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The 14th Texas Linguistic Society was held on November 1-3, 2013 at the University of Texas at Austin. Presentations covered all areas of linguistics, with special sessions on 'Signed Languages' and 'Morphosyntax'.

Many thanks to our keynote speakers:
- Cinzia Russi (The University of Texas at Austin)
- Mark Aronoff (Stony Brook University)
- Andrew Koontz-Garboden (University of Manchester)

In addition to the three keynotes, there were 16 presenters. All were invited to submit their papers for publication in the proceedings, and five elected to do so.

Signed, the editors,
    Kyle Jerro and Kate Mesh

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Honorific Composition in Glue

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1   Introduction

Politeness is ubiquitous in natural language. It can be expressed in many different ways: through choice of content, through direct or indirect speech, or through the choice of particular lexical items that are associated directly with formal speech. Expressions of the latter class are found in many languages to varying degrees: for a relatively impoverished case, many European languages have varieties of the *tu/vous* distinction (cf. Horn 2007) and, at the other extreme, languages like Javanese are known to have a large set of lexical items which can be tied to a highly articulated system of speech levels (e.g. Keeler 1984). In recent years, there has been a good deal of research into the semantic and pragmatic properties of expressions which indicate speech level, usually known as *honorifics*.

Honorific expressions can be defined (at least tentatively) as the class of lexical items or affixes which have the expression of respect or status as their primary meaning. There is a substantial literature on such expressions in formal linguistics, though mostly in syntax, where the discussion has concentrated mostly on the relation between honorification and agreement.[1] In semantics, the main focus has been on the meaning types of honorifics, the main conclusion having been that honorifics introduce expressive meanings, and on how composition works with them given that they are expressive. However, this research, particularly those portions of it which are fully explicit about composition, has only been carried out for a highly restricted class of lexical items, and further makes some potentially controversial assumptions.

This paper is concerned with some of the empirical problems arising from the clearest proposal currently on the market, that of Potts and Kawahara (2004). We begin our investigation with a partial description of Japanese honorifics in section 2, together with a justification of analyzing honorifics as introducing expressive content. We then show in section 3 that certain problems arise in the compositional process associated by Potts and Kawahara with subject and object honorification, due to the combination of the adjacency requirements imposed by their composition logic with the potentially nonlocal predications which can be required by argument honorification. Section 4 proposes a solution which associates honorific targets directly with grammatical roles: subjects for subject honorifics, and objects for object honorifics. The proposal is implemented using the glue semantics for Lexical-Functional Grammar. Section 5 concludes with an evaluation of the approach and a comparison with possible alternatives.

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[1] See e.g. Niinuma (2003) and Boeckx and Niinuma (2004).

2   Honorification in Japanese

Like many languages, Japanese has expressions whose conventional meanings indicate polite or impolite behavior of the speaker. Honorification is one such example. It is widely distributed in the language and can be expressed in a variety of ways.

In Japanese, some verbs lexically specify an expressive meaning (plus ordinary verbal denotation).

(1)   Sensei-ga   irassyat-ta.
      teacher-nom   come.hon-pst
      At-issue: The teacher came.
      Expressive: The speaker honors the teacher.

In (1), the sentence conveys two different semantic contents at two different levels. At an at-issue level, it just refers to an event in which the teacher came. For the expressive meaning, on the other hand, it implies the speaker has a sense of respect for the teacher. Thus, honorifics indicate that the speaker (is at least behaving as if she) honors one of the arguments of a verb.

In other cases, honorifics are derived from ordinary verbal predicates via systematic morphological processes. For example, in (2) the honorific meaning is derived from the affixation of the passive morpheme *–rare* to the verb, while in (3) it comes from the affixation of the honorific prefix *o-*[2] to the verb, which is followed by the copular verb *-ninaru* "become".

(2)   Sensei-ga   Seito-o   home-rare-ta.
      teacher-nom   student-acc   praise-hon-pst
      At-issue: The teacher praised the student.
      Expressive: The speaker honors the teacher.

(3)   Sensei-ga   seito-o   o-home-ninat-ta.
      teacher-nom   student-acc   hon-praise-become-pst
      At-issue: The teacher praised the student.
      Expressive: The speaker honors the teacher.

In lexically-specified honorifics, the grammatical target of honorific expressions is solely determined according to the choice of a verb: even if a verb has two (or more) arguments, honorifics can correctly find the target with reference to the grammatical relations of the arguments.

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[2] The prefix *o-* can be used in various ways. One use is to refer to an entity in a polite manner (e.g. *o-kane* "money"). Another usage is to attach to a verb to derive a result nominal with slightly a formal flavor (e.g. *o-nigiri* "rice ball"). Nevertheless, the item is not necessarily honorific, since it can also be used in highly grammaticalized expressions (e.g. *o-naka* "stomach"), or in sarcastic expressions (e.g. *o-nobori-san* "country hick").

(4)   Sensei-ga   ringo-o   mesiagat-ta.
       teacher-nom apple-acc   eat.hon-pst
       At-issue: The teacher ate an apple.
       Expressive: The speaker honors the teacher.

In (4), although the verb *mesiagaru* (lexical honorific form of *taberu* "eat") takes two arguments, it always targets the subject as its honorific meaning.

In fact, Japanese employs different morphology according to the grammatical target of honorific meaning.

(5)   Subject Honorification
       Sensei-ga   seito-o   o-tasuke-ninat-ta.
       teacher-nom   student-acc hon-help-become-pst
       At-issue: The teacher helped the student.
       Expressive: The speaker honors the teacher.

(6)   Object Honorification
       Seito-ga   sensei-o   o-tasuke-si-ta.
       student-nom   teacher-acc hon-help-do-pst
       At-issue: The student helped the teacher.
       Expressive: The speaker honors the teacher.

Subject honorification in (5) takes a grammatical subject as its honorific target and is used to display the speaker's respectful attitude toward a subject. Object honorification in (6), on the other hand, expresses a sense of respect for an object referent and shows the speaker's humbleness toward a discourse participant.

Subject honorification is one well-known diagnostic for subjecthood in Japanese (Harada 1976). Since it has the property that some semantic feature of a nominal is reflected on the verbal morphology, it has been regarded as an instance of syntactic agreement between a subject and some functional head (see Toribio 1990, Kishimoto 2000, Ura 2000). However, the previous syntactic analyses of subject honorification cannot be extended to object honorification, since they have relied exclusively on the syntactic hierarchy between a subject and an object, despite the tacit understanding that *tasukeru* "help" in (5) and (6) should project the same syntactic structure. One attempt to unify the subject and object honorification syntactically is Boeckx and Niinuma (2004), who argue that the two types of honorification are associated with different functional heads in the syntax, but they still offer no solution for the relationship between the semantics of honorific predicates and their verbal morphology (cf. Bobaljik and Yatsushiro 2006).

In this paper, we will pursue a lexico-semantic analysis that can capture both the detailed semantic interpretation of Japanese honorific expressions and their semantics-morphology association. In our analysis, both subject honorification and object honorification can be treated uniformly under the same lexical semantic system, and the

source of honorific meanings can be explained in terms of honorific affixes that attach to a verb.

3 Potts and Kawahara (2004)

In this section, we discuss one of the most detailed semantic analyses of honorification in the literature, namely Potts and Kawahara (P&K henceforth). One characteristics of P&K analysis is that honorification is treated as introducing expressive content. Japanese honorificaiton satisfies the following properties of expressives identified in Potts (2005, 2007).

(7) a. Independence
b. Immediacy
c. Descriptive ineffability

First, at-issue meanings and expressive meanings are independent of each other and do not interact. In this way, they are like presuppositions in that they are immune from denial:

(8) Adamu-ga   o-warai-ninara-nakat-ta
Adam-nom   hon-laugh-become-neg-pst
At-issue: Adam did not laugh.
Expressive: The speaker honors Adam.

The negation on the verb denies the at-issue meaning but the sentence as a whole still has the same expressive meaning as its positive counterpart.

Secondly, expressive are like performatives in that the act of uttering the relevant word or phrase is the act of conveying its content. Thus just like denying the content of a performative after uttering the performative sentence is infelicitous, the following continuation does not sound felicitous, either.

(9) Adamu-ga   o-warai-ninat-ta
Adam-nom   hon-laugh-become-pst

  # sikasi watasi-wa   Adam-ni   keii-o   harau-tomori-wa   nai
  but   I-top   Adam-dat   respect-acc show-intend-top   neg
  'But I don't mean to show respect towards him'

Lastly, like other expressives, the exact meanings of honorific expressions are difficult to identify as there are no obvious paraphrases. So far, we have been glossing the expressive meaning of subject honorification as 'the speaker honors x', but we have not been specific as to what it means to 'honor'. In fact, there are many different situations in which honorific expressions are used. Those situations may include cases in which it is obvious that the speaker does not honor the relevant individual but s/he feels obliged to

use honorific expressions due to social circumstances. (See Kikuchi 1997 for detailed descriptions.) In this paper we take up this view and treat honorifics as expressives.

Now let us go into the formal semantic details of P&K analysis. They assume a new semantic type ε for expressives, in addition to the regular basic semantic type e for individuals and t for propositions. The expressive type denotes relations between two individuals and attitudes. Formally, the domain of the expressive type ε is the set of all triples *arb*, where *a* and *b* are individuals and *r* is a member of the set of intervals representing emotive attitudes, defined as subintervals of the real numbers in the interval [−1, 1].

For instance, the semantics of the subject honorific morpheme is given below:

(10) $\llbracket SH \rrbracket = \lambda x. \, s[0.8, 1]x$

This morpheme is of the type <e, ε>. It takes an individual argument and yields that the speaker of the sentence has a highly positive emotive attitude toward the relevant individual.[3]

Functional types are constructed in a usual manner as <σ, τ> for any regular types σ and τ. We also have a functional expressive type <σ, ε> for any regular type σ. When we have expressions of regular types alone, semantic composition goes via functional application. When we have an expression of type ε, we need a new semantic rule.

(11) If α is a branching node whose daughters are β and γ, where $\llbracket \beta \rrbracket$ is of a functional expressive type whose domain contains $\llbracket \gamma \rrbracket$, then $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket(\llbracket \gamma \rrbracket)$ • $\llbracket \gamma \rrbracket$.

According to the rule, the argument of an expressive function is used in two-dimensional way; in one dimension the functor applies to the argument just like regular functional application whereas in the other dimension it simply passes the argument up to the next level. The symbol • is used to show that the node has a two-dimensional meaning.

Here's a sample syntactic tree and its semantic derivation:

(12) a. Adamu-ga   o-warai-ninat-ta
          Adam-nom   hon-laugh-become-pst

      b.   laugh(adam) : t

         SH(adam): ε • adam: e   laugh: <e,t>

         SH: <e, ε>   adam: e

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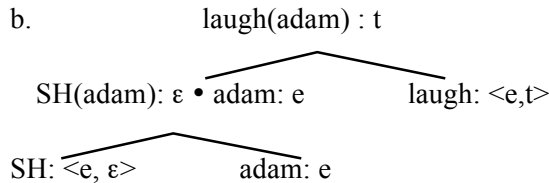
[3] We suspect that this is not quite right in that emotivity and honorification are distinct; one can have a negative emotive attitude toward some individual while at the same time honors (or speak as if s/he honors) the same individual. We put aside this difference here; see Asher and McCready (2013) and McCready (2014) for proposals.

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From this tree, we interpret the top most node of regular type and any node of expressive type. What we get is the at-issue meaning saying that Adam laughed and the expressive meaning that the speaker of this sentence honors Adam.

We seem to correctly derive both at-issue and the expressive meanings. But notice that the honorifics morpheme *o…ninar(u)* is attached to the verb in the Japanese example whereas in the tree provided in P&K system it is placed adjacent to the subject. That is, the semantic mechanism crucially relies on the placement of the honorific morphemes, which does not seem to have obvious motivation from their apparent placements. We may say that the honorific morphology introduces its semantic content distinct from its surface form. But this means that the parsetree construction is driven by the needs of the composition mechanism, resulting in an undesirable dependence.

This problem alone might be avoided by introducing the ♦ operator of McCready (2010), which conjoins at-issue and expressive meanings. McCready shows that some lexical expressions introduce both at-issue and expressive meanings at the same time. Japanese honorific verb *irassyar(u)* is one such case.

(13)   Adamu-ga   irassyat-ta
       Adam-nom   come.hon-pst
       At issue: Adam came.
       Expressive: The speaker honors Adam.

The verb consists of one morpheme, unlike the example *o-warai-ninar(u)* above, and has both at-issue meaning corresponding to *come* and the same subject honorific meaning as *o…ninar(u)*. Using the ♦ operator, we can write its semantics as follows:

(14) $[\![irassyar-]\!] = \lambda x.$ x comes ♦ $\lambda x.$ s[0.8, 1]x

Applying this mechanism compositionally, we say that *o-warai-ninar-* introduces both at-issue and expressive meanings as shown below:

(15)   a. $[\![wara-]\!] = \lambda x.$ x laughs: <e, t>
       b. $[\![o…ninar]\!] = \lambda x.$ s[0.8, 1]x: <e, ε>
       c. $[\![o-warai-ninar-]\!] = \lambda x.$ x laughs ♦ $\lambda x.$ s[0.8, 1]x

However, the problem is more general in that the solution presented above does not directly apply to other cases. Consider the following examples:

(16)   a. sensei-ga   ringo-o   mesiasat-ta
           teacher-nom   apple-acc   eat.hon-pst
       b. sensei-ga   ringo-o   tabe-rare-ta
           teacher-nom   apple-acc   eat-hon-pst
           At-issue: The teacher ate the apple.
           Expressive: The speaker honors the teacher.

If we stick to the original P&K system, the subject honorific morpheme *SH* should be adjacent to the subject, skipping the object, in order to derive the desired expressive meaning. Otherwise we end up expressing that the speaker honors the apple.

The McCreadian solution above does not quite work either: The first denotation wrongly predicts that the speaker honors the apple and the second denotation contains a vacuous quantification.

(17) a. ⟦*mesiagar-*⟧ = λx. λy. y eats x ♦ λx. s[0.8, 1]x
      b. ⟦*mesiagar-*⟧ = λx. λy. y eats x ♦ λx. λy. s[0.8, 1]y

The second way also poses another problem for independent honorific morphemes. We need distinct items for different verb types:

(18) a. ⟦*o…ninar*⟧ = λx. s[0.8, 1]x: <e, ε>   intransitive
      b. ⟦*o…ninar*⟧ = λx. λy. s[0.8, 1]y: <e, <e, ε>>   transitive
      c. ⟦*o…ninar*⟧ = λx. λy. λ.z. s[0.8, 1]z: <e, <e, <e, ε>> >   ditransitive

To sum up, we have seen morpho-semantic discrepancies in P&K system. Many honorific morphemes are verbal morphology in Japanese but P&K system semantically requires honorific morphemes to be adjacent to the honored arguments.

