langle e, t\rangle$.

For a countable noun with a numeral, a Num head then takes ClP as its complement, projecting NumP. For illustration, we give a denotation for *hai* 'two' in (43), as well as the structure and interpretation for *hai quyển sách* "two CL book" in (44–45). Following Ionin and Matushansky (2006, 2018), *hai* 'two' (43) takes a predicate of atoms as its input and returns a predicate that is true of plural individuals that can be made up of two or more such atoms.[24] Here we use BOOK as the predicate of book atoms and * denotes the sum-closure operator of Link 1983.

(43) $[\![\textit{hai}\text{ 'two'}]\!] = \lambda P_{\langle e,t\rangle} \,.\, \lambda x_e \,.\, \mu_P(x) \geq 2$ (type $\langle et, et\rangle$)

(44)



(45) a. $[\![\text{NP } ①]\!] = \lambda z \,.\, {}^*\textsc{book}(z)$

b. $[\![\text{ClP } ②]\!] = \lambda y \,.\, \textsc{atom}(y) \wedge {}^*\textsc{book}(y)$
$= \lambda y \,.\, \textsc{book}(y)$

c. $[\![\text{NumP } ③]\!] = \lambda x \,.\, \mu_{\textsc{book}}(x) \geq 2$ (type $\langle e, t\rangle$)

A NumP nominal description of this form may be interpreted in an argument position as definite or indefinite (see e.g. Đoàn et al., 2019; Phan and Lam, 2021). As the NumP itself is of type $\langle e, t\rangle$ (see (45c)), its interpretation in an argument position will require an operation such as the application of a null

[23] Chierchia (1998) analyzes mass noun denotations as kinds, with a type-shift mapping kinds to their cumulative predicates. We simplify this aspect of the analysis here.

[24] Based on Ionin and Matushansky's semantics for cardinal numerals, we define the P-measure function as $\mu_P = \lambda x : \textsc{atomic}(P) \wedge {}^*P(x) \,.\, \max\left(\lambda n \,.\, \exists S_{\langle e,t\rangle}\, [\Pi(S)(x) \wedge |S| = n \wedge S \subseteq P]\right)$. Ionin and Matushansky (2006: 318; 2018: 13) define $\Pi(S)(x)$ to mean that S is a partition for the plural individual x.

D head or a type shifter (Partee, 1986; Chierchia, 1998). For concreteness, here below, we will present the use of the Restrict composition rule (Chung and Ladusaw, 2004) with Existential Closure.

Based on this analysis for Vietnamese noun phrases, we propose that *nhiều* 'many' and *ít* 'few' are also Num heads. We propose the denotation for *nhiều* 'many' in (46) below, which results in a denotation for *nhiều quyển sách* "many CL book" as in (47) below. We can analyze *ít* 'few' as the combination of *nhiều* with the degree negation LITTLE (Heim, 2006, 2008) but concentrate on the analysis of *nhiều* here.

(46) $[\![\textit{nhiều}\text{ 'many'}]\!] = \lambda P_{\langle e,t\rangle} \,.\, \lambda d \,.\, \lambda x_e \,.\, \mu_P(x) \geq d$ (type $\langle et, \langle d, et\rangle\rangle$)

(47) $[\![[_{\text{NumP}}\text{ nhiều quyển sách}]]\!] = \lambda d \,.\, \lambda x \,.\, \mu_{\text{BOOK}}(x) \geq d$ (type $\langle d, et\rangle$)

The use of the P-atom-relative measure function μ_P in (46) requires that its complement denote a predicate of atoms (see footnote 24 above), and therefore be a classifier phrase, ClP. For non-countable nouns such as *nước* 'water,' a variant *nhiều* 'much' for mass noun denotations using an abstract measure function is used instead; see (48). This variant *nhiều* 'much' can also combine directly with a countable noun such as *sách* 'book' without its classifier; see (49).

(48) $[\![\textit{nhiều}\text{ 'much'}]\!] = \lambda P_{\langle e,t\rangle} \,.\, \lambda d \,.\, \lambda x_e \,.\, P(x) \wedge \mu(x) \geq d$ (type $\langle et, \langle d, et\rangle\rangle$)

(49) $[\![[_{\text{NumP}}\text{ nhiều sách}]]\!] = \lambda d \,.\, \lambda x \,.\, {}^*\text{BOOK}(x) \wedge \mu(x) \geq d$ (type $\langle d, et\rangle$)

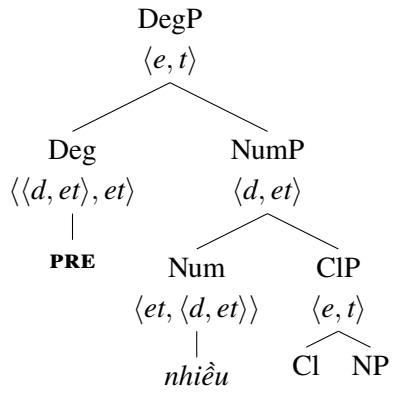
This explains the fact that certain nouns such as *sách* 'book' require a classifier (for 'book,' *quyển* or *cuốn*) in the presence of a numeral (Simpson and Ngo, 2018: 213) but the classifier may be left out with *nhiều* and *ít*, as we have seen with *sách* 'book' in examples in this section. Here however, for concreteness, we continue to illustrate the case of *nhiều* with countable nouns using classifiers.[25]