4   Honorifics in Glue

As we showed in the last section, subject and object honorifics raise difficulties for the proposal of P&K, which cannot analyze them without resorting to otherwise unmotivated movement or other mechanisms. In this section, we will present a solution to this problem, which extends the P&K analysis in a way which eliminates the problem. In particular, we will propose the use of LFG-based glue semantics to correctly select the argument targeted by the honorific.[4]

Lexical-Functional Grammar is a grammar formalism making use of grammatical roles in linguistic analysis (Bresnan 2001; Dalrymple 2001). In particular, it involves roles as SUBJ for subjects, OBJ for objects, etc.; these roles are introduced in the syntactic structure (*constituency structure* or c-structure) via the labeling of argument positions, or, in some languages, lexical items, where grammatical roles can be recovered via case marking. Note that other information than grammatical roles can also be represented, for instance when a particular phrase is an adjunct; given a labelled c-structure and lexical

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[4] We are not the first to make use of LFG for the analysis of honorifics. Arka (2005) also proposes doing so, but uses a different approach in general, mostly because he is not directly concerned with compositional semantics in the way that we are. Also, the domain of inquiry of his paper is the system of Balinese honorifics, which appears to involve the expression of social hierarchies and the membership in social classes of discourse participants, rather than the honorification of sentential arguments. Arka also does not consider the detailed semantic analysis of honorification, restricting himself to syntax and pragmatics.

items, feature unification yields representation of predicational dependencies *functional structures* or f-structures). In LFG, semantic composition is defined at the f-structural level. As a result, the composition of arguments is directly determined by grammatical roles rather than being purely structurally based as in standard formulations of compositional semantics (e.g. Heim and Kratzer 1998). This means that considerations of syntactic locality need not play a role in the analysis, which gives a clear path toward a full analysis of honorific composition.

   Before turning to our analysis, let us make the above discussion more precise.

(19)   David yawned.

This sentence has the following c-structure (at least for the purposes of illustration):

$$
\begin{array}{c}
\text{S} \\
\diagup \qquad \diagdown \\
\text{NP} \qquad\qquad \text{VP} \\
\uparrow\text{SUBJ}=\downarrow \qquad\qquad | \\
| \qquad\qquad\qquad \text{V} \\
\text{N} \qquad\qquad\qquad | \\
| \qquad\qquad\qquad \text{slept} \\
\text{David} \qquad \uparrow\text{PRED= 'YAWN<SUBJ>'} \\
(\uparrow\text{PRED= 'DAVID')}
\end{array}
$$
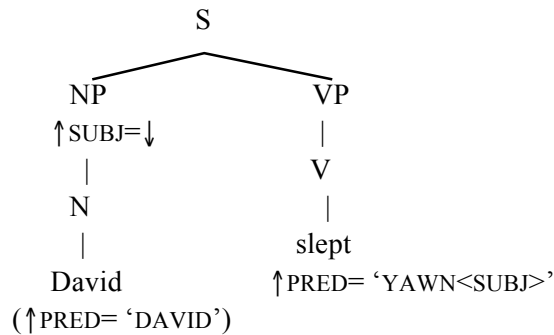
This c-structure, after unification of all labelled elements, resolves to the f-structure in (20).

(20) $\begin{bmatrix} \text{SUBJ} & [\text{PRED} \quad \text{'DAVID'}] \\ \text{PRED} & \text{'SLEPT<SUBJ>'} \end{bmatrix}$

Let us now examine the semantics for this example. Semantic composition is generally done in LFG using the so-called *glue semantics*, which is defined over f-structures. The glue semantics makes crucial use of the Curry-Howard isomorphism, which shows the relationship between logical derivation and convergence in the λ-calculus.[5] Exploiting this observation allows the use of lexical entries of the form *Meaning:Composer*, where *Meaning* is a λ-calculus term and *Composer* is an expression in the multiplicative fragment of linear logic (Girard 1987), the fragment containing only linear conjunction and implication. This last is the key bit: linear implications of the form a −○ b, defined as a |= b, consume *a*-type expressions to give *b*-type expressions, and so directly model the kind of resource sensitivity that is a key element of natural language semantics (cf. the discussion of the Θ-criterion in chapter 3 of Heim and Kratzer 1998).

   To provide a semantics for this sentence, there are two steps. We must first retrieve

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[5] See Sørensen and Urzyczyn (2006) for extensive discussion, and Dalrymple (2001) for the application to LFG.

lexical entries for the expressions used in the sentence. The glue strategy gives lexical entries like the following for the expressions used in (19). According to this, 'David' denotes a "conjunction" of the individual David (or his correspondent in a formal model) and a term of type *e*, and 'slept' denotes the usual λ-term paired with a linear implication which maps the term corresponding to the subject in the f-structure to the sentence denotation. This last element is a glue semantics correspondent to a term of type <e, t>, given that subjects are *e*-typed.

(21) a. $[\![David]\!]$ = David: $d_{\sigma<e>}$
      b. $[\![slept]\!]$ = λx.slept(x): $(\uparrow \text{SUBJ})_\sigma \multimap \uparrow_\sigma$

The second step is to replace objects like $(\uparrow \text{SUBJ})_\sigma$ with instantiations, giving meaning constructors. This object refers to the subject of the sentence, and so we can consult the f-structure to see what that subject is: thus we replace $(\uparrow \text{SUBJ})_\sigma$ by d_σ, the meaning of 'David', and $\uparrow_\sigma$ by S_σ, the meaning of the top node of the sentence. After 'consumption' of d_σ, the meaning resource denoted by 'David', and using the Curry-Howard isomorphism, we arrive at *slept(d)*, the sentence denotation, as desired.[6]

Let us now turn to an example of a transitive sentence, which will give a closer approximation to the honorifics which are our focus here. Consider (22) and its c-structure below.

(22) Zach attacked Jack
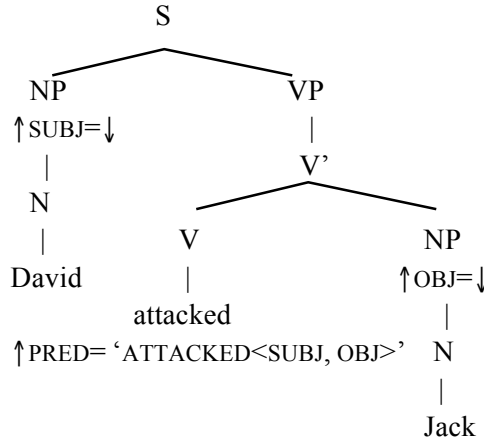
Unification yields the f-structure in (23).

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[6] Note that this derivation and discussion are slightly simplified; full details can be found in Dalrymple (2001).

(23)
$$\begin{bmatrix} \text{PRED} & \text{`ATTACK<SUBJ, OBJ>'} \\ \text{SUBJ} & [\text{PRED} \quad \text{`ZACK'}] \\ \text{OBJ} & [\text{PRED} \quad \text{`JACK'}] \end{bmatrix}$$

The meaning constructors for (22) are more complex than those for (19), as is to be expected. They are arrived at in the same way as above: lexical entries are retrieved, and then meaning constructors are produced from them by carrying out the appropriate substitutions. After this process, we arrive at the meaning constructors in (24).

(24)
Zack: z_σ
Jack: j_σ
$\lambda x \lambda y.\ \text{select}(x, y): z_\sigma \multimap [j_\sigma \multimap S_\sigma]$

The derivation of S_σ from these meaning constructors goes as follows.

(25)

$$\cfrac{j_\sigma \qquad \cfrac{z_\sigma,\ z_\sigma \multimap [j_\sigma \multimap S_\sigma]}{j_\sigma \multimap S_\sigma}}{S_\sigma}$$

To a first approximation, it is clear how to apply this theory to honorifics. Plainly it is necessary to distinguish subject and object honorifics, and to let the honorific predicate modify its argument at a distance. But this is extremely simple in the present setting. We can simply let each type of honorific select for a different argument directly in its denotation, as expressed in the meaning constructors (before substitution with particular instantiations of the relevant arguments). On this picture, object honorifics introduce meanings of the form (26), where the element taking on the OBJECT role is selected, and subject honorifics introduce meanings of the form (27), where the SUBJECT is selected. This is entirely straightforward.

(26) $[\![OBJ\text{ - }Hon]\!] = \lambda x.\ \text{hon}(s, x): (\uparrow \text{OBJ})_\sigma \multimap S_\sigma$
(27) $[\![SUBJ\text{ - }Hon]\!] = \lambda x.\ \text{hon}(s, x): (\uparrow \text{SUBJ})_\sigma \multimap S_\sigma$

However, we have argued that honorifics introduce expressive meanings (together with much of the literature, as we mentioned). This aspect of the interpretation of honorifics is not reflected in (26) or (27). We will deal with this aspect of the interpretation by assuming that the existence of a set-valued feature EXP (for 'expressive content') in f-structures, to which honorific morphology will introduce its content (along with other terms which carry expressive content).[7] To see the result of this move, consider the

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[7] The 'expressive feature' itself is not strictly speaking required; as the content of expressives is never the main predication of a sentence, that content is in fact a type of adjunct, and so one could simply put it in the more standard LFG feature ADJ(unct) (also set-valued) and distinguish the

examples (5) and (6) repeated here.

(28) Sensei-ga   seito-o   o-tasuke-ninat-ta.
     teacher-nom   student-acc   hon-help-become-pst
     At issue: The teacher helped the student.
     Expressive: The speaker honors the teacher.

(29) Seito-ga   sensei-o   o-tasuke-si-ta.
     student-nom   teacher-acc   hon-help-do-pst
     At issue: The student helped the teacher.
     Expressive: The speaker honors the teacher.

The f-structure corresponding to the above two examples are as follows, given the use of EXP.

(30)
$$\begin{bmatrix} \text{PRED} & \text{'HELP<SUBJ, OBJ>'} \\ \text{SUBJ} & [\text{PRED} \quad \text{'TEACHER'}] \\ \text{OBJ} & [\text{PRED} \quad \text{'STUDENT'}] \\ \text{EXP} & \{[\text{PRED} \quad \text{HON<SP, SUBJ>}]\} \end{bmatrix} \begin{bmatrix} \text{PRED} & \text{'HELP<SUBJ, OBJ>'} \\ \text{SUBJ} & [\text{PRED} \quad \text{'STUDENT'}] \\ \text{OBJ} & [\text{PRED} \quad \text{'TEACHER'}] \\ \text{EXP} & \{[\text{PRED} \quad \text{HON<SP, SUBJ>}]\} \end{bmatrix}$$

Our next task is to provide an interpretation for the expressive items within glue semantics. The classical theory is that of Potts (2005), who proposes a system of types which lack the property of resource-sensitivity: in this theory, the result of combining a functional type of the 'expressive' sort of the form $<\sigma, \tau^\epsilon>$ with an input of the correct type σ returns both the result of applying the relevant function and the input in an unchanged form, so for the present case, σ and τ^ϵ. Clearly, this is needed for honorifics, as we need the subject/object argument to play roles both in honorific and in predication. However, this non-resource-sensitivity is not obviously compatible with linear implication, which is resource-sensitive, as discussed above. A system which allows the duplication of resources in glue semantics is required.

Fortunately, a proposal which we can adopt already exists in the literature. Arnold and Sadler (2010) propose that expressive meaning constructors have the general form r $\multimap$ (r⊗c) for input resource r and expressive content c. (Here '⊗' is the linear logic multiplicative conjunctor.) Meaning constructors of this kind take a resource r and map it to a pair of objects: the result of application c and the initial input r, so the desired resource-insensitivity is built into the meaning constructors for expressive objects. This proposal follows a suggestion by Potts (2005:85-87).[8]

This idea can be implemented for the honorific case as in (31) and (32).

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expressive content by its semantics. This is the strategy followed by e.g. Arnold and Sadler (2010). We use EXP strictly for perspicuity.

[8] This approach is not the only possible option even in an LFG setting, eg. the monadic approach of Giorgolo and Asudeh (2012).

(31)　〚*OBJ - Hon*〛 = λx. hon(s, x): $(\uparrow OBJ)_\sigma \multimap ((\uparrow OBJ)_\sigma \otimes CI_\sigma)$

(32)　〚*SUBJ - Hon*〛 = λx. hon(s, x): $(\uparrow SUBJ)_\sigma \multimap ((\uparrow SUBJ)_\sigma \otimes CI_\sigma)$

These lexical entries will enter into derivations in the obvious way. We exemplify them with (28) and (29). For (28), the derivation is as follows. The first step (in the upper right of this derivation) is the key one in which the subject argument *sensei* combines with the honorific. The honorific is 'looking for' the term corresponding to the syntactic object which has the SUBJ role in the f-structure; when this is found, it is consumed by the honorific, yielding *teacher*: $t_\sigma \otimes hon(sp, teacher): CI_\sigma$. By the elimination rule for multiplicative conjunction, the expressive part is put aside, leaving only *teacher*: t_σ, which can then be input to the rest of the derivation much as with the simple transitive sentence we saw above.

(33)

$$\text{teacher: } t_\sigma \quad \lambda x\,hon(sp, x): \otimes hon(sp, x): t_\sigma \multimap (t_\sigma \multimap CI_\sigma)$$

$$\text{Elim}_\otimes \frac{\text{teacher: } t_\sigma \otimes hon(sp, teacher): CI_\sigma}{}$$

$$\frac{\lambda x\lambda y.help(x, y): t_\sigma \multimap (s_\sigma \multimap S_\sigma) \qquad \text{teacher: } t_\sigma}{}$$

$$\frac{\text{student: } s_\sigma \qquad \lambda x.help(teacher, y): (s_\sigma \multimap S_\sigma)}{}$$

$$help(teacher, student): S_\sigma$$

The derivation of (29) is similar in every respect, except that the argument targeted by the honorific morphology is now that occupying the OBJ role rather than the SUBJ.

(34)

$$\text{teacher: } t_\sigma \qquad \lambda x\,hon(sp, x): \otimes hon(sp, x): t_\sigma \multimap (t_\sigma \multimap CI_\sigma)$$

$$\text{Elim}_\otimes \frac{\text{teacher: } t_\sigma \otimes hon(sp, teacher): CI_\sigma}{\text{teacher: } t_\sigma} \quad \frac{\lambda x\lambda y.help(x, y): s_\sigma \multimap (t_\sigma \multimap S_\sigma) \quad \text{student: } s_\sigma}{\lambda x.help(student, y): (t_\sigma \multimap S_\sigma)}$$

$$help(student, teacher): S_\sigma$$

The only remaining complication is that the expressive content (of meaning constructor type CI_σ must be collected from these derivations to be interpreted, in order to ensure that it exhibits the usual properties of expressivity such as scopelessness (cf. Potts 2007). This can be done in a way precisely analogous to the proposals of Potts (2005) and McCready (2010), who take expressive content to be placed in a separate dimension of meaning on the basis of its type. In the present setting, this can be done by taking all content labeled with a meaning constructor of the form CI_σ from the derivation and assembling it in a separate dimension.[9]

We should discuss one final case, that of suppletive honorific forms. Japanese has a fairly large number of such forms (see Kikuchi 1997), which have already received some

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[9] For some worries about compositionality that arise with this approach, see Gutzmann (2012).

attention in the literature on expressive content (e.g. McCready 2010). Such expressions are easily modeled in the present system—in fact, they can be modeled here much more easily than in McCready's (2010) variant of the Potts (2005) system. The reliance of the latter system on type construction means that modifying the system to account for new forms requires heavy work in the foundations of the theory, which tends to have repercussions throughout the system (see McCready 2010, Gutzmann 2012 for exemplars of the complications that can result). However, the present system, with its reliance on object-level operations, makes it easy to add new forms. We exemplify with the suppletive honorific *irasshar-* 'hon + come'. The lexical entry for this form given in (35) differs from those in (31) and (32) in two ways. First, on the semantic side, it introduces two predications: one of the property of coming, and the second of the property of being honored by the speaker. These two predications are conjoined by the metalogical operator '♦' adopted from McCready (2010). The existence of these two predications is reflected in the meaning constructor by no longer returning the input unchanged (on the left-hand side of the $\otimes$ conjunctor, but instead letting the constructor return a sentence denotation.