NumP headed by *nhiều* or *ít* is of type $\langle d, et\rangle$ rather than the standard $\langle e, t\rangle$ type for NumP; see (47/49) vs (45c) above. Following our core proposal above, there are two ways to convert this type $\langle d, et\rangle$ NumP meaning into a $\langle e, t\rangle$ nominal description meaning: projecting a PRE Deg head in the nominal extended projection or introducing a POST DegP as an adjunct or specifier to NumP, followed by DegP movement to the right.[26] These two options are illustrated in (50) below.

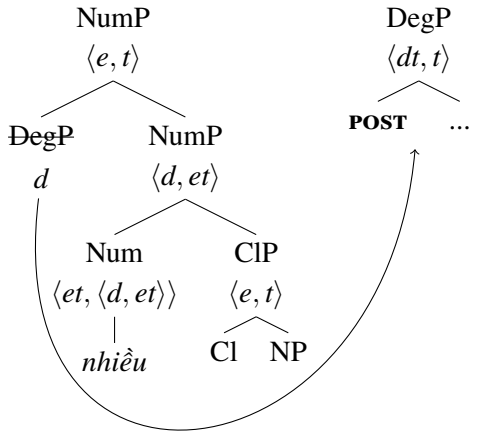
[25] Vietnamese also has countable nouns which do not take an overt classifier. Following Simpson and Ngo 2018, we analyze such noun phrases as involving a covert classifier.

[26] If we analyze the positive (bare) form of gradable predicates as involving a type-shift, applying this POS type-shift is a third option. See footnote 9 above.

(50) a.

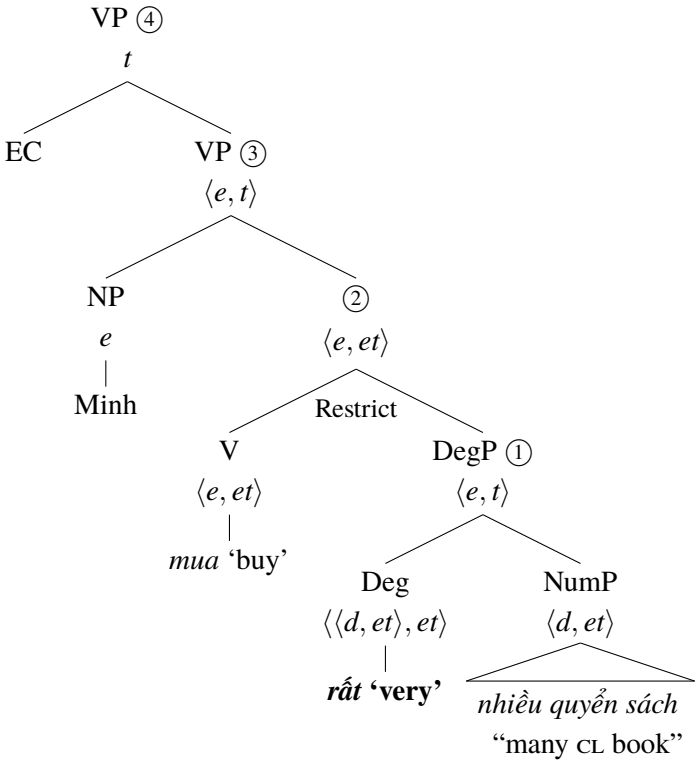


b.



Concretely, we now present the interpretation of "Minh buy very many CL book" (PRE) and "Minh buy many CL book more Kim" (POST) from (35) above, beginning with the former. The predicate VP for "Minh buy very many CL book" with its predicate-internal subject (simply shown in Spec,VP) is shown in (51). As also noted above, the transitive verb of type $\langle e, et\rangle$ and its object of type $\langle e, t\rangle$ (DegP) cannot compose directly via Functional Application. For concreteness, here we adopt the use of the Restrict composition rule (Chung and Ladusaw, 2004) followed by Existential Closure (EC) at the VP level (Heim, 1982; Diesing, 1992).[27]

(51)



[27] Trinh 2011a proposes the use of Restrict and EC for object indefinites in Vietnamese. The combination of Restrict followed by EC in this manner mimics the effects of the semantic incorporation mode of composition in Van Geenhoven 1998. Existential closure is also invoked for the interpretation of quantity nominals in English in Rett 2014: 255.

An alternative would be to take *nhiều/ít*-headed NPs to be existential quantificational NPs of type $\langle et, t\rangle$ — either using a null

Consider the interpretation of the numbered nodes in (51) above. The interpretation for DegP ① is as in (52a) below, given the denotation for *rất* 'very' in (18) above and for NumP in (47). Following discussion in Chung and Ladusaw 2004: 9–10, we let Restrict return for ② a type $\langle e, et\rangle$ denotation which takes its agent as its outermost argument (52b), and then returns a type $\langle e, t\rangle$ predicate of the theme that is restricted to satisfying ⟦DegP⟧ (52c). This facilitates composition with the agent followed by Existential Closure (EC), resulting in the final VP denotation in ④ (52d). The subject later moves up to its canonical, high position.

(52) a. $[\![\text{DegP } ①]\!]^c = [\![\textit{rất}\text{ 'very'}]\!]^c\left([\![\text{nhiều quyển sách "many CL book"}]\!]\right)$

$= \lambda z\,.\,\max\left(\lambda d\,.\,[\![\text{nhiều quyển sách}]\!]\,(d)(z)\right) \gg s_c$

$= \lambda z\,.\,\mu_{\text{BOOK}}(z) \gg s_c$

b. $[\![②]\!]^c = \text{Restrict}\,(\lambda y\,.\,\lambda x\,.\,\text{BUY}(x,y),\ \lambda z\,.\,\mu_{\text{BOOK}}(z) \gg s_c)$

$= \lambda x\,.\,\lambda y\,.\,\text{BUY}(x,y) \wedge \mu_{\text{BOOK}}(y) \gg s_c$

c. $[\![\text{VP } ③]\!]^c = [\![②]\!]^c\,([\![\text{Minh}]\!])$

$= \lambda y\,.\,\text{BUY}(\text{Minh}, y) \wedge \mu_{\text{BOOK}}(y) \gg s_c$

d. $[\![\text{VP } ④]\!]^c = 1$ iff $\exists y\,.\,\text{BUY}(\text{Minh}, y) \wedge \mu_{\text{BOOK}}(y) \gg s_c$

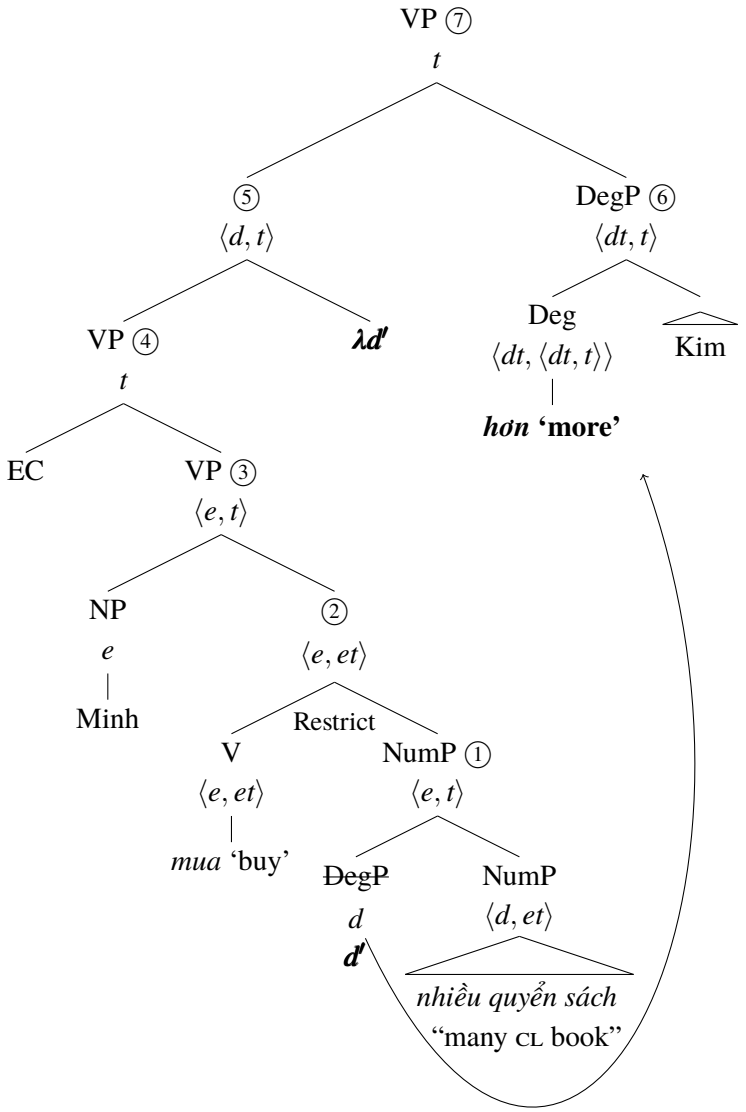
"Minh bought some books, whose quantity significantly exceeds the contextual standard."

Next we turn to our POST example with comparative *hơn* from (35) above. The degree morpheme *hơn* with its standard forms a degree quantifier of type $\langle dt, t\rangle$. We again assume comparative deletion within the standard, as in (23) above, which we do not illustrate here.

D head or a type shifter (Partee, 1986) — which then QR to take scope; see e.g. Hackl 2009: fn. 26.