(35) $[\![irassyar\text{-}]\!] = \lambda x.\ come(x) \blacklozenge \lambda x.\ hon(s, x): (\uparrow SUBJ)_\sigma \multimap (S_\sigma \otimes CI_\sigma)$

We must assume the existence of the elimination operator for terms conjoined by ♦ given in (37), which says that the right-hand sides of ♦-terms can be eliminated if they correspond to meaning constructors of the sort CI_σ.[10]

(36) sensei-ga   irassyat-ta
      teacher-nom   come.hon-pst
      At-issue: The teacher came.
      Expressive: The speaker honors the teacher.

(37) Elim$_\blacklozenge$
      $\alpha \blacklozenge \beta: \gamma \otimes CI_\sigma \vdash_{Elim_\blacklozenge} \alpha : \gamma$

Given these assumptions, the derivation of (36) will go as follows (where it is assumed that the subject is already resolved, as above).

(38)

$$\dfrac{\dfrac{teacher: t_\sigma \qquad \lambda x.\ come(x) \blacklozenge \lambda x.\ hon(s, x):\ t_\sigma \multimap (S_\sigma \otimes CI_\sigma)}{come(teacher) \blacklozenge \lambda x.\ hon(s,teacher): S_\sigma \otimes CI_\sigma}}{come(teacher): S_\sigma} \text{Elim}_\blacklozenge$$

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[10] This corresponds to the process proposed by McCready (2010) of transforming ♦-conjunctions to •-conjunctions, which can then be eliminated via the standard Pottsian rules.

5 Conclusion

In this paper, we have provided a general system capable of analyzing honorific composition without recourse to 'patches' such as semantically motivated movement operations. This system extends the analysis of P&K, which is a popular and intuitive view, but which is not able to cover the full range of honorific data without additional stipulations. We made use of the glue semantics for LFG, and in particular the extension to conventional implicature and expressives proposed by Arnold and Sadler (2010), to overcome the adjacency problem faced by P&K. All in all, we take this proposal to be satisfactory; the combination of LFG and resource duplication gives the desired result.

However, we cannot claim to have solved all difficulties associated with honorific composition. Let us briefly mention two in this final section. The first involves quantification, and the second the specific details of the present approach.

The question of how expressive content interacts with quantification is a fraught one. Potts 2005 treated expressive content like honorifics on par with the conventional implicatures (claimed to be) introduced by appositive constructions. However, quantificational appositives in general cannot be anchors for appositives.

> (39) a.   A small child, who was carrying a very large ice cream cone, was standing on the platform.
> b. * Every small child, who was carrying a very large ice cream cone, was standing on the platform.

On this basis, Potts built into his logic what amounts to a prohibition against quantificational anchors, i.e. those which cannot be viewed as denoting individuals. But it is easily possible to quantify over clearly expressive content like that of honorifics or pejoratives, as in (40).

> (40)   Dono-kyooju-mo   ringo-o   o-tabe-ni-nat-ta
>   every-professor-Q apple-acc   hon-eat-become-pst
>   At-issue: 'Every professor ate an apple'
>   Experssive: 'The speaker respects all the professors'

Such examples cannot be analyzed in the P&K system, assuming that certain properties of the system of Potts (2005) also hold for ε-types, namely that there are no ε-typed inputs and that abstraction over them is not available. In order to remedy this situation, a way to quantify over expressive content is required; a method for doing so has been proposed by Gutzmann (2012), but not specifically for the honorific case, and certainly not within glue semantics (much less LFG). The project of modifying the current system to account for quantification is an interesting one, but one we will have to leave for future work.

The second issue is a more fundamental one. For the present proposal, the use of grammatical roles is crucial, which we suspect is likely to be controversial. If one does

not accept the use of grammatical roles as theoretically primitive entities in syntax and semantics, one is unlikely to endorse the present proposal; it might even be asked whether it is compositional, in the sense that the way in which meanings are composed does not depend on the surface form of sentences.[11] In general, a strength of doing semantics in the LFG system is that it is easy to model nonlocal phenomena, but this is also a weakness in that it is relatively difficult to constrain the mapping from structure to meaning. One lesson that can be drawn from the present proposal is that the modeling of honorific composition requires a way to reference and select nonlocal elements from the pool of possible arguments.   It remains to be seen which of the possible ways in which this process can be modeled will turn out to be the most desirable from a theoretical perspective.[12]

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[11] This issue is one that arises elsewhere in the application of glue semantics for LFG, for example in the modeling of intervention effects, which crucially involve intervention in the c-structural component.

[12] Watanabe et al. (2014) give a proposal set within a different model of the syntax-semantics interface, in which honorifics select their arguments in a much less direct way than in the current proposal. A full comparison must be left for future work.

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Unifying the semantics of class terms and classifiers in Vietnamese

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1 Introduction

Vietnamese utilizes numeral classifiers in order to combine nouns with numerals, a phenomenon widespread in the region among different language families of East and Southeast Asia. It is well known that that in these languages, classifiers are often obligatory for the purposes of counting nouns, as is shown in (1).[1]

(1) a. tám *(con)   chó
        eight CLF:ANIM dog
        'eight dogs'
     b. hai *(cuốn)   sách
        two CLF:VOLUME book
        'two books'

     c. bốn *(trái)   cam
        four CLF:FRUIT orange
        'four oranges'
     d. bảy *(cây)   dù
        seven CLF:LONG-SKINNY umbrella
        'seven umbrellas'

The examples in (1) also demonstrate that classifiers categorize nouns along various abstract semantic criteria, which can vary, but most often involve animacy, shape, size, and structure (Aikhenvald, 2000), though also function and social status (Denny, 1976). In other words, numeral classifier systems demonstrate an interaction between the syntax and the specific lexical semantics of the words involved. Being able to syntactically combine with numerals appears to be connected to not only the individuating functional semantics of classifiers, but also their lexical non-logical meaning (Roberts, 2010) that is sensitive to the semantic qualities of nouns.

Class term compounds complicate the matter by having mixed properties of both nouns and classifier phrases. Many are directly countable, which, assuming that class term compounds are compound nouns, runs counter to the generalization that nouns always require classifiers for the purposes of counting. Consider the following examples, where a numeral appears to be combining directly with a (compound) noun (highlighted in bold), with no classifier intervening in the canonical position:

(2) a. mười **nhà   thương**
        ten   house injured
        'ten hospitals'
     b. ba   **phòng khách**
        three room   guest
        'three living rooms'

     c. năm **bàn cờ**
        five table chess
        'five chessboards'
     d. chín **cây chuối**
        nine tree banana
        'nine banana trees'

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[1]Abbreviations used: CLF:(PROPERTY): classifier with semantic property specified (where no property is listed, I make no commitments to the semantic properties of the classifier); CT: class term; ANIM: animate; (IN)DEF: (in)definite; GEN: generic
Compounds in examples are listed in boldface

Some compounds are capable of taking optional classifiers:

(3) a. ba   (chiếc) **máy   bay**   b. sáu (người) **thợ   may**
         three CLF:UNIT machine fly   six CLF:PERSON worker sew
         'three airplanes'   'six tailors'

While this makes class term compounds appear like classifier phrases, they share other properties with bare nouns, such as being underspecified for number.

(4) a. chó   b. con   chó
         dog   CLF:ANIM dog
         'dog(s)'   'a/the dog(*s)'

(5) **cây chuối**
     tree banana
     'banana tree(s)'

In (4), the bare noun *chó* is underspecified for number, denoting both singular and plural sets (as well as having kind/generic interpretations); however the addition of the classifier *con* restricts the denotation of the resulting ClfP to singular sets of atomic dogs. (5) shows that class term compounds behave like bare nouns in this regard.

This variability in classifier omission for compounds seems to hint at a type of language change in Vietnamese where nouns participating in compound derivation are at least partially reanalyzed as classifiers – if not entirely so. DeLancey (1986) provides an analogous diachronic account of compounding in Thai, where he shows that class terms are a major source in the development of new classifiers. I propose that DeLancey's theory of class terms being a source of classifier emergence, which I return to later, also applies to Vietnamese, providing evidence in §3. If this is the case, it is not surprising that class terms show mixed properties of both bare nouns and classifiers. Employing the grammaticalization theory of von Fintel (1995), this occurs by composing in the functional meaning of a classifier – individuation, or access to sets of atomic individuals – into the meaning of the class term in compounds. In other words, as class terms are proto-classifiers, we expect them to share the same semantic function of individuation.

However, if this is the case, then no theory where classifiers enable the individuation or provide the unit of measure for the nominal complement is sufficient. For example, for Chierchia (1998) classifiers form a constituent with the NP in order to convert the kind denotations of nouns into atomic sets so that combination with numerals can occur; Krifka (1995) proposes that classifiers provide a specific measure function, but that they form a constituent with the numeral in order to combine with atomic nominal predicates. What these styles of analyses share is that they treat the entities being counted as being within the denotation of the noun, with the classifier providing the appropriate semantic function to allow composition of the numeral with the noun.

The problem with this view is two-fold given the class term compound data: first, not all class term compounds that can combine directly with numerals involve a nominal modifier. In *máy bay*, 'airplane' (lit. 'machine fly'), *bay* is a verb meaning 'fly'. If we expect that classifiers and class terms either create or access atomic sets of their nominal complements, it is unclear what (non-)atomicity looks like for verb denotations. This leads to the second, major problem with the traditional view of classifiers: what is being counted is not the

atoms in the noun, but rather atoms of what the entire compound denotes. This can be seen in (2d), where what is being counted is not bananas, but trees – specifically banana trees.

In this paper, I argue that what is being counted in Vietnamese numeral phrases is always the individuals denoted by the entire ClfP or class term compound, rather than just the (non-)nominal second element following the classifier/class term. As noted by Thompson (1965), both constructions share a head-modifier relationship. It is this modifier role that is performed by the second element of ClfPs and class term compounds: the head and modifier are combined via the Compound Relator function that takes the set denoted by the Clf/class term and returns a new selective subset. It is the entities in the denotation of this new selective subset that are being counted in numeral phrases.

The remainder of this paper is organized as follows: I provide more background on class terms and class term compounds in §2. Specifically, I demonstrate that these types of compounds have mixed properties of both bare nouns and classifier phrases, with the class term head apparently taking on classifier properties. In §3, I argue that these mixed properties are in fact not surprising if class terms are an intermediary stage of noun to classifier grammaticalization. DeLancey (1986) proposes such a grammaticalization trajectory for Thai, and I provide evidence showing that this trajectory extends to Vietnamese as well. Given that classifiers and class terms are semantically connected via grammaticalization, I provide an analysis in §4 that unifies their semantics: crucially, I show that unlike previous analyses of classifiers, the entities being counted are in the denotation of the ClfP or class term compound as a whole, rather than simply their second elements. This is done via the Compound Relator function, which takes the head and modifier as inputs and returns a new set that is a selective subset of the head. I summarize in §5.

2   Class terms

Vietnamese is traditionally considered to be a highly isolating language with little to no morphology other than compounding, which is a highly productive process in the language. One major source of compounding involves the usage of class terms. Class terms are nouns used as (semantic) heads in compounding, where they are phonologically dependent and lexically obligatory (Enfield, 2004). Thompson (1965) calls these constructions in Vietnamese pseudo-compounds, defining them as "morpheme sequences with two immediate constituents at least one of which is bound" (p. 133). Consider the following examples:

(6)   xe, 'vehicle/car'
    a.   **xe đạp**, 'bicycle' (lit. 'vehicle step')
    b.   **xe điện**, 'tram' (lit. 'vehicle electricity')
    c.   **xe lửa**, 'train' (lit. 'vehicle fire')
    d.   **xe tăng**, 'tank' (lit. 'vehicle tank')

(7)   máy, 'machine'
    a.   **máy bay**, 'airplane' (lit. 'machine fly')
    b.   **máy lạnh**, 'air conditioner' (lit. 'machine cold')
    c.   **máy giặt**, 'washer' (lit. 'machine wash')
    d.   **máy chữ**, 'typewriter' (lit. 'machine grapheme')

One thing that becomes apparent is that the meaning of the class term compound, while being potentially idiomatic, is not entirely unpredictable. The entities that a class term compound denotes are always some subkind of whatever the class term denotes. Put another

way, the meaning of class terms have a taxonomic relation to the meaning of the compounds they derive: for example, Enfield (2004) shows the high level of productivity of class term compounding in Lao for referents in the natural domain, where one might intuitively expect taxonomic relationships.

Sometimes in Vietnamese this taxonomic relationship appears to be divided:

(8) bánh, 'cake'
    a. **bánh chưng**, 'rice cake' (lit. 'cake stew')
    b. **bánh bao**, 'steamed bun' (lit. 'cake bag')
    c. **bánh mì**, 'bread' (lit. 'cake wheat')
    d. **bánh phở**, 'rice noodles' (lit. 'cake phở')
    e. **bánh xe**, 'wheel' (lit. 'cake vehicle')
    f. **bánh răng**, 'cog' (lit. 'cake teeth')

In the examples in (8), there is some relevant relation between each compound to the meaning 'cake', whether it has something to do with being food of some (semi-)regular consistency, such as *bánh mì*, 'bread', or being a round object, such as *bánh răng*, 'cog'. However, it seems that the relevant relation with the class term is inconsistent, as bread is not necessarily round and cogs are not food. These relations are discussed further in §4.2.

Class term compounds often have mixed properties of both bare nouns and classifier phrases (ClfPs). Kirby (2006) shows that bare classifier phrases have restricted interpretations compared to bare NPs, as can be seen in the reproduced table below:

(9)

	Bare NP	[Clf+N] (ClfP)	[Num+Clf+N] (NumP)
Definiteness	Indef/Def/Gen	Indef/Def	Indef
Number	Sg/Pl	Sg	–

The table in (9) shows that bare NPs allow the largest range of possible interpretations: they can give rise to indefinite, definite and generic/kind readings, as well as being underspecified for number. On the other hand, bare ClfPs cannot give rise to generic/kind level readings, while also being restricted in meaning to singular entities.

This correlation between syntactic structure and possible semantic interpretation provides some diagnostics for determining whether a class term compound is a bare NP or a ClfP. In addition to these diagnostics, I also consider data dealing with coordination and NP-Ellipsis to determine the categorical status of class term compounds; in the end, they demonstrate mixed properties of both bare NPs and ClfPs, as summed in the table below:

(10) Mixed-properties of class term compounds

NP-like	ClfP-like
generic interpretation	(directly countable)
underspecified for number	(NP-Ellipsis)
no coordination of complements	

Class term compounds always have the NP-like properties: allowing generic/kind level interpretations and being underspecified for number. Additionally, class terms do not allow coordination of their second element, which is not a property of NPs per se, but is one that is expected if they were truly clasifiers; because it provides evidence that class term compounds are not ClfPs, I put this property of non-coordination within the list of NP-like properties.

The ClfP properties include direct countability, which I take to mean appearing adjacent to an overt numeral with no intervening element, and NP-Ellipsis. Class term compounds occassionally have these properties, which is the central puzzle of this paper, though not all of them do. I argue that this is because class term compounds are actually all underlyingly bare NPs, with the classifier-like properties of class terms are the result of grammaticalization.

The following subsections provide explicit data for the mixed properties of class term compounds summarized in (10).

2.1 Noun-like behavior

Kirby's table in (9) shows that bare nouns have a wider range of possible semantic interpretations than bare ClfPs: specifically, they allow generic readings and are ambiguous between singular and plural. Consider the following example, which shows both of these possibilities:

(11) Chó ăn thìt.
dog eat meat

'(The) Dogs eat meat.'
or 'A/The dog eats meat.'

(12) Con chó ăn thìt.
CLF:ANI dog eat meat

'A/The dog eats meat.'