Another non-movement alternative would be the use of Chierchia's Derived Kind Predication rule, but see Trinh 2011a for an argument against this approach for Vietnamese.

(53)



The DegP originates as the modifier or specifier of NumP and moves, leaving a degree type trace. This allows for the type $\langle e,t\rangle$ interpretation of NumP ① in (54a) below. This facilitates the interpretation of the verb and object via Restrict in ②, composition with the agent in ③, existential closure over the theme argument in ④, and degree abstraction in ⑤ (54b–e). A parallel derivation involving null operator movement takes place in the standard clause with the subject Kim, composing with *hơn* to yield the DegP denotation for ⑥ (54f). Composing with ⑤, we yield the final VP denotation in ⑦ (54g). The subject again moves out of VP in the full structure.

(54) a. $[\![\text{NumP } ①]\!] = \lambda z \,.\, \mu_{\text{BOOK}}(z) \geq d'$

b. $[\![②]\!] = \text{Restrict}\,(\lambda y \,.\, \lambda x \,.\, \text{BUY}(x,y),\ \lambda z \,.\, \mu_{\text{BOOK}}(z) \geq d')$
$= \lambda x \,.\, \lambda y \,.\, \text{BUY}(x,y) \wedge \mu_{\text{BOOK}}(y) \geq d'$

c. $[\![\text{VP } ③]\!] = [\![②]\!]\,([\![\text{Minh}]\!])$
$= \lambda y \,.\, \text{BUY}(\text{Minh}, y) \wedge \mu_{\text{BOOK}}(y) \geq d'$

d. $[\![\text{VP } ④]\!] = 1$ iff $\exists y \,.\, \text{BUY}(\text{Minh}, y) \wedge \mu_{\text{BOOK}}(y) \geq d'$

e. $[\![⑤]\!] = \lambda d' \,.\, \exists y \,.\, \textsc{buy}(\text{Minh}, y) \wedge \mu_{\textsc{book}}(y) \geq d'$

f. $[\![\text{DegP } ⑥]\!] = \lambda D_{1,\langle d,t\rangle} \,.\, \max(D_1) > \max\,(\lambda d'' \,.\, \exists x \,.\, \textsc{buy}(\text{Kim}, x) \wedge \mu_{\textsc{book}}(x) \geq d'')$

g. $[\![\text{VP } ⑦]\!] = 1$ iff $\max\,(\lambda d' \,.\, \exists y \,.\, \textsc{buy}(\text{Minh}, y) \wedge \mu_{\textsc{book}}(y) \geq d') > \max\,(\lambda d'' \,.\, \exists x \,.\, \textsc{buy}(\text{Kim}, x) \wedge \mu_{\textsc{book}}(x) \geq d'')$

"The maximum number of books that Minh bought exceeds the maximum number of books that Kim bought."

To extend the analysis to descriptions of subject noun phrase quantity as in examples (39–42) above, we tentatively assume that it is also possible to apply existential closure above the surface subject position. Note that bare nouns and NPs with numerals in subject position allow for both definite and indefinite uses in Vietnamese (Đoàn et al., 2019; Phan and Lam, 2021). This may be related to the availability of the optional existential verb *có* above indefinite subjects, as indicated in (39–42), which may suggest that indefinite subject constructions are in fact biclausal existential constructions. See Paul 2021 for recent, parallel discussion regarding indefinite subjects in Mandarin Chinese.

5 Movement and scope

In this section, we show that POST-phrases take scope in their pronounced position. This supports our analysis which treats POST-phrases as degree quantifiers of type $\langle dt, t\rangle$ that move overtly, rightward, to a scope-taking position.

As Heim 2000 shows for English, the scope-taking of degree quantifiers can introduce scope ambiguities, just as quantificational noun phrases do. Lemon 2020: 503 has observed the same with *hơn* comparatives in Vietnamese. Consider example (55). This sentence is judged as grammatical and true in both Context 1 and Context 2 below.

(55) **Scope ambiguity with *hơn*:**

Minh muốn tập yoga *đều đặn* **hơn** Kim.
Minh want do yoga regularly more Kim
'Minh wants to do yoga more regularly than Kim.'

a. ✓ Context 1 (want > more): Whoever does yoga the most this week will get a prize. Minh is very competitive. Neither Minh nor I know how often Kim does yoga, but Minh is determined to find out and to do more.

b. ✓ Context 2 (more > want): Kim wants to do yoga twice a week. Minh wants to do yoga three times a week. They do not know each other.

Context 1 supports a parse where the comparative claim is part of the content of Minh's desire, i.e. in the scope of 'want.' A parse of this form for (55) is illustrated in (56a). Context 2 supports a parse where

we compare the content of Minh's desires to the content of Kim's desires; neither's desires include any comparative claim.

(56) a. "want > more":

Minh$_i$ want [PRO$_i$ do yoga t_{DegP}-regularly] [$_{\text{DegP}}$ ***hơn*** [Kim ~~do yoga t_{op}-regularly~~]]

"Minh's desire is: Minh does yoga more regularly than Kim does."

b. "more > want":

Minh$_i$ [want PRO$_i$ do yoga t_{DegP}-regularly] [$_{\text{DegP}}$ ***hơn*** [Kim$_j$ ~~want PRO$_j$ do yoga t_{op}-regularly~~]]

"The maximum frequency that Minh wants to do yoga exceeds the maximum frequency that Kim wants to do yoga."

Note that the truth conditions that we predict for each of these parses, paraphrased in (56a,b) above, are such that parse (56a) but not (56b) is true in the minimal context described in (55a) and similarly parse (56b) but not (56a) is true in the minimal context described in (55b). Therefore the fact that (55) can be uttered truthfully in both Context 1 and Context 2 shows that the sentence allows for both of the parses in (56).

We propose that such scope-taking movement of DegP is overt and rightward, as it is indicated in (56), which explains the linear position of such POST degree morphemes. In this example, the right edge of the embedded clause under 'want' and the right edge of the verb phrase headed by 'want' are aligned at the right edge of the clause, and so the resulting strings are predicted to be equivalent, explaining the ambiguity of example (55). However, there are also instances where two such parses can be disambiguated by their word order, as predicted by our account.

Consider the following pair of examples in (57–58). Both involve an embedded clause under the matrix verb 'tell,' with a *hơn* comparative describing the quantity of books, which is the embedded clause object. The two examples vary only in the linear order of *hơn* and its standard and the prepositional phrase 'to the teacher,' construed as introducing the goal for the higher verb, 'tell.'[28] We describe two contexts: in Context 1, the teacher was told a comparative claim, whereas in Context 2, we compare the degrees that were mentioned in two different people's messages to the teacher.

(57) ***hơn Minh* inside of matrix 'to the teacher':**

Kim nói rằng Mai đọc [$_{\text{NP}}$ *nhiều* sách] [**hơn** Minh] [với thầy giáo].
Kim tell C Mai read many book more Minh to teacher
'Kim told the teacher that Mai read more books than Minh.'

a. ✓ Context 1 (tell > more): Kim told the teacher "*Mai* read more books than *Minh*."

[28] The preferred position for the prepositional phrase 'to the teacher' is immediately following *nói* 'tell,' and therefore speakers vary in their willingness to accept the strings in (57–58). The judgment of interest here is that, for speakers who do comfortably accept both structures in (57–58), there is a systematic difference in the interpretational range between the two examples.

b. ✓ Context 2 (more > tell): *Kim* told the teacher that Mai read 5 books. *Minh* told the teacher that Mai read 4 books.

(58) ***hơn Minh* to the right of matrix 'to the teacher':**

Kim nói rằng Mai đọc [$_{NP}$ *nhiều* sách] [với thầy giáo] [**hơn** Minh].
Kim tell C Mai read many book to teacher more Minh
'Kim told the teacher that Mai read more books than Minh.'

a. # Context 1 (tell > more): Kim told the teacher "*Mai* read more books than *Minh*."

b. ✓ Context 2 (more > tell): *Kim* told the teacher that Mai read 5 books. *Minh* told the teacher that Mai read 4 books.

As we indicate above, example (57) is judged as true in both of these contexts. The prepositional phrase 'to the teacher' is in sentence-final position, allowing the comparative DegP *hơn Minh* to be within the embedded clause as illustrated in (59a) or at the right edge of the matrix VP as in (59b), together with extraposition or higher attachment of 'to the teacher.' In contrast, the linear position of *hơn Minh* following the matrix adjunct 'to the teacher' in (58) makes the comparative DegP necessarily scope out of the embedded clause as in (59b).

(59) a. "tell > more":

Kim tell [$_{CP}$ that Mai [read t_{DegP}-many book] [$_{DegP}$ ***hơn*** [Minh ~~read t_{op}-many book~~]]]
to teacher

"Kim told the teacher: Mai read more books than Minh did."

b. "more > tell":

Kim [tell [$_{CP}$ that Mai read t_{DegP}-many book] (to teacher)]
[$_{DegP}$ ***hơn*** [Minh ~~tell Mai read t_{op}-many book~~]] (to teacher)

"The number of books that Kim told the teacher that Mai read is greater than the number of books that Minh told the teacher that Mai read."

The contrast in (57–58) is precisely what is predicted by our analysis, as the structures in (59) illustrate. In particular, this contrast indicates that the linear position of the POST expression transparently reflects its scope, as predicted by account where POST DegPs move overtly to the right to their scope-taking positions. These examples and their interpretations cannot be explained if POST-phrases appeared in their post-predicate position via rightward adjunction to the gradable predicate or if they were allowed to take scope via covert movement.

6 Conclusion

In this paper, we undertook the first in-depth investigation into degree constructions in Vietnamese. We began by noting that some degree morphemes in the language appear before their gradable predicate and some after. Although this distinction may at first glance simply suggest a rather superficial difference in linear position alone, we instead argue that the two classes of degree morphemes involve substantially different syntax and semantics.