In (11), *chó* can have a reading meaning that dogs in general eat meat. It can also be interpreted as a plural noun, meaning that multiple dogs eat meat. Bare ClfPs, however, do not allow these readings, as (12) demonstrates. When the classifier is present, the denotation of the ClfP is obligatorily singular, and blocks the generic interpretation.

Class term compounds, like bare NPs, allow generic and plural interpretations:

(13) **Máy bay** đi lẹ lắm.
machine fly go quick very

'Airplanes go really quickly.'
or 'The airplanes go quickly.'

As can be seen above, *máy bay* can be interpreted generically or as a plural; as both of these interpretations are impossible for a bare ClfP (12), (13) provides good evidence that class term compounds are not actually ClfPs, and are more likely to be NPs.

Additionally, it is possible for nouns that share the same classifier to be coordinated underneath that classifier (in bold below):

(14) 100 **trái** chuối với cam
100 CLF:FRUIT banana and orange

'100 [oranges and bananas]'

(15) *100 **trái** chuối với chó
100 CLF:FRUIT banana and dog

intended: '100 [bananas and dogs]'

In (14), both bananas and dogs take the classifier *trái* for fruit, and can thus be conjoined underneath it[2]. (15) shows that two nouns that require different classifiers, such as *chuối*, 'banana', and *chó*, 'dog', cannot be conjoined underneath a shared classifier such as *trái*, 'fruit'.

If class terms were actually just full blown classifiers within compounds, then we would expect that their complements should be able to be coordinated. This is not the case:

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[2]While it is interesting to note that the resulting interpretation can be either distributive or collective, I leave this fact to be addressed elsewhere

(16) *100 **máy**   **bay** với **giặt**
      100 machine fly and wash

      'intended: 100 [airplanes and washing machines]'

Recall that *máy bay* means 'airplane' and *máy giặt* means 'washing machine'; they both share the class term *máy*, 'machine'. The fact that *bay* and *giặt* cannot be conjoined underneath *máy* provides good evidence that whatever the structure of class term compounds is, it is not a ClfP construction.

The evidence for class term compounds being bare nouns is strong then, as all of them have the noun-like properties mentioned. However, as we have briefly seen, some class terms also have classifier-like behavior.

2.2 Classifier-like behavior

As shown above, a number of class term compounds can be directly counted, which is unexpected for bare nouns, which generally always require classifiers.

(17) mười *(**trái/quả**) cam   (18) mười **xe đạp**
      ten   CLF:FRUIT orange   ten   car step

      'ten oranges'   'ten bicycles'

Typical nouns, such as *cam*, 'orange', require classifiers in counting contexts (17). Note here that *trái* and *quả* are synonymous classifiers for fruit, with *trái* being more associated with the Southern Vietnamese dialect and *quả* with the Northern Vietnamese dialect. The class term compound *xe đạp*, 'bicycle', however, can appear without any overt classifier between it and the numeral.

In §2.1 I provide evidence that the class term compound cannot be analyzed as a typical ClfP. There is additional evidence for this, even in the counting context, where class term compounds like *xe đạp* can optionally take classifiers:

(19) mười (chiếc)   **xe đạp**   (20) *mười trái   quả   cam
      ten   CLF:VEHICLE car step   ten   CLF:FRUIT CLF:FRUIT orange

      'ten bicycles'   'ten oranges'

As (19) shows, the classifier *chiếc*, which generally means 'piece' but is used specifically for vehicles as well, can be used to count *xe đạp*, showing up in the canonical classifier position between the numeral and the NP. This is in fact the most conservative strategy for counting *xe đạp*, grammatical for all Vietnamese speakers. Compare this to the example in (20), where both fruit classifiers *trái* and *quả* are being used to count the noun *cam*. Classifier recursion, or the ability for a noun to take more than one classifier in a single counting construction, has been argued to be impossible (Jiang, 2012). This is clearly seen in (20), and implies that what is being counted in (19) is not a typical ClfP.

Another property of classifiers is that they license NP-Ellipsis (NPE), wherein ellipsis of the NP complement of a classifier is licensed given a contextual antecedent (Nguyễn, 2004; Alexiadou and Gengel, 2011; Cheng and Sybesma, 2009; Jenks, 2011). Consider the following example, where the classifier is in boldface:

(21) Nếu mày ăn ba **trái**   cam, tôi sẽ ăn ba **trái**   <*cam*> luôn.
      if   2.SG eat three CLF:FRUIT orange 1.SG FUT eat three CLF:FRUIT   also

      'If you eat three oranges, I will eat three ones as well.'

In (21) above, the entire ClfP [trái cam] is mentioned in the first clause, which licenses ellipsis of the noun *cam* in the second clause. Similarly, certain class terms also seem to license this ellipsis – though it should be noted that unlike ClfPs, the elided element of a class term compound is not necessarily an NP, though I will continue to call it NPE for convenience:

(22) Nếu mày mua ba **máy** **lạnh**, tôi sẽ mua ba **máy** <*lạnh*> luôn.
     if   2.SG buy three machine cold 1.SG FUT buy three machine   also
     'If you buy three air conditioners, I will buy three ones as well.'

In (22), we can see that the class term *máy* licenses NPE: *lạnh* is elided in the second clause, similar to *cam* in (21). However, an important fact to note is that this NPE is not a property of the class term itself, but seems to be a property of the class term within its specific compound context. In other words, whereas *máy* licenses NPE in the compound *máy lạnh* in (22), it does not necessary license it in other *máy* compounds:

(23) *Nếu mày mua ba **máy** **bay**, tôi sẽ mua ba **máy** <*bay*> luôn.
     if   2.SG buy three machine fly 1.SG FUT buy three machine   also
     'If you buy three airplanes, I will buy three ones as well.'

In (23), we can see that the compound *máy bay*, which is formed from the class term *máy* like *máy lạnh*, does not license NPE. However, notice that both compounds are still directly countable (though they can take an optional classifier, such as the generic *cái* for inanimate nouns):

(24) a. mười (cái) **máy** **lạnh**   b. mười (cái) **máy** **bay**
       ten   CLF machine cold   ten   CLF machine fly
       'ten air conditioners'   'ten airplanes'

This suggests that the function of classifiers that allow counting is independent from the mechanisms that license NPE, though I do not have more to say on this topic in this paper.

To summarize, class term compounds prove to be problematic for the view that Vietnamese has obligatory classifiers, as they are often directly countable without an overt classifier. Instead, it appears as if the class term head of the compound takes on classifier functions, even licensing other syntactic phenomena such as NPE. However, while CT compounds always have the relevant properties of bare nouns, they vary in the degree to which they behave like ClfPs; in the following section, I show that this is due to the fact that class terms are nouns utilized to derive compounds, which can ultimately lead to their grammaticalization as classifiers.

3 Grammaticalization

Aikhenvald (2000) states that numeral classifiers most often emerge from nouns, and De-Lancey (1986) shows more specifically that Thai classifiers emerge from class term compounds. As can be seen in (25) below, the word order of the Thai NP, [N Num Clf], as well as the prominence of the language family's repeater constructions – where a noun can be doubled as its own classifier (repeated form in bold) – provides a pathway for a noun to end up as a classifier in the language.

(25)   a.   takrâa săam **takrâa**   b.   ráan-ʔaahăan săam **ráan**
            basket three CLF   shop-food   three CLF

            'three baskets'   'three restaurants'
                                                           (Post, 2007, Thai)

These examples clearly demonstrate DeLancey's claim that Thai classifiers arise from re-peated (head) nouns in counting constructions.

While Thai classifiers emerge from its repeater classifer constructions, Vietnamese does not appear to have these constructions, and classifiers emerge from a reanalysis of the sur-face word order of ClfPs and class term compounds, as well as the influence of prosodic preferences. By stipulating that this grammaticalization cline exists for Vietnamese, we then expect class terms to variably have both noun-like and classifier-like properties as they fall along the cline in different places.

The process of a classifier grammaticalizing from a class term in Vietnamese is due to reanalysis of the surface word order from [Num CT X] to [Num Clf X], where X stands for the non-categorically specified second element of a compound. Recall that Vietnamese is generally head-initial:

(26)   a.   **cây chuối**   b.   cuốn   sách
            tree banana   CLF:VOLUME book

            'banana tree'   'a book'

In each of the examples in (26), the first element of the constituent is the head, and is followed by some modifying or specifying element. In (26a), *cây* means 'tree' while *chuối* specifies that meaning to 'banana tree'; while in (26b) *cuốn* means 'volume' while *sách* specifies that meaning to 'book volume'. The latter case has additional meaning in its functional semantics pertaining to singularity, as we have seen, though this does not bear on the subsective relationship of books to volumes.

The case of *cây chuối* is similar in that *cây* denotes a superset of trees, which is then specified to the subset of banana trees within that. However, a slight difference is that unlike the ClfP situation, where the second element is a subset of the first element, bananas are not a subset of trees. Rather the meaning of the whole compound, 'banana tree', is a subset of 'tree'. If a ClfP has the structure [A [B]], then $B \subseteq A$; if a class term compound has the structure [A B], then we instead have the case that $AB \subseteq A$, where AB is the denotation of the entire compound, which can have varying degrees of idiosyncratic meaning.

Looking at the case of loanwords shows that in some cases, the subsective relationship in class term compounds can be identical to that of ClfPs. The word *tăng* is a loanword from *tank*, and thus enters the language with its fully idiomatic meaning 'tank'. However, it is lexicalized as the compound *xe tăng*, where the class term *xe* means something like 'wheeled land vehicle'. Because compounding in the case of *xe tăng* is no longer creating any idiomatic meaning, there is now redundancy between the meaning of *xe* and that of *tăng*; in other words, *xe* does not appear to be contributing any extra meaning to the overall meaning of the compound, as *tăng* already means 'tank' by virtue of being a loanword. As a result, *xe tăng* now has the same $B \subseteq A$ relationship between its constituent elements as ClfPs have, resulting in reanalysis of *xe* as Clf.

An additional independent factor behind reanalysis of class terms as classifiers might also be a prosodic one. In her dissertation on child acquisition of Vietnamese classifiers, Tran (2011) noted that children presented with disyllabic nouns (including compounds,

loanwords and reduplicated nouns) often made errors in choosing the prescriptively appropriate classifier. She notes that they made four types of mistakes (pp. 357-358):

1. classifier omission
2. usage of the general classifier in place of the more specific target one
3. production of the target classifier with reduction of the disyllabic noun to a single-syllable [I assume this means omission of one of the noun's morpheme rather than any kind of phonological reduction]
4. alternative two- to three-syllable nouns which where either the general classifier was used or the classifier was omitted

Following a numeral, Tran observes that there is a preference for either a disyllabic noun sans classifier, or a classifier with a monosyllabic, reduced/truncated noun. For children at least, there is a strong prosodic effect in which there is the expectation of two syllables following a numeral. This is due to most Vietnamese words being monomorphemic and monosyllabic (not counting compounds), which makes most [Num Clf NP] constituents tri-syllabic.

Though lacking in experimental evidence, there are empirical data of a disyllabic preference for adult speakers of Vietnamese: Thompson (1965) mentions briefly how native Vietnamese speakers diplay a strong preference for disyllabic expressions in cases where a monosyllabic expression is grammatical. He identifies this preference primarily in two places: fragment answers and clause-final position. He also mentions that in at least some cases, focal particles are frequently followed by the relative particle *mà* purely for stylistic/emphatic effect. As he doesn't provide good examples to support this usage, though, I do not include those data here.

If it is indeed the case that classifiers emerge from class terms, which are in turn nouns modified by some other element, then we expect to see certain traces of this trajectory. While I have not conducted a wide-scale study, specific examples do appear to support this hypothesis. Consider the following:

(27) a. Noun: **cây**   'tree'
      b. CT: **cây** chuối 'banana tree'
      c. Clf: **cây** dù   'a/the umbrella'

As (27) shows, the morpheme *cây* appears to be playing at least three different (though not unrelated) roles. It has the base meaning of 'tree' when used as a bare noun, which is incorporated into the meaning of the compounds it is a CT head for, such as *cây chuối*, 'banana tree'. Additionally, it also functions as a classifier for long and skinny objects, such as umbrellas; we can tell in (27c) that *cây* is a true classifier as it is obligatorily singular.

If the usage of *cây* as a classifier derived from its usage as a CT in compounds, then these are the types of traces of this trajectory that we would expect to find. Note that the classifier's meaning also appears to be more functional in meaning (i.e. denoting singleton sets of atoms) while being semantically bleached in its lexical meaning; this is in line with grammaticalization in general, where semantic bleaching is correlated with a more functional meaning. In sum, though a more comprehensive diachronic study of Vietnamese CTs and classifiers must be done, there is compelling evidence to believe that the latter evolve from the former.

4   Unifying Clf and CT semantics

If new classifiers emerge from nouns functioning as class terms in compounding, then the functional/logical meaning of classifiers must be composed into the meaning of class terms,

following the theory of grammaticalization proposed by von Fintel (1995). If this is the case, then there should be a unified semantics of countability that can account for both classifiers and class terms.

Recall that while standard theories analyze the functional meaning of classifiers as making the individual atoms of the nominal predicate countable (either by modifying the noun's semantics or the numeral's), they always assume that these atoms are within the set denotation of the noun. The case of class term compounds shows that it cannot be the case that the atomic entities being counted are denoted purely by this second element (nouns or otherwise), but that the atoms are rather in the set denotation of the entire compound or classifier phrase itself. To return to an example such as *cây chuối*, 'banana tree' (lit. 'tree banana'), what is being counted are not banana atoms, but rather banana tree atoms. In §4.1, I propose the Compound Relator function as a small modification to standard analyses of classifiers that can make sure that the numeral phrase is counting the right type of entities.

In §4.2, I show that though the denotations of CT compounds are within the taxonomy defined by their respective CT – i.e. *cây chuối*, 'banana tree', is a subkind of *cây*, 'tree' – the modifying element of a ClfP/CT compound does not exactly map the denotation of the head to a subset of that set. This can be seen in compounds like *bánh xe*, 'wheel', composed of the head *bánh* roughly meaning 'cake' and the modifier *xe* meaning 'vehicle/car'; wheels are not strictly speaking a subset of cakes, though they share a property of being round. Modifiers in ClfP and CT compounds don't denote a subset of the head's exact denotation, then, but rather a selective subset defined by some subset of the salient properties of the head: i.e. in the case of *bánh xe*, wheels are not a subset of cakes, but of round things.

4.1 The Compound Relator function

The vast majority of previous approaches to classifiers treats classifiers as enabling reference to singleton sets of atoms within the denotation of the noun of a ClfP. Jenks (2011), for example, provides the following semantics of the Thai classifier, *lûuk*:

(28) $[\![\text{lûuk}_{Clf}]\!] = \lambda k \lambda n \lambda x \,.\, {}^{\cup}k(x) \wedge \mu_{AT}(x) = n$ \hfill if ${}^{\cup}k \in \lambda x \,.\, \text{ball-like}(x)$
(Jenks, 2011, p. 81)

This semantic meaning for Thai classifiers can be paraphrased as a function that takes a kind-denoting noun (Chierchia, 1998) k, a numeral n and an individual x, and returns true iff x is within the set denotation of the type-shifted kind (${}^{\cup}k$) and the cardinality of x is equal to n, with the presupposition that individuals in ${}^{\cup}k$ are ball-like – the function is undefined if this presupposition does not hold.

However, as the previous sections show, a semantic meaning of this type does not work for CT compounds. For one, it assumes that the Clf/CT first takes a kind-denoting noun as a complement. CT compounds are not as syntactically constrained as ClfP with respect to the category of the second element: *xe đạp*, 'bicycle' (lit. 'vehicle step'), where the second element is a(n eventive/action) verb; *máy lạnh*, 'air conditioner' (lit. 'machine cold'), where the second element is an adjective (or stative verb – the distinction is trivial here). If Clfs/CTs are to first compose with something of type *k*, i.e. a bare noun, then these CT compounds are problematic, as verbs and adjectives/stative verbs are not typically analyzed as denoting kinds; even if they did, it does not ensure that the kind of entities that the compound denotes is within the set denotation of the type-shifted verb/adjective. In other words, an air conditioner is not a machine that is cold, and a bicycle is not a vehicle that steps. This problem still remains even if we ignore the kind-denoting properties of bare nouns in Vietnamese and other (South)East Asian languages, and treat them as predicates denoting sets.

Secondly, as I have been claiming throughout this paper, the denotation in (28) is ultimately counting the wrong kinds of atomic entities when it comes to CT compounds. This is true even in cases where we avoid the aforementioned type problem: consider a CT compound such as *cây xoài*, 'mango tree', where the second element is a noun. We can see that giving *cây* the semantics above results in an undesireable prediction that what we are counting is mangos rather than mango trees:

(29)   False prediction:
       $[\![\text{cây xoài}]\!] = \lambda n \lambda x \,.\, {}^{\cup}\text{MANGO}(x) \wedge \mu_{AT}(x) = n$ if ${}^{\cup}\text{MANGO} \in \lambda x \,.\, \text{long-skinny}(x)$

Not only does this type of denotation count the wrong kind of atomic entities in CT compounds, but it also presents problems for the presuppositional (lexical) content of the CTs themselves. Under the denotation above, we would in fact have an undefined meaning for *cây xoài*, as mangos are not long and skinny, thus failing the presupposition. Analyses that treat the semantic properties that classifiers lexically specify as a part of the asserted truth-conditional meaning (Rothstein, 2010) do no better, and in fact are arguably worse, as they predict falsehood rather than being undefined.

Nomoto (2013) has yet another analysis following McCready (2009, 2012) where the lexical meaning of classifiers is neither truth-conditional nor presuppositional, but is rather captured best via conventional implicatures within the framework developed by Potts (2005):

(30) $[\![\text{Clf}]\!] = \lambda P \lambda x \,.\, P(x) \wedge [\neg \exists y \in P \,.\, y < x] \blacklozenge \lambda P \,.\, P \subseteq \text{CLASS}$

Here, the formalization is slightly different than Jenks', but the fundamental idea is the same: the Clf takes a predicate argument P and an individual argument x, and is true if x is in P and is atomic. The ClfP also simultaenously has the conventional implicature (indicated by the material following $\blacklozenge$ that the set P is a subset of a set with the properties specific to the classifier being used (with CLASS representing these properties). Once again, however, this denotation results in counting the wrong type of atomic entities for CT compounds (we would once again be counting mangos instead of mango trees).

In sum, previous analyses of classifiers cannot be extended to the case of CT compounds, as they all assume that what is counted is a nominal second element of a ClfP, rather than what is denoted by the entire ClfP/CT compound. For the purposes of this paper, I adopt and modify Nomoto's formalization of classifier semantics, though any other formalization must also take into account my argument that what is being counted in ClfPs and CT compounds is not simply atoms in the denotation of the second element.

In order to specify that what is being counted is the entire ClfP/CT compound, rather than just the second element, I propose the Compound Relator function that maps the set denoted by the head noun to another set specified by the modifier; this new set is not a strictly intersective/subsective set, but rather a selective subset, further detailed in §4.2. The Compound Relator (CR) function thus takes two arguments and returns a set that is related to both arguments; a subset relation satisfies this relation.

(31)   Compound Relator function: $\text{CR}(\alpha, \beta)$
       a.   if $\beta \subseteq \alpha$ then $\text{CR}(\alpha, \beta) = \beta$
       b.   else $\text{CR}(\alpha, \beta) = \gamma$, where γ is related to both α and β in some way

The condition in (31b) that the new set γ is related to both α and β 'in some way', is left intentionally vague, as the exact semantic relation between compound elements is notoriously unpredictable: *firetruck* in English refers to a vehicle that is utilized in putting out

fires, while Vietnamese *xe lửa*, lit. 'vehicle fire', refers to a train, which at least historically used to run on an engine that was primarily fueled by fire. While I do not attempt to capture the nature(s) of relations between the two elements of a compound and its meaning as a whole, I also show in the next section that these relations are not completely arbitrary either: specifically, γ is a selective subset of α, though not necessarily a strict subset.

The condition in (31a) is crucial for the case of ClfPs, where the noun always denotes a subset of the classifier: *con* refers to animals while *chó* refers to dogs, which comprise a subset of animals. Thus CR(ANIMAL, DOG) refers to dogs ($\gamma = \beta$), because $\beta \subseteq \alpha$. In other words, when there is a subset relation between the two elements of a ClfP (or CT compound), then the set that is returned by the Compound Relator function is trivial, as it is equivalent to the more specific modifier set. Consequently, in the case of true ClfPs, the kind of atoms denoted by the entire ClfP is identical to the kind of atoms comprising the nominal complement; as such, it makes sense that previous approaches in the literature have simply assumed that the atoms being counted is solely dependent upon the noun.

Thus, we have the updated semantics for classifiers and CTs:

(32) $[\![$Clf/CT$]\!] = \lambda P \lambda x \,.\, \text{CR}(\text{CLASS}, P)(x) \wedge [\neg \exists y \in (\text{CR}(\text{CLASS}, P) \,.\, y < x]$
  ♦ $\lambda P \,.\, \text{CR}(\text{CLASS}, P) \subseteq \text{CLASS}$

All that has changed from Nomoto's original semantics here is that rather than looking at the set denoted by $P(x)$ to evaluate set membership and atomicity of x, we are now looking at the set denoted by CR(CLASS, P), where CLASS represents the set denoted by the specific lexical properties of the classifier: long and skinny things, fruit, animals, etc. For true Clfs, then, CR(CLASS, P)(x) trivially reduces to the same thing as P(x): counting dog-animals or mango-fruit is the same as counting dogs or mangos, respectively.

It is in the case of CT compounds where the CR function makes a difference, though. Recall that *cây xoài* denotes mango trees rather than mango fruit. Because MANGO $\not\subseteq$ TREE – that is, mangos are not a subset of trees – CR(TREE, MANGO) must return a new set that is related to both TREE and MANGO in some way. In this case particular case, this new predicate is the set of mango trees:

(33) $[\![$cây xoài$]\!]$
  a. $= \lambda x \,.\, \text{CR}(\text{TREE}, \text{MANGO})(x) \wedge [\neg \exists y \in \text{CR}(\text{TREE}, \text{MANGO}) \,.\, y < x]$
    ♦ $\lambda P \,.\, \text{CR}(\text{TREE}, \text{MANGO}) \subseteq \text{TREE}$
  b. $= \lambda x \,.\, \text{MANGO-TREE}(x) \wedge [\neg \exists y \in \text{MANGO-TREE}(x) \,.\, y < x]$
    ♦ $\lambda P \,.\, \text{MANGO-TREE} \subseteq \text{TREE}$

The relation between mango trees and mangos and trees is relatively transparent, but this is not always the case; a compound can refer to something not entirely predictable in relation to its parts, as with the *firetruck – xe lửa* example earlier. It is in those cases where the output of the CR function is subject to the idiomatic interpretation of a CT head and its modifier.

(34) $[\![$xe lửa$]\!]$
  a. $= \lambda x \,.\, \text{CR}(\text{VEHICLE}, \text{FIRE})(x) \wedge [\neg \exists y \in \text{CR}(\text{VEHICLE}, \text{FIRE}) \,.\, y < x]$
    ♦ $\lambda P \,.\, \text{CR}(\text{VEHICLE}, \text{FIRE}) \subseteq \text{VEHICLE}$
  b. $= \lambda x \,.\, \text{TRAIN}(x) \wedge [\neg \exists y \in \text{TRAIN}(x) \,.\, y < x]$
    ♦ $\lambda P \,.\, \text{TRAIN} \subseteq \text{VEHICLE}$

Having the CR function thus lets us unify the semantics for classifiers and class terms, which is motivated by the evolution of classifiers from nouns utilized as class terms in

compounds. While the CR function is essentially redundant in the case of true classifiers, it is necessary in order to return a new set in CT compounds where the two elements are not directly related to each other (i.e. subset relation). I take this redundancy to imply that when the two elements already have a direct relation to each other, there is no need to create a new set that relates the two arguments that the CR function takes; this relation already exists. This captures the intuition that there is little to no ambiguity in the denotation of a novel ClfP, but the denotation of novel compounds is not always predictable – the speaker/hearer must find a way to relate the two compound elements to get the denotation of the compound as a whole, though this relation is subject to variation, evident in English *firetruck* and Vietnamese *xe lửa*.

4.2 Deriving selective subsets with the Compound Relator function

This section provides a more in-depth look at how the Compound Relator function returns a new set that is related to both compound elements. Specifically, the relation between the set γ is not arbitrary with respect to the head CT α, but as I demonstrate below also not necessarily a strict subset/intersective set; rather if α is actually treated as the set defined by various semantic qualities (i.e. fruit, round, etc), then γ must be a subset of the set described by at least one of these qualities, but not necessarily all of them. In other words, the set γ returned by the CR function is a subset of at least one of the CT's supersets (that is a proper subset of the domain), but not necessarily all of them. I call this the selective subset relation:

(35) **Selective subset ($\subseteq_S$):** A $\subseteq_S$ B holds iff B is the intersection of a contextually-given set of sets Z, such that each set in Z is a superset of B and is a proper subset of the domain, and A $\subseteq$ Y where Y $\in$ Z

Note that each set in Z must be a proper subset of the domain, to prevent any set trivially being a selective subset of any other set by virtue of the domain being a superset by necessity.

Given the selective subset definition in (35), the result of CR(α, β) where $\beta \nsubseteq \alpha$ is the set γ, such that $\gamma \subseteq_S \alpha$. In other words, the set denoted by a CT compound is a subset of at least one superset of the class term that heads it, but isn't necessarily a subset and doesn't necessarily intersect with the set denoted by the class term's bare noun equivalent.

Let's consider a more concrete example: recall that CT compounds comprise a taxonomy of the CT that heads them. The example from (8) is reproduced below:

(36) bánh, 'cake'
   a. **bánh chưng**, 'rice cake' (lit. 'cake stew')
   b. **bánh bao**, 'steamed bun' (lit. 'cake bag')
   c. **bánh mì**, 'bread' (lit. 'cake wheat')
   d. **bánh phở**, 'rice noodles' (lit. 'cake phở')
   e. **bánh xe**, 'wheel' (lit. 'cake vehicle')
   f. **bánh răng**, 'cog' (lit. 'cake teeth')

The dictionary definition of *bánh* is 'cake', and indeed compounds derived from this morpheme's use as a class term, such as *bánh bao* seem cake-like enough in being round, edible things with some sort of internal consistency. However, these properties that are present in the meaning of *bánh* show up more irregularly as one works down the list of CT compounds in (36): *bánh phở*, 'rice noodles', are certainly edible and internally consistent, but are not

saliently round in any way.[3] Contrast this to *bánh xe*, which refers to wheels (usually in reference to a vehicle's wheel), which are round, but not edible – whether they are conceptualized as having regular internal consistency is arguable.

If *bánh* denotes the set of cakes, then it seems incorrect to consider rice noodles and wheels as proper subsets of cakes. However, at the same time, it is clear what the relation of these things to cakes is: rice noodles are edible and wheels are round, and both generally have some internal consistency. In other words, they are selective subsets of cakes: RICE-NOODLES $\subseteq_S$ CAKE; WHEEL $\subseteq_S$ CAKE.

We can see that it is not just CT compounds in Vietnamese that have this selective subset relation between the head and modifier, but also ClfPs. Consider the following examples of the classifier *trái*:

(37)   a. *trái cam*, 'an/the orange'
        b. *trái chuối*, 'a/the banana'
        c. *trái banh*, 'a/the ball'

The classifier *trái* is ordinarily used for fruits, as can be seen in the case of oranges in (37a). It is also unsurprisingly used for bananas as well, as they are also fruit. However, what is interesting is that *trái* also serves as the classifier for *banh*, 'ball', which is not a fruit. The relation is clear, though: balls are spherical, as are many fruits, such as oranges. Crucially, bananas are non-spherical fruits and balls are spherical non-fruits, so there is no single unified semantic property set for *trái* that can capture both bananas and balls without ruling out the other. Rather, while the CR function returns the set denoted by the nominal complement in ClfPs, they are still subject to the selective subset relation.

A natural question that arises is given the set Z of supersets of B, why can't A $\subseteq_S$ B with respect to any Y $\in$ Z, no matter how obscure or irrelevant? Put another way, cakes are also often sweet, so there is a superset of cakes that is the set of sweet things. However, I am unaware of any compounds derived from the CT *bánh* that denote sweet things that are inedible, non-round, etc. (such as antifreeze, for example). Such a compound would be quite surprising, as sweetness is not a highly salient property of Vietnamese *bánh* – in fact, of the examples listed in (36), not one of the food items is sweet.

This is where the the condition that the set Z (set of supersets) is contextually given comes into play: only the most salient properties of a CT are generally at play when deriving selective subsets via the CR function. For a CT like *bánh*, it is salient that cakes in Vietnamese are generally round, edible and have internal consistency, but not that they are (sometimes) sweet, and it is these properties that will be targeted by a novel compound headed by *bánh*. So of all the countless supersets of B that can be in Z, we only consider the ones that are contextually provided, i.e. highly salient.

Given that the context still provides a number of supersets comprising Z, there is also some ordering of salience within Z. In the case of *bánh*, for example, the superset of edible things is probably more salient than the property of being round, as exemplified by the compounds denoting non-round foods: i.e. *bánh phở*, 'rice noodles'; *bánh chưng*, 'rice cake' (typically rectangular). Thus, there appears to be at least a partial ordering of salient, contextually-provided properties that comprise the CT/Clf; a higher degree of salience will correlate to that particular superset being targeted when CR derives a selective subset.

Nomoto (2013) provides an analysis of this ordering of importance in classifier properties in a Linear Optimality Theory (LOT) framework. Recall that CLASS in his denotation

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[3]It should be noted that rice noodles of the sort described by *bánh phở* are generally sold in plastic packs where they are dried and wound into 'bricks'. This packaging no doubt has some impact on the choice of the CT *bánh*, but as mentioned, these packaged noodles are box-shaped, rather than being round

in (30) is actually shorthand for the various properties specified by a classifier that are a part of the classifier's conventionally implicated meaning. In his analysis, these properties are constraints that are weighted, with violations incurring penalties against the aggregated harmonic score H; consider the following tableau for the Japanese classifier *dai*, used for land vehicles (superficially comparable to Vietnamese *xe*):

(38)

dai kuruma/honbako/neko CLF car/bookcase/cat	INANIMATE 34.81	MECHANICAL 3.9	ON THE GROUND 0.5	DETACHED 1.3	CARRIES THINGS 0.2	*H*
car						0
??bookcase		*		*		-4.2
*cat	*	*			*	-38.91

(Nomoto, 2013, p. 85)

The harmonic score H is calculated according to the following formalization:

(39) $\quad H_i = -\sum w_j v_j$

    a. H_i is harmony score of candidate i

    b. w_j = weight of constraint j

    c. v = number of violations of j

(Nomoto, 2013, p. 52)

In (38), we can see that using *dai* with *kuruma*, 'car', incurs no violations, resulting in a perfect H score of 0; on the other hand, using *dai* with *neko*, 'cat', incurs more significant violations, with a low H score of -38.91. This is interpreted as *dai* being a perfectly grammatical classifier for cars, but unacceptable for cats; *honbako*, 'bookcase', has a score of -4.2, which is not perfect, but also not as bad as -38.91 for *neko*, thus resulting in questionable acceptability.