We summarize our proposal as follows. PRE are functional heads (Deg^0) in the extended projection of the gradable predicate. They are type $\langle\langle d, et\rangle, et\rangle$ and therefore compose directly with the gradable predicate, returning a non-gradable predicate meaning. In contrast, POST morphemes project phrases with any arguments they introduce (DegP) and modify or specify the gradable predicate. POST DegPs are degree quantifiers of type $\langle dt, t\rangle$ and take scope through overt movement to the right. This account not only derives the characteristic difference in linear position of PRE and POST expressions, but also explains the fact that POST morphemes introduce arguments and form complex phrases but PRE do not, and that POST morphemes separate from their gradable predicate to a position that indicates their scope, whereas PRE always immediately precede their gradable predicate.

The idea that the inventory of degree morphemes in a single language may include both functional heads and modifiers has been proposed before in Doetjes 1997, 2008 and Neeleman, Van de Koot, and Doetjes 2004 for English and Dutch, accounting for e.g. differences in the behavior of *much*-support (Corver, 1997). In Vietnamese, the distinction between functional heads and phrasal modifiers is manifest in an entirely different way, in gross differences in their linear position within the clause. Nonetheless, our study reinforces the idea that such a distinction is a necessary and productive one for the inventory of degree morphemes within an individual language, thereby indirectly supporting the core claim of Doetjes and colleagues as well.

By way of conclusion, we return to the rightward nature of POST DegP movement. The idea that POST DegPs move rightward to a scope-taking position is a critical component of our analysis and the success of our account here thereby strengthens the motivation for the existence of rightward movement in grammar, the status of which has been rather controversial.

We note that POST DegP movement in Vietnamese may cross finite clause boundaries, as in (59b). Ross (1967: 307) proposes that rightward displacement operations in English (e.g. heavy NP shift and extraposition from NP) are clause-bound. In more recent work, Overfelt (2015) confirms this to generally be the case for English heavy NP shift, but also shows that the addition of parasitic-gap-containing adjuncts can license long-distance rightward movement. He therefore concludes that rightward movement is in principle long-distance, similar to leftward movement, but restricted in that it is only possible to ensure semantic convergence at LF. See also Cecchetto 2004 and Syrett 2015 for parallel conclusions on

the locality of Quantifier Raising (QR), which despite being covert has also been argued to be a rightward movement (Fox and Nissenbaum, 1999; Fox, 2002).

These studies highlight an important commonality between POST DegP movement in Vietnamese and these other, earlier studied instances of rightward movement: they are all (at least to some degree) motivated by the needs of semantic interpretation. These parallels suggest that rightward directionality of movement may be a hallmark of movements necessitated by convergence at the LF interface, when they are overt,[29] in contrast to leftward movements which are driven by the idiosyncratic properties of attracting functional heads.[30] We are hopeful that Vietnamese POST degree constructions will form a new and productive testbed for further study of the nature of rightward movement in the future.

[29] As for why POST DegP movement must be overt, we proposed in section 3 that this reflects a general ban on degree argument positions being filled by overt material (the negative setting of Beck et al. 2009's Degree Phrase Parameter). Bare measure phrases also move rightward, which may reflect their also being degree operators of type $\langle dt, t \rangle$, or that this direction of movement is by analogy with all other movements from this position, which are POST DegPs that move rightward.

[30] Jenks (2011: §6.4.3) suggests precisely this distinction in his discussion of Thai quantifier float. This conclusion is also supported by discussion in Matushansky 2002: ch. 6, although the facts there are more complicated. Considering the position of degree operators within the English DP, Matushansky shows that rightward movement of degree operators is overt QR and must result in their scope-taking position.

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Appendix

POST with arguments

POST degree morphemes that introduce arguments each have their own idiosyncratic syntactic specifications. We first describe the syntax of POST degree morphemes that introduce comparative standards, summarized first in (60), and then turn to their semantics.

(60) **POST with standards:**

	type	*hơn* 'more'	*quá*$_{\text{POST}}$ 'more' (⇝malefactive)	*bằng* 'as'	*như* 'like'
phrasal	e	✓ (62–63)	* (65)	✓ (62–63)	✓ (62–63)
clausal	$\langle d, t \rangle$	✓ (61)	* (65)	✓ (61)	✓ (61)
measure phrase	d	✓ (64)	✓ (64)	* (64)	* (64)
no overt standard		✓ (67)	✓ (1c)	✓ (67)	* (67)

In our analysis above, we follow Lemon 2020 in the view that surface-phrasal standards as in (62–63) are underlyingly clausal with obligatory comparative deletion. One of Lemon's arguments for this analysis of surface-phrasal standards is the fact that the complementizer *là* — available with clausal standards of *hơn* and *như* (61) — can also appear with phrasal standards as in (62). Interestingly, this use of *là* is not possible with phrasal standards that correspond to the subject, as in (63).

(61) **Clausal standards:**

Sâm đi bộ *nhanh* {**hơn** (là) / **bằng** (*là) / **như** (là)} [$_{\text{standard}}$ Kim {đi bộ / chạy} (*nhanh)].
Sâm walk fast more C / as / like C Kim walk / run ~~fast~~
'Sâm walks {faster than / as fast as} Kim walks/runs.'