I assume that whatever weighting mechanism is at play for determining classifier-noun harmony in Nomoto's LOT formalization is the same mechanism at play for ranking saliency of the contextually provided (super)sets comprising Z in the CR function. The context provides only the salient properties (supersets) of a given CT/Clf, forming the set of sets Z; these sets in Z are then weighted for relative salience with respect to each other. In this way, when a new compound is formed via the CR function, it will usually be a subset of the most salient superset (property) of the head CT/Clf. This also ensures that the derived compound has a taxonomic relationship to the head that it is derived from.

In summary, what is being counted in the case of class term compounds and ClfPs is not the atoms denoted by the second element of each construction, but rather the atoms denoted by the entire constituent as a whole. In the case of ClfPs, this is a trivial difference, because the Compound Relator function will return the same set denoted by the Clf's nominal complement; however, it is in CT compounds where we see idiomatic meaning creep back in, making it clear that we must consider the meaning of the compound as a whole in order to count the right type of things.

The CR relation derives and returns a new set that is related to both of the elements that comprise the compound, and while this set need not be strictly intersective with the set denoted by the head, we see that it is also not a completely arbitrary set: CR returns a selective subset of the head. The selection of which head property to be a selective subset with respect to is further constrained to the contextually provided head supersets – in other words, only the salient properties of the head matter. These contextually provided supersets are also then weighted such that the set returned by the CR function will tend towards being a subset of the most salient contextually provided superset, as this will result in the best harmonic score. In plain words, a novel compound will often incorporate the meaning of the head's most prominent quality/s.

5 Conclusions

In this paper, I show that previous analyses of classifiers are insufficient to handle CT compounds in Vietnamese. These CT compounds are often directly countable without classifiers, which is problematic at first glance for Vietnamese, which is ordinarily considered an obligatory classifier language – and indeed, many nouns in the language require classifiers in order to be counted, making it different from languages where classifiers appear to be optional with all nouns (c.f. Indonesian (Chung, 2000); Malaysian (Nomoto, 2013)).

Furthermore, typologically distinct classifier languages also demonstrate similar problems in counting the wrong sorts of things in compound (or compound-like) constructions. Consider the following data from Chol (Mayan):

(40) a. cha'-ts'ijty   ja'as
          two-CLF:LONG-SKINNY banana

          'two bananas'

      b. cha'-pajl   ja'as
          two-CLF:BUNCH banana

          'two bunches of bananas'

      c. cha'-tyek   ja'as
          two-CLF:TREE banana

          'two banana trees'

                                          (Chol, (Bale and Coon, to appear, p. 8))

Though they relocate the heavy lifting of individuation and atomicity away from the classifier and onto the numeral, Bale and Coon (to appear) provide the following semantic meanings for Chol classifiers and numerals (specifically *ux*, '3', here), which are still problematic with respect to what is being counted:

(41) a. Denotation of a numeral that requires a classifier:
          $[\![\text{ux}]\!] = \lambda m \lambda P : \text{ATOMIC}(P) . \{x : {}^*P(x) \wedge m(x) = 3\}$

      b. Denotation of the classifier:
          $[\![\text{p'ej}]\!] = \mu_{\#}$ (Bale and Coon, to appear, p. 7)

In the semantics above, the numeral takes a classifier, which provides a cardinality measure function $\mu_{\#}$, and a nominal predicate P as arguments; as long as P is atomic, then what is returned is the set such that each sum, x, of entities that can be formed within that set is in P, and the cardinality of x (presumably with respect to the classifier's specific properties) is equal to some number – 3 in the case of *ux*.

Despite the difference in formalization, what is crucial to notice about Bale and Coon's proposal for Chol classifiers is that it suffers from the same problem of paying too much attention to the entities denoted by the nominal predicate and their atomicity. Consider (40c), where what is being counted is banana trees. According to the denotations in (41), we check for atomicity in the set of bananas, and then look at sums of individuals that are both bananas and tree-cardinalities of 3, which will likely yield an empty set, as nothing is going to be simultaneously a banana and a tree. The problem is that by having only P show up in the denotation, we are caring too much about the entities denoted by the noun, instead of what the noun and Clf together denote. In short, Chol provides another example where the standard analysis of classifiers (and numerals) leads to the prediction that we are counting bananas, and not banana trees.

These data are less problematic if we view CTs as part of the grammaticalization path from nouns to classifiers, as proposed by DeLancey (1986) for Thai, and appears to also be the case for Vietnamese; doing so, however, motivates a unified semantic account of both classifiers and class terms. To do this, I have outlined a proposal in which it is always the entities denoted by the entire compound (used loosely to include both CT compounds and ClfPs), rather than just entities denoted by the second element. This set of entities is returned by the Compound Relator function, which either returns the same set denoted by the nominal complement in ClfPs (as they satisfy a subset relation already), or returns a selective subset of the head CT/Clf.

While the semantic relations between the elements comprising compounds is as notoriously multi-headed as the mythical Hydra, they are not entirely without order. The selective subset relation seen in the CR function shows that the taxonomic relationship between compounds and their heads is systematic in a way that the grammar on a larger scale is sensitive to (i.e. direct countability). While semantic analyses of classifiers have generally focused largely on the logical, individuation-oriented meaning of classifiers, I hope to show in this paper that looking at the non-logical, lexically specific meaning of classifiers and class terms can give us a fuller, more nuanced view of the classifier landscape.

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Wenn man's bedenkt[1] **- Yet another look at applicative *be*-verbs in German**

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1.   Introduction: Characterising the applicative pattern in German

German, in parallel to its West Germanic sister English, exhibits a phenomenon variously called locative alternation, or applicative construction. Since both terms reflect contrasting theoretical approaches to the phenomenon, I will talk about applicatives or the applicative pattern to avoid espousing either theory. Yet it isn't good form to delay a definition with a disclaimer, hence: What is an applicative? Attested in a variety of languages yet particularly common in Bantu languages, applicatives affect the argument structure of a verb such that one of its oblique arguments comes to be expressed as the direct object of the applicative verb. An applicative morpheme on the verb may signal not only the pattern itself but also the different semantic roles of the respective direct object: recipient, beneficiary, instrument (Trask 1993), as well as location or goal. It is these latter two roles that some authors working on the applicative in German have focused on, hence the term locative alternation. Brinkmann (1997) defines the phenomenon as a "change in the argument structure of transitive and intransitive verbs of motion [...] and of transitive verbs of position". Her focus is thus clearly on verbs that take oblique location arguments. Michaelis & Ruppenhofer (2000, 2001) note that applicative verbs in German can take objects with a wider range of thematic roles, such as beneficiary or maleficiary. Examples of each are provided in (1). The (b), (d), and (f) sentences illustrate the use of the base verb corresponding to the applicative.

(1)   a. *Die   Kinder **be-werfen**   das   Fenster mit   Steinen*.
            the.NOM children APPL-throw the.ACC window with stones.DAT.PL
            'The children be-throw the window with stones' (location/goal)

        b. *Die   Kinder   **werfen** Steine   **gegen** das   Fenster*.
            the.NOM children throw stones.ACC.PL against the.ACC window
            'The children throw stones against the window.' (location/goal expressed as
                                                  gegen PP)

        c. *Meine Oma   **be-kocht** mich   immer wenn ich*
            my.NOM grandma APPL-cook   1SG.ACC always when 1SG.NOM

            zu Besuch bin.
            to visit   be
            'My granny be-cooks me whenever I'm visiting (her)' (beneficiary)

        d. *Meine Oma   **kocht** immer **für** mich   wenn ich   zu Besuch bin*.
            my.NOM grandma cook always for 1SG.ACC when 1SG.NOM to visit   be
            'My grandma always cooks for me when I'm visiting (her).' (beneficiary

 e. *Heinz **belügt** manchmal seine Frau*.
  Heinz APPL-lie sometimes his.ACC wife
  'Heinz be-lies his wife sometimes' (maleficiary)

 f. Heinz **lügt** manchmal.
  Heinz lie sometimes
  'Heinz sometimes lies.' (no maleficiary expressed)

German differs from English in having an overt productive applicative morpheme, the unseparable prefix *be-*, illustrated in (1, c, e). A second difference from English is that *be-* takes both transitive (1a/b, c/d) and intransitive (1e/f) base verbs (Michaelis & Ruppenhofer 2001). German has over 500 such verbs, yet Brinkmann (1997) observes that though being rather productive, *be-* cannot be prefixed to all verbs of the language. Hence **besinken* 'be-sink' and **befallen* 'be-fell', for example, are not acceptable applicatives.

 The two most comprehensive accounts that have been brought forward to describe *be*-verbs in German are Brinkmann (1997), which is based on Wunderlich (1987), and Michaelis & Ruppenhofer (2000, 2001, henceforth M&R). The former looks at the phenomenon from a lexical decomposition point of view (based on Wunderlich 1987) and treats *be-* as an argument-promotion device, while the latter take a constructional approach in which *be*-verbs are part of an argument structure construction (based on Goldberg 1995).

 The present study seeks to contribute to the study of the German applicative in examining the following hypotheses:

- One of the contentious issues surrounding the applicative is the interpretation of the direct object of *be*-verbs. M&R (2000, 2001) propose that the semantic schema associated with the construction accounts for interpreting the referent of the direct object as holistically affected by the verbal action, while Brinkmann (1997) and Wunderlich (1987) suggest an explanation in terms of general interpretive principles. I espouse the latter theory and expand on the nature of these principles.

- *Be*-verbs have been proposed to originate from motion and/or location predicates, yet the applicative prefix seems to apply to a much wider range of predicates. To capture this fact, M&R propose a list of metonymic extensions of a basic *be*-verb schema. I question whether these extensions are necessary to explain the range of applicative predicates and suggest that (almost) all predicates share in common the implication of affectedness of their direct object participant.

This paper is structured as follows. In the next section, the lexical decomposition and constructivist approaches mentioned above will be outlined briefly. Specifically, I will look at M&R's criticism of the earlier Brinkmann study and adopt it where I agree with the authors. In section three, the interpretation of the direct object of *be*-verbs is discussed, while section four focuses on the denotation of applicative predicates and constraints on *be*-prefixation. Section five concludes the paper with a summary of the findings.

2.   Theorising the German applicative: Lexical decomposition vs. constructivism

Brinkmann (1997) adopts Wunderlich's hypothesis that *be*-verbs were historically formed via incorporation of the Old High German preposition *bi* 'around something/ with respect to something' into a base verb. While Modern German has lost the independent preposition *bi*, Brinkmann argues that *be*-verbs correspond closely to non-applicative verbs that take prepositional complements headed by *an* 'at' or *auf* 'on', hence *be-* must have the same argument structure as these prepositions but differs from them in only surfacing as a bound morpheme in *be*-verbs (1997: 79). *An* and *auf* denote contact between a theme and the outer surface of a reference object, paralleling a property of German applicatives termed exteriority: With very few exceptions, the referent of the direct object is interpreted as two- rather than three-dimensional, excluding events where a theme moves towards the interior of a location/goal (Brinkmann 1997: 80, M&R 2001: 32). Brinkmann attributes the property of exteriority to the marker *be-*, while M&R argue that it constitutes a feature of the applicative construction and as such is able to override meaning elements of lexical verbs unifying with the construction. Hence *füllen* 'fill' in (2a) denotes movement into a container, while *befüllen* in (2b) evokes an iterative reading in which various bottles are filled and re-filled, each time involving different spatio-temporal coordinates. According to M&R, a planar region of bottles is created over the iterated acts of be-filling (2001: 49).

(2)   a. *Sie   füllte Wasser   ins   Glas*.
             she.NOM fill.PST water.ACC   in.the.ACC glass
             'She poured water into the glass.'

          b. *Außerdem müssten Betriebe die Mehrwegflaschen **be-füllen**, eine*
             plötzliche Erhöhung ihrer Pfandrückstellungen bewältigen.
             'Moreover companies that be-fill returnable bottles would have to cope with a
             sudden increase of their reserve for deposits.' [M&R 2001: 48]

          c. *Aber da   haben die   Leute   die   Waschmaschine   mit heißem*
             but   there have   the.NOM people the.ACC washing.machine with hot.DAT

             *Wasser **be-füllt***.
             water APPL-fill.PTCP
             'But there the people be-filled the washer with hot water.'
             [http://www.hausgarten.net/gartenforum/technik/20752-waschmaschine-mit-
             heissem-wasser- befuellen.html, 15 November 2012]

However, not only does M&R's idea of a planar region in (2b) not coincide with native speakers' intuitions about this sentence, but (2c) illustrates that acts of be-filling do not have to be repeated in order for the applicative to be acceptable. The example sentence describes a method for saving energy by filling a washer with hot water, and the speaker refers to a single instance where this method was presented on a TV show.

Exteriority then seems to be a strong trend in *be*-verbs rather than an exceptionless rule. The examples in (3) illustrate several other *be*-verbs that can describe movement towards the inner region of a reference object. In addition, examples (1c) and (1e) demonstrate that, if the direct object referent is human, two-dimensionality is usually not assumed: Somebody who is be-cooked is not, for example, smeared with food but receives food to ingest, and *be*-lying also does not conceptualise a human being as a planar region.

(3)   a. *Und wenn man   eine Einkaufskiste unterbringen will*,
    and when   one.NOM a.ACC shopping.crate fit   want

    die   mit schwererem Gut als Küchen- und Klorollen
    that.REL with heavier.DAT good than kitchen and toilet.rolls

    be-stopft   *ist, dann verflucht man   das   Hieven*
    APPL-stuff.PTCP be then curse   one.NOM the.ACC heaving

    über die   vorgeklappte Sitzlehne beim   Carrera.
    over the.ACC folded.down backrest at.the.DAT Carrera
   'And when you're fitting a shopping crate that is be-stuffed with heavier
    goods than kitchen and toilet paper, you curse heaving (it) over the folded
    down backrest of the Carrera.'
    [http://www.auto-motor-und-sport.de/forum/threads/2137-Gebrauchtwagen-
    Supersportwagen- Heft-21-2011/page3, 17 November 2012]

    b. *Vor   diesem Roman sollte eigentlich gewarnt   werden: Bevor*
    against this.DAT novel   should really   warn.PTCP AUX.PASS before

    Sie   anfangen ihn   zu lesen, sollten Sie   Ihren   Kühlschrank
    you.NOM begin   it.ACC to read should you.NOM your.ACC fridge

    gut **be-stücken,** *die   nötigste   Wasche waschen und die*
    well APPL-piece the.ACC most.urgent laundry wash   and the.ACC

    Verabredungen für die   nächsten Tage absagen.
    appointments   for the.ACC next   days cancel
   '(People) should really be warned about this novel: Before starting to read,
    you should *be*- piece (load) your fridge well, do laundry and cancel your
    appointments for the next few days.'
    [http://dict.leo.org/forum/viewWrongentry.phpidThread=325257&id
    Forum=3&lp=ende&lang=de, 17 November 2012]

c. *Einen LKW so   zu **be-laden,**   daß sehr viel   rein passt*
 a. ACC   truck such to APPL-load that very much into fit

  und trotzdem nichts   passiert ist zu 80% eine   Frage
  and yet   nothing happen   be to 80% a.NOM question

  der   Erfahrung   und zu 20% von der   Verpackung abhängig.
  the.GEN experience and to 20% of the.DAT packaging dependent
  'To be-load a truck such that it can fit a lot yet nothing happens (to the goods) is to 80% a question of experience and to 20% dependent on the packaging.'
  [http://www.spedition-24.com/umzug_lkw_beladen.html, 17 November 2012]

d. *Viele   Leute   halten   Tanken für selbstverständlich, aber gerade*
  many.NOM people consider fuel   for self.evident   but   especially

  die   junge Autofahrergeneration ist mit   dem   Tanken noch nicht
  the.NOM young generation.of.drivers be with the.DAT fueling still   not

  *vertraut, da   meistens die   Eltern   das   Auto **be-tanken.***
  familiar since often   the.PL.NOM parents the.ACC car APPL-fuel
  'Many consider re-fueling a matter of course, yet especially the young generation is not yet familiar with re-fueling, as usually their parents be-fuel the car.'
  [http://www.hau-tu.de/index.php5/Wie_man_ein_Auto_richtig_betankt, 20 November 2012]

2.1   Be-verbs as preposition incorporation: The lexical decomposition account

Looking more closely at the preposition incorporation account, Wunderlich (1987) argues that *be*-verbs are created via functional composition of the verbal and prepositional functions, without creating additional meaning for the composed verbal complex. The semantic characteristics of *be*-verbs are attributed to constraints on the semantic class of the base verb as well as general pragmatico-semantic principles (M&R 2001). From a lexical decomposition view, preposition incorporation accounts for the fact that an oblique argument of the base verb is promoted to direct object as follows. As illustrated in (4a), the meaning of a non-applicative sentence is derived from the conjunction of verbal meaning with that of a PP, which only takes one argument, namely *Farbe* (y). When *be-* is incorporated in (4b), the conjunction involves the base verb and a preposition with the following argument structure: XzXy BECOME (LOC (y, AT (z))). This incorporated preposition *be-* takes two arguments, *Farbe* (y) and *Wand* (z). Only in the incorporated variant (4b) is the z argument visible and 'counts' for the assignment of arguments to syntactic functions in thematic structure (Brinkmann 1997: 93-96).

(4)   a. *Sie   sprühte   Farbe an die   Wand*. {SPRAY (x,y) & P(y)} (s)
         she.NOM spray.PST paint   on the.ACC wall
         'She sprayed paint onto the wall.'

     b. *Sie   **be-sprühte**   die   Wand mit Farbe*.
       she.NOM APPL-spray.PST the.ACC wall with paint.DAT
       'She be-sprayed the wall with paint.'
                         {SPRAY (x,y) & BECOME (LOC (y; AT (z)))} (s)

The argument most deeply embedded in the formal representation in (4b) is z, the "lowest argument", which is assigned the accusative case of the direct object, while x as the highest argument is assigned nominative. Y, as an argument for which both a higher and a lower role exist, should receive dative case in Wunderlich's account, yet it always surfaces as an oblique PP. To account for these data, Wunderlich proposes the notion of L-command, which parallels c-command but ranges over logical types rather than syntactic categories (Brinkmann 1997: 97). On this view, the y argument is excluded from structural linking to a core argument function because it does not L-command the lowest argument z. L-command is defined in (5), taken from Brinkmann (1997: 97).

(5)   L-command: A node *a* L-commands a node *p* iff the node *y*, which either directly
         dominates *a* or dominates *a* via a chain of nodes type-identical to *y*, also
         dominates *p*.

As an argument of SPRAY, y is dominated by a node of type $<e,t>$ which does not dominate z and must hence be expressed as an oblique. Wunderlich is thus able to account for another property of the applicative in German: The direct object of the base verb becomes an oblique argument of the *be*-verb and can always be omitted.

     M&R (2001) object to this account by arguing that it complicates the syntax-semantics interface by introducing L-command, which has not been motivated independently and furthermore makes the wrong predictions for verbs like *senden* 'send'. They suggest that this verb of transfer should be representable via the semantic form SEND (x,y) & BECOME (LOC (y; AT (z))), yet, as the example in (6) shows, the location argument y receives dative case rather than the oblique required by L- command.

(6)   *Ich   sende dir   eine Karte   aus New York*.

     1SG.NOM send   2.SG.DAT a.ACC postcard from New York

     'I send you a postcard from New York.'

     M&R (2000, 2001) raise a more fundamental concern about the lexical decomposition view of *be*-verbs. They argue that a lexical rule that promotes an oblique to direct object position presupposes the existence of an argument to be promoted in the argument structure of the base verb. However, *wachsen* 'grow' does not have an

obligatory location/goal argument, yet *bewachsen* in (7) surfaces with a location object. Here, Wunderlich (1987: 614) has to assume that "the modifier[2] turns into an argument first, and then this argument is incorporated".

(7)   *SELBSTKLIMMER = Kletterpflanzen, die mit speziellen Haftorganen Wände oder andere Flächen direkt **bewachsen**, Beispiele: HAFTWURZELN bei Efeu HAFTSCHEIBENRANKEN bei Wildem Wein.*
'Self-climbers = climbing plants that directly be-grow walls or other surfaces with the help of special adhesive/sticky extremities, for instance, sticky roots in the case of ivy, sticky tendrils in the case of wild vine.' [M&R 2001: 21]

(8)   a. *Peter hat (*mir) beim Kartenspielen gemogelt.*
       'Peter cheated (*me) at cards.'

       b. *Peter hat mich beim Kartenspielen **bemogelt.***
       'Peter be-cheated me in cards.' [M&R 2000: 345]

(9)   a. *Damals wäre um ein Haar ein Flüssiggastank in Mitleidenschaft gezogen worden [...] die Petershausner Feuerwehr musste diesen daher intensiv **beregnen** [...].*
       'Back then a tank full of liquid gas almost got damaged [...] the Petershausen fire department therefore had to make a great effort to be-rain it [...].'
                         [M&R 2001: 22]
       b. *Die Kreuzung Arsenalstraße wird **beampelt.***
       'The Arsenalstraße crossing will *be* be-traffic-light-ed.'
                     [M&R 2001: 19, my translation]

As M&R (2001) point out, Wunderlich's incorporation account faces further problems. Some *be*-verbs take, for example, a maleficiary object whose expression is not permitted to surface with the base verb: The intransitive *mogeln* 'cheat' in (8a) does not allow expressing who was cheated, while its applicative counterpart in (8b) does. While for *mogeln*, we can at least conceive of an implied maleficiary, other *be*-verbs are created from verbs such as *regnen* 'to rain', which takes no argument at either the syntactic or the conceptual level. Nevertheless, *beregnen* in (9a) may describe the thorough pouring of water onto a gas tank. Example (9b) illustrates that nouns lacking an argument structure of their own may be equipped with one as they enter the applicative pattern. For denominal *be*-verbs, Wunderlich stipulates the existence of phonologically empty morphemes such as 'put' (e.g. 'put traffic lights') which host noun and preposition incorporation at the same time. Since no verbs like *ampeln* 'to traffic light' exist, Wunderlich furthermore assumes that lexicalisation of the input to preposition incorporation for denominal *be*-verbs is prohibited (M&R 2001: 21).

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2 An optional verbal argument in Wunderlich's terminology.

2.2   A constructional approach to the German applicative

In light of the number of additional processes required for the lexical decomposition analysis of German applicatives, M&R propose "verb-level constructions, which unify with the lexical entries of verbs" (2001: 39) to yield the applicative construction. By introducing constructions as signs with their own argument structure, M&R can account for the instances of valence augmentation or creation illustrated in (7) - (9): According to Goldberg (1995, 1997), the number of thematic roles of a linking construction like the applicative may properly include that of the lexical verb plugged into it. If the verb lacks a location/goal/beneficiary/maleficiary argument, then the applicative construction will supply it. Thematic roles that overlap between verbal and constructional meaning fuse in the process of unification, for instance, the agent role of *mogeln* fuses with the agent role of the applicative, while roles provided by the construction alone enter the thematic core of the applicative verb via Talmy's (1988) Override Principle:

(10)   Override Principle: If lexical and structural meanings conflict, the semantic specifications of the lexical element conform to those of the grammatical structure with which it is combined.

This same principle also accounts for the existence of denominal and deadjectival *be*-verbs without recourse to phonologically empty material. The applicative construction overrides the syntactic category of the input and assigns its own verbal feature (M&R 2001: 46). Thematic roles added by the construction which are not present as arguments or adjuncts in the base lexeme are drawn from the "larger semantic frame which constitutes our understanding of the socio-cultural context in which the property or entity [or weather verb, author's addition] plays a role" (M&R 2001: 46). This formulation may seem vague because the exact mechanism via which referents for the vacant slots in the applicative construction are chosen is not elaborated, yet the overall idea makes sense intuitively: Taking (9b) as an example, traffic lights are part of a schema where they are put at crossings to regulate traffic, hence crossings and people installing traffic lights may be drawn on for agent and location arguments. In contrast, bakers and cake form no part of the schema evoked by the term *Ampel*, hence *Der Bäcker beampelte den Kuchen* 'The baker be-traffic-light-ed the cake' is semantically odd and only acceptable if we assume that there are decorative sugar traffic lights that can be put on a cake.

M&R hence propose that the applicative construction is a Saussurean sign with its own argument structure as well as a linking constraint that specifies that its location/goal argument be linked to the direct object function (2001: 61). At the same time, the construction licenses null complementation of the theme argument (which constitutes the direct object of the lexical verbs with which the applicative unifies), accounting for the omissibility of the theme argument noticed by Wunderlich and Brinkmann (2001: 42). Since argument structure constructions are form-meaning pairings, M&R propose that the meaning of the applicative construction in German can be described as a polysemous structure, a radial category of senses in Lakoff's (1987) terminology, at the heart of which is the scene in which a theme covers a surface (M&R 2001: 67). Metaphorical and metonymic extensions of this prototype account for the wide

variety of scenarios which *be*-verbs can describe.

3.   The interpretation of the direct object in German applicatives

Pinker (1989) analyses the locative alternation in English and proposes a lexical rule that converts the thematic core of a locative verb from "X causes Y to go into/onto Z" (theme-object) to "X causes Z to change state by means of moving Y into/onto it" (Pinker 1989: 79). Gropen et al. (1991) claim that in order for an argument to surface as direct object, "its referent [needs to be] specified as being affected in a specific way in the semantic representation of the verb" (118). Brinkmann (1997) concludes from this that a verb needs to provide information about both the manner in which its theme argument changes location and the type of change its goal or location argument undergoes in order to participate in the locative alternation - otherwise, either location or locatum cannot be interpreted as affected by the verbal action and the verb does not alternate. *Pour* in (11a) is an example of such a non-alternating verb: It specifies the manner in which water is moved towards a location, thus licensing a theme object, but it makes no predictions as to how the location is changed by the verbal action. The vase in (11a) may become filled to any degree, or, if it has a hole, it may even remain empty. *Load* in (11b), however, may surface with a location object or a theme object, because it denotes both a manner of moving objects and a change of state in the location, which becomes filled.

(11)   a. He poured water into the vase. / *He poured the vase with water.

          b. He loaded hay onto the cart. / He loaded the cart with hay.

          Different definitions of affectedness have been suggested in the literature. As illustrated above, Pinker (1989) equates the notion with a change of state, while for Gropen et al. (1991), affectedness encompasses both change of state (for location objects) and change of position (for theme objects). Michaelis and Ruppenhofer (2001) refine the concept by taking into consideration both physical and mental changes of state and allowing for these to be intended by the subject rather than necessarily effected by the verbal action. Beavers (2011) reviews the literature on affectedness and proposes that different degrees of affectedness reflect how specific a predicate is about the result state achieved by the verbal action. On the affectedness hierarchy he proposes, quantised changes of state such as *Kim lengthened the rope 5 inches* present the highest degree of affectedness, followed by non-quantised changes such as *Kim lengthened the rope*, predicates that indicate a potential for change, for instance *Kim wiped the table (clean)*, and predicates that indicate no change, for example *Kim laughed* (359). Types of change include properties of the direct object, its location, as well as complete consumption of a direct object referent. These different types are unified by a definition of change that involves transfer of a theme (the direct object) along a scale that defines the change. In *Kim lengthened the rope 5 inches*, for example, the theme *the rope* moves along a scale of length from an initial point *s* to a final point *s+5 inches*.
          Brinkmann (1997: 66) questions whether a location object necessarily changes state in English locative constructions, noting that many of them allow durational adverbials such as *for hours*. Such adverbials usually accompany verbs denoting states or

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processes, which Brinkmann contrasts with temporally bounded events such as changes of state. Hence, according to her, *spray* in (12) does not bring about a change of state in the lawn, because the verbal action is unbounded.

(12)   He sprayed the lawn with water for hours.

Dowty (1991: 591), however, notes that activities like spraying, for example painting, differ from loading activities in that one can continue to spray or paint even after a whole surface has been covered, yet one can generally not continue to load a container beyond its upper limit. *Spray* can thus have a telic or an atelic reading, yet its direct object is still considered to undergo a significant change of state: In Dowty's example, a wall becomes sufficiently covered in paint, and in (12), the lawn becomes soaked in water. Beavers (2011) also notes that telicity is closely linked to affectedness, but not co-extensive with it, as only quantised changes of state obligatorily involve telic predicates.

Turning now to German, Brinkmann argues (and M&R 2001 agree with her) that locations do not have to undergo a change of state in order to surface as direct objects of *be*-verbs. She provides the following examples of non-affected locations:

(13)   a. *Donna **be-streut**   den   Kuchen mit Zucker*.
            Donna APPL-sprinkle the.ACC cake   with sugar.DAT
            'Donna be-sprinkles the cake with sugar'

          b. *Die   Vandalen **be-streichen** das   Auto mit Farbe*.
            the.PL.NOM vandals   APPL-brush the.ACC car   with paint.DAT
            'The vandals be-brush the car with paint'

          c. *Die   Jungen **be-werfen** die   Wand mit Kieselsteinen*.
            the.PL.NOM boys   APPL-throw the.ACC wall   with pebbles.PL.DAT
            'The boys be-throw the wall with pebbles'

Be-sprinkling is argued not to change the cake in (13a) as "the sugar may end up on the cake in a thin or thick layer, or even in little heaps" and, similarly, the car in (13b) has not changed state as "the paint may end up on [it] in any pattern at all" (71). While the manner in which the theme moves towards the location is not indicated (a factor that should only play a role in the *be*-less theme object variant of the sentence), a change in the physical state of the locations in (13a) and (13b) is easily detected: The sugar now forms part of the cake and the car has (at least partly) a new colour. Brinkmann's observation about (13c), however, cannot be refuted, as it is unlikely that a wall would be affected in any way by being be-thrown with pebbles. Direct objects of *be*-verbs thus do not always have to change state. Following Beavers (2011), we may assume that verbs such as *bewerfen* still take an affected direct object: Predicates of surface contact or impact such as German *bewerfen* or English *wipe* and *hit* carry a potential for change since contact or, in Beavers' terms, force transmission, often constitutes a prerequisite for (physical) changes of state (2011: 356). While lower on the affectedness hierarchy than

actual (non-)quantised change of state, potential for change may still be subsumed under affectedness.

Nevertheless, Brinkmann and Michaelis & Ruppenhofer agree with Andersen's (1971) observation that applicative verbs treat their direct objects in a holistic manner. Holism is understood by all four authors as complete coverage or saturation of the object, hence, for example, the cake in (13a) is only be-sprinkled if its whole surface is covered in sugar. However, I argue that complete coverage is not the only relevant notion here. In fact, various sentences that have been argued by the above authors to involve saturation of a location are felicitous if we assume no complete coverage. Andersen (1971), for example, argues that (14a) presents a contradiction (marked by ⊥) but not all native speakers of English agree with his judgement. Presented with a parallel example in German (14b), native speakers of the language do not even raise an eyebrow but accept it as felicitous.