(62) **Object-denoting phrasal standards may take complementizer *là*:**

Tôi *thích* trà {**hơn** (là) / **bằng** (*là) / **như** (là)} [$_{\text{standard}}$ cà phê].
1sg like tea more C / as / like C coffee
'I like tea {more than / as much as} (I like) coffee.' (based on Lemon 2020: 499 ex. 8)

(63) **Subject-denoting phrasal standards disallow complementizer *là*:**

Minh *cao* {**hơn** (*la) / **bằng** (*la) / **như** (*la)} [$_{\text{standard}}$ Kim].
Minh tall more / as / like Kim
'Minh is {taller than / as tall as} Kim.'

We choose to maintain the uniform, underlyingly clausal derivation for phrasal standards and take these restrictions on the appearance of *là* to be a superficial morphological difference. In support of this view, we note that standards of *bằng* always disallow *là*, even when clearly clausal: see *bằng* in (61).

Examples (64–65) show differences in the availability of measure phrase standards, which are degree-denoting NPs. Measure phrases may also be introduced by *hơn* as a differential, following its standard (66).

(64) ***hơn* and *quá* can take measure phrase standards, *bằng* and *như* cannot:**

Sâm *cao* {**hơn / quá** / ***bằng** / ***như**} [$_{\text{standard}}$ 1.8m].
Sâm tall more / QUA$_{\text{POST}}$ / *as / *like 1.8m
'Sâm is taller than 1.8m.' (*quá* $\rightsquigarrow$ and that's a problem)

(65) ***quá*$_{\text{POST}}$ can only take a measure phrase standard:**

a. Sợi dây này *dài* **quá** [$_{\text{standard}}$ 2m / mức tôi có thể tưởng tượng].
CL string this long QUÁ$_{\text{POST}}$ 2m level 1sg can imagine
$\approx$ 'The string is longer than {2m / the level I could imagine} (and that's a problem).'

b. * Sợi dây này *dài* **quá** [$_{\text{standard}}$ sợi dây kia / tôi có thể tưởng tượng].
CL string this long QUÁ$_{\text{POST}}$ CL string that 1sg can imagine
Intended: 'The string is longer than {that string / I could imagine} (and that's a problem).'

(66) ***hơn* can introduce a differential, which follows the standard:**

Nó *cao* **hơn** [$_{\text{standard}}$ em trai] [$_{\text{differential}}$ 15cm].
3sg tall more younger.brother 15cm
'They're 15cm taller than their younger brother.'

Comparatives with *hơn* and *quá*$_{\text{POST}}$ and equatives with *bằng* but not *như* may appear without an overt standard argument (67). Where there is no overt standard, a contextually salient standard is referenced.

(67) **Comparatives and equatives with no overt standards:**

Minh *cao* {**hơn / quá** / **bằng** / ***như**}.
Minh tall more / QUÁ$_{\text{POST}}$ / as / like
'Minh is {taller / as tall}.' (QUÁ $\rightsquigarrow$ and this is a problem)

Based on the above description, we provide simplified semantic denotations for these standard-taking POST Deg heads. We conventionally use the variables T for the degree description formed by DegP movement in the main clause and S for the standard degree description formed by null operator movement, as in (23) above.

(68) **Denotations for POST with standards:**

a. $[\![hơn_{\text{MP}}$ 'more'$]\!] = \lambda d_d \,.\, \lambda T_{\langle d,t\rangle} \,.\, \max(T) > d$

b. $[\![hơn_{\text{stnd}}$ 'more'$]\!] = \lambda S_{\langle d,t\rangle} \,.\, \lambda T_{\langle d,t\rangle} \,.\, \max(T) > \max(S)$

c. $[\![hơn_{\text{diff}}$ 'more'$]\!] = \lambda S_{\langle d,t\rangle} \,.\, \lambda \Delta_d \,.\, \lambda T_{\langle d,t\rangle} \,.\, \max(T) \geq \max(S) + \Delta$

These three entries for *hơn* echo that in Lemon 2020: 501.

d. $[\![quá_{\text{POST}}]\!] = \lambda d_d \,.\, \lambda T_{\langle d,t\rangle} \,.\, \max(T) > d$

NOT-AT-ISSUE: if $(\max(T) > d)$, there is a problem

See Erlewine and Nguyen 2022 for motivation for this description.

e. $[\![bằng/như \text{ 'as'}]\!] = \lambda S_{\langle d,t\rangle} \,.\, \lambda T_{\langle d,t\rangle} \,.\, \max(T) \geq \max(S)$

There are also similative uses of *như* as in (69), which we assume involves another denotation.

(69) **Non-degree, similative uses of *như*:** (Nguyen, 1997: 192)

a. ăn **như** bò ngốn cỏ
eat like cow eat grass
'to eat gluttonously'

b. đẻ **như** thỏ
birth like rabbit
'to reproduce like rabbits'

The other POST degree morphemes which can introduce arguments are the superlative *nhất*, which optionally introduces a comparison class (7), and *đến nỗi* 'to the extent that' which obligatorily introduces a result clause (8). We discuss *đến nỗi* below.

(70) **Denotation for *nhất* 'most':**

$[\![nhất_C \text{ 'most'}]\!] = (\lambda K_{\langle e,t\rangle} \,.) \; \lambda D_{\langle d,t\rangle} \,.\, \forall D' \in C[\max(D) > \max(D')]$

C is a set of contextual alternatives, congruent to the focus alternative set (see e.g. Rooth, 1992), varying by values in the comparison class K, if specified.[31]

The reference to focus alternatives in (70) reflects the focus-sensitivity of *nhất* superlatives, as in (71). (71A1) is felicitous in a context with a salient Question Under Discussion as in (71Q1), whereas (71A2) is felicitous with question (71Q2).

(71) ***nhất* superlatives are focus-sensitive:**

Q1. Ai *thích* ăn táo **nhất**?
Who like eat apple most

A1. $[\text{Kim}]_F$ *thích* ăn táo **nhất**.
Kim like eat apple most
'Kim likes to eat apples more than any other person does.'

Q2. Kim *thích* ăn gì **nhất**?
Kim like eat what most

A2. Kim *thích* ăn $[\text{táo}]_F$ **nhất**.
Kim like eat apple most
'Kim likes to eat apples more than eating anything else.'

Excess, sufficiency, and result clauses

As Meier 2003 has shown, expressions of excess (English *too*), sufficiency (*enough*), and result clauses (*so...that*) constitute a semantic natural class in that they relate the measured degree to the degree of that

[31] In English, a comparison class can be specified by an *among* adjunct: *Among the boys, John likes Mary the most.* vs *Among the girls, John likes Mary the most.*

same predicate that makes a particular goal attainable or leads to a certain result. Interestingly, these expressions do not share a uniform syntax or compositional semantics in Vietnamese: the *quá*$_{\text{PRE}}$ excessive and *đủ* sufficiency morphemes are PRE functional heads whereas the result-introducing *đến nỗi* is a POST Deg head that forms a degree quantifier with its complement clause.[32]

Here we provide the appropriate semantic denotations for all three expressions, building on discussion in Schwarzschild 2008 and Grano 2022. Note that these expressions take intensionalized complements, in contrast to the PRE and POST denotations above, which necessitates the use of a rule such as Intensional Functional Application (Heim and Kratzer, 1998: 308). Reflecting their syntax as a functional head, *quá*$_{\text{PRE}}$ 'too' and *đủ* 'enough' are of type $\langle\langle s,\langle d,et\rangle\rangle,\langle e,t\rangle\rangle$ and make reference to a contextually determined consequence proposition Q. The consequence Q is modalized, frequently describing the possibility of attaining a desired goal, and can be specified by a purpose clause with an overt or covert modal as in (11). See Erlewine and Nguyen 2022 for further discussion. In contrast, *đến nỗi* 'to the extent that' takes a result proposition R of type $\langle s,t\rangle$ as an argument to form an intensionalized degree quantifier of type $\langle\langle s,dt\rangle,t\rangle$.

(72) **Denotations for degree morphemes of excess, sufficiency, and result:**

a. $[\![quá_{\text{PRE}}\text{ 'too'}]\!]^w = \lambda G_{\langle s,\langle d,et\rangle\rangle}\ .\ \lambda x\ .\ \exists\theta_d\ .\ \textsc{because}(w)(\lambda w'\ .\ G(w')(\theta)(x))(\lambda w'\ .\ \neg Q(w'))$
(type $\langle\langle s,\langle d,et\rangle\rangle,\langle e,t\rangle\rangle$)

b. $[\![đủ\text{ 'enough'}]\!]^w = \lambda G_{\langle s,\langle d,et\rangle\rangle}\ .\ \lambda x\ .\ \exists\theta_d\ .\ \textsc{because}(w)(\lambda w'\ .\ G(w')(\theta)(x))(Q)$
(type $\langle\langle s,\langle d,et\rangle\rangle,\langle e,t\rangle\rangle$)

c. $[\![đến\ nỗi\text{ 'to the extent that'}]\!]^w = \lambda R_{\langle s,t\rangle}\ .\ \lambda T_{\langle s,dt\rangle}\ .\ \exists\theta_d\ .\ \textsc{because}(w)(\lambda w'\ .\ T(w')(\theta))(R)$
(type $\langle\langle s,t\rangle,\langle\langle s,dt\rangle,t\rangle\rangle$)

where $\textsc{because}(w)(p)(q)$ is true if and only if p and q are true in w and p is a reason for q (Schwarzschild, 2008: 325)

[32] We argue in Erlewine and Nguyen 2022 that *quá*$_{\text{POST}}$ is not an excessive that relates to a purpose-oriented threshold but instead is a comparative with an additional malefactive inference. See (68d) above.