(14)   a. ⊥ John smeared the wall with paint, but most of the wall didn't get any paint on
           it. [Andersen 1971: 389]

        b. *Mäxchen*   ***be-schmiert*** *gerade die*   *Wand mit Marmelade*,
           Max.DIM.NOM APPL-smear   just   the.ACC wall   with jam.DAT

           aber glücklicherweise beschränkt er   *sich auf die*   *linke untere*
           but   luckily   limit   he.NOM REFL to the.ACC left   lower

           Ecke.
           corner
           'Little Max is be-smearing the wall with jam, but luckily he's limiting himself
           to the lower left corner.'

Complete coverage of the location is much less relevant to the speaker of (14b) than any detrimental change to its surface. Compare Beavers (2011: 357), who notes that "[i]f I chip the rim of a glass, is it less affected than if I smudge it all up? In principle we should keep quantity distinct from degree of affectedness". In that respect, *be*-verbs resemble scalar adjectives with a minimal endpoint. Just like an object is considered *wet* or *dirty* as soon as it exhibits a minimal amount of dirt or liquid, stains on the walls, curtains, or furniture of our homes or on our clothes are considered damaging to these objects, and removing them takes money, time, and effort. In the eyes of the speaker, then, as soon as a (small) portion of the location is covered by the theme, the verbal action significantly affects it.

Another case where complete coverage does not seem to be implied by *be*-verbs is when the theme represents a bounded, definite entity. Brinkmann (1997) argues that location arguments of *be*-verbs need to be non-incremental (in the sense of Dowty 1991) unbounded masses whose quantificational properties cannot determine the endpoint of the verbal action, allowing the action to continue until the location is completely covered. We do find, however, that *be*-verbs can be used in constructions with incremental themes like *Besitztümer* 'belongings' in (15), where at least for some native speakers of German

there is no implication that the car is fully loaded. In fact, Pinker (1989: 127) claims that English *load* and the semantically similar *pack* or *stock* occur in the applicative pattern without implication of full coverage, as long as the loaded or packed locations come to fulfil their function as containers.

(15) *Sie* **be-lud** *den Umzugswagen mit ihren wenigen*
       she.NOM APPL-load.PST the.ACC. loading.truck with her.PL.DAT few

       Besitztümern und sagte der Stadt für immer adieu.
       possessions and say.PST the.DAT city for always goodbye
       'She be-loaded the moving van with her few possessions and said good-bye to the city forever'.

Let us summarise what we know about the interpretation of the direct object of an applicative so far: The relevant argument is felt to be affected holistically by the verbal action, yet it does not necessarily have to change state physically or mentally (in actuality or intended by someone), potential for change is sufficient. The direct object referent also does not need to be covered completely by the theme.

At this point it may be instructive to consider the application of Dowty's (1991: 576) approach to argument selection via proto-roles and assume that the argument with the most patient-like entailments fills the direct object slot. Such entailments include

- a change of state: This entailment includes definite and indefinite changes of state as well as coming into existence or ceasing to exist (573),

- functioning as an incremental theme: Incremental themes are "NP[s] that can determine the aspect of the sentence, since the parts of the event correspond to parts of the NP referent that are affected by the action; the event is 'complete' only if all parts of the NP referent are affected (or effected)" (588),

- being stationary relative to another participant (573).

Applying this to the German applicative, we see that the direct object usually has more proto-patient entailments. It often changes state, while the oblique argument changes position, which according to Dowty is only a patient-like entailment when specific locations for the position change are indicated (1991: 574). Furthermore, the direct object may act as incremental theme and generally remains stationary with respect to the oblique argument moving towards it. The corresponding non-applicative verb takes as its direct object an argument that moves between specific locations and may act as an incremental theme, while its oblique argument changes state and remains stationary, which indicates that the ability to function as an incremental theme outweighs other proto-role entailments (Dowty 1991: 588). We can thus summarise that general interpretive principles of the direct object, namely to attract the argument with the most prototypical patient properties or host an affected participant, can account for the applicative pattern. In M&R's constructional view of German *be*-verbs, the holistic

interpretation of the direct object derives from the prototypical situation type described by these verbs, namely the (complete) coverage of a location by a theme over time, which affects the location object holistically. However, as M&R themselves observe, not all uses of the *be*-pattern denote (literal) saturation or coverage of a location. Some applicatives focus on transfer of a theme towards a goal or involve direct objects otherwise affected by a theme, hence coverage cannot account for holism by itself. Hence an account of holism that relies on general interpretive principles seems to cover the variety of scenarios described by *be*-verbs better than one which focuses only on one possible meaning of the applicative. In the following section, we will discuss whether another assumption of the constructivist approach, namely a common semantic core for *be*-verbs beyond that generally shared by transitive verbs, needs to be assumed for applicative verbs in German. Section 4.1 questions sense extensions from a core scenario of coverage that has been suggested by M&R (2000, 2001), while section 4.2 applies the findings of this examination to proposed constraints on *be*-verbs.

4.   The semantics of *be*-predicates
4.1   Do *be*-verbs share a common semantic core?

M&R (2000, 2001) propose that be-verbs form a semantically coherent category by virtue of being associated with a single semantic schema, at the core of which resides the scenario of covering a location with a theme. Exploiting the potential of this scene, M&R find metaphorical extensions such as 'seeing as contact with a percept', 'attending to a percept as contact with it', and 'discourse as travel over a topic'. In addition, they postulate metonymic inferences of coverage that create further denotations of *be*-verbs such as iterated or intensive action, transfer, and affecting. For the purposes of this paper, we will focus on these metonymic sense extensions.

        M&R consider coverage of a surface the prototypical implication of applicatives in German because they prevail in number (ca. 45% of the verbs classified in their study denote coverage of a surface) and have been innovated to a greater extent than, for example, verbs of removal such as *berauben* 'rob'. The examples of innovative *be*-verbs with a coverage sense provided by M&R are denominal *bespiken* 'put spikes onto', *bestrahlen* 'illuminate; irradiate [e.g. food]', and *beampeln* 'put up traffic lights'. Note that all three verbs are equally plausible from an affectedness perspective, such that a *bespikt* tire provides more traction on slippery surfaces, *bestrahlt* food supposedly becomes germ-free and the installation of traffic lights changes the traffic rules associated with a formerly all-way-stop crossing. The source of the coverage scenario, according to M&R (2001), is one of the meanings associated with the historical preposition *bi*, translated by Grimm (1854) with the Latin *circum* 'around, (entire or partial) encompassing and surrounding of an object' (Lewis & Short 1879). Grimm provides the example *sehen* 'see' versus *besehen* 'look at from all sides' which instantiates metaphorical coverage of an object with one's gaze. It should be added that Grimm's dictionary mentions a second usage of the prefix *be-* as expressing "the consummate impact on an object" (*be-*, Grimm 1854: vol. I line 12021206, my translation). Affectedness and coverage readings thus coexist since at least the 19th century, making both plausible candidates for a prototypical scenario associated with German applicatives.

        Turning now to the different related denotations of *be*-verbs, I propose that

various of the applicative's senses found by M&R may be subsumed under the notion of affectedness for economy's sake. Starting with the prototype itself, a careful examination of the verbs listed in M&R's (2001) appendix reveals that 23 out of 46 coverage-denoting verbs with an intransitive base denote a change in the mental or physical state of the direct object: *bedrücken* 'depress', *befallen* 'seize, infest', *beglänzen/ beleuchten/ bescheinen* 'shine on', *begrasen/beweiden* 'graze on', *behängen* 'hang on', *belecken* 'lick over', *bemannen* 'man (e.g. a ship)', *bespannen* 'span, stretch over', *bespringen* 'jump on', *bespritzen* 'spray on', *bevölkern* 'populate', *bewachsen* 'grow on', *bewuchern* 'grow rampant over/on', (ein Bett) *beziehen* 'make up (a bed)', *belegen/besetzen* 'occupy', as well as probably *befummeln/ betatschen* 'feel up', *begrapschen* 'grope', and *bekrabbeln* 'crawl around on'. As the English translations illustrate, the affectedness meaning may either be the primary meaning component as in *bedrücken* 'depress', or on a par with the coverage denotation, for example in *bewachsen* 'grow on', or secondary as in *beleuchten* 'shine on'. M&R point out that coverage does not necessarily imply full saturation of a surface, yet as we discussed in section 2 above, in such cases affectedness is often the dominating semantic component. Take, for example, *befummeln* 'feel up': The verb can describe a scenario where only specific parts of a person's body are touched, hence full coverage is not necessarily implied - but, crucially, this person's privacy is invaded, affecting them physically and mentally. This closer look at *be*-verbs formed from intransitive base verbs and listed as primarily denoting coverage shows that, while coverage of a surface is one possible implication of *be*-verbs, it may not be as dominant numerically as M&R (2001) assume.

One of the extended senses of German applicatives proposed by M&R is transfer of a theme onto a surface, which, according to the authors, falls out from the coverage scenario. However, not only does transfer imply that the referent in direct object position receives something which may well affect it, but M&R's examples involve purely metaphorical transfer of communicative objects as well as of effects. The question is why one would want to postulate a metaphorical sense extension of effect transfer when the same phenomenon can be described as affectedness without recourse to metaphor? *Beeinflussen*, literally 'be-influence (noun)', *beflügeln*, literally 'be-wing' (inspire), and *befrieden*, literally 'be-peace' (bring peace to) clearly imply affectedness of their direct object and only few verbs on M&R's list have a prominent transfer reading, for example *beschuldigen* 'accuse, put blame on' and *bevollmächtigen* 'authorise, give somebody authorisation'. Even these latter two verbs can be construed to involve affectedness, as an authorised person is imbued with power and an accused person is the maleficiary of an act of accusation.

Aside from transfer, M&R also suggest iteration and intensity as independent denotations of *be-* verbs in German. They argue that iterated action is often necessary to achieve complete coverage of a surface, and iteration in turn implies intensity. Some of the examples discussed by the authors do not necessarily imply iterated or intensive action, however. M&R's example *beziehen* 'draw, receive' often denotes repeated actions, as in their example (16a), yet it can also be employed for nonrecurring transactions, as in (16b), where the CEO receives a one-time payment.

(16)   a. *Es kann nicht angehen, daß auch auf kommunaler Ebene Wahlbeamte schon*
       *mit vierzig eine Pension **be-ziehen.***
       'It cannot be the case that even on the municipal level elected officials already
       be-draw a pension at the age of forty.' [M&R 2000: 383]

       b. *Die Lorbeeren bekommt jedoch der gescheiterte Noch-Vorstandschef*
       the.ACC laurels receive however the.NOM failed still.CEO

       *Eick. Er   **be-zieht**   eine Abfindung   von 15 Millionen.*
       Eick he.NOM APPL-draw a.ACC compensation of   15 million
       'Failed still-CEO Eick takes credit [for saving Arcandor's future]. He be-draws
       a compensation of 15 million [euros].
       [http://www.news.de/archiv/2009/nachrichten-vom-31-08-2009-Seite-8/, 20
       November 2012]

The authors also argue for a required iteration meaning of *befahren* 'drive on', observing
that (17a) sounds unacceptable to most German speakers when combined with the adverb
heute 'today'. If a nonrecurring driving act is thus forced, *fahren* 'drive' as in (17b) must
be used. Iteration cannot be the source of the unacceptability of (17a), however, as the
adverb *meistens* 'mostly, usually' results in an equally unacceptable judgement for (17a).

(17)   a. *??Ich   **be-fahre**   heute/meistens die   A3.*
          1SG.NOM APPL-drive today/mostly   the.ACC A3

       b. *Ich   fahre heute/meistens die   A3.*
          1SG.NOM drive today/mostly   the.ACC A3
          'I'll take/drive on highway A3 today/mostly.'

Further examples include *beballern* 'fire at', whose base verb *ballern* already implies
iterated shooting, hence the applicative does not add this meaning component; and
beziffern 'number', literally 'be-cipher', which can be explained by holistic coverage
and/or affectation of the manuscript or book to be numbered. While many of the 19 *be-*
verbs listed as involving primarily iteration imply a habitual or repeated action, most may
be covered under affectedness or coverage senses, making it questionable whether an
independent iteration sense needs to be postulated.

       With respect to intensive action, M&R's intuition diverges from mine in various
cases, for example, they claim that *bekämpfen* 'fight someone' implies higher intensity
than *kämpfen* 'fight', since "one is not simply fighting against something, but actively
combating something" (2001: 82). If combating implies that a person lines up weaponry
and musters all their strength to fight, then this may be true of both *kämpfen* and
bekämpfen, as (18) illustrates.

(18)   a. *Sie   kämpfen mit allen   Mitteln.*
          they.NOM fight   with all.PL.DAT mean.PL.DAT
          'They fight by all means (necessary).'

b. *Sie*   ***be-kämpfen*** *den*   *Terror mit*   *allen*   *Mitteln*.'
      they.NOM APPL-fight   the.ACC terror with all.PL.DAT mean.PL.DAT
      'They fight terror by all means (necessary).'

Another example of intensive action discussed in M&R is *siegen* 'win, conquer' versus *besiegen* 'conquer, defeat', which according to the authors implies a "more decisive resolution of a conflict" (2001: 82). However, both verbs identify a clear winner (the subject) and loser, the difference being that this loser is the direct object of *besiegen* whereas he or she is implied in *siegen*. We may wonder what it means for a conflict to be resolved more decisively - maybe the loser takes longer to recover from their loss, is hence more affected by the fight, but in that case, the use of the applicative can be explained equally well via *bekämpfen's* affectedness sense. For many of the verbs listed under intensive action no difference in intensity between the base form and the applicative is discernible: *lehren* 'teach' seems as instructive as *belehren* 'inform, instruct', *nagen* 'nibble, gnaw' implies neither more nor less fervent activity than *benagen* 'nibble, gnaw at' and a justice system that *strafen* 'punish' its criminals is not more lenient than one that *bestrafen* 'punish' them. Interestingly, simple argument promotion to direct object cannot be adduced to account for the applicative use in *belehren* and *bestrafen*, since in both cases, the base verbs take the beneflciary/maleficiary as their direct object as well. The differences here seem to be more idiosyncratic than systematic: *Strafen* has a poetic, archaic ring which *bestrafen* lacks, and *belehren* often involves correcting somebody's erroneous previous assumptions, while *lehren* has no such implications.

      M&R (2000, 2001) also consider affectedness as a sense extension of coverage and list 49 verbs in this category. Of these, 22 denote physical or mental changes in the direct object participant (for example *besaufen* 'get liquored up' and *bekehren* 'convert'), 13 take beneficiary or maleficiary objects (e.g. *bekochen* 'cook for somebody' or *beschwindeln* 'deceive'), a few have a secondary transfer or coverage sense *(besteuern* 'put a tax on', *behacken* 'be-chop') and a sizeable six *be*-verbs denote mating activities in the animal kingdom. Note that many of these verbs imply that their object is affected holistically in the sense discussed in section 3, for example *besaufen* affects the whole person drinking rather than a part of them, as does *bekehren* to the converted person. The holistic interpretation of the direct object here does not derive from coverage or saturation of the object, but from the fact that many of the predicates in this section are integrative (Lobner 2000) in that they view their objects as undivided wholes that are affected whenever a part of them is affected (for example *beschwindeln* or *bekochen)*. Interestingly, M&R (2000) argue that applicative constructions typically involve summative rather than integrative predicates, i.e. they favour predicates which are only true overall if they are true of all the parts of their direct object referents (347). This summative reading is compatible with M&R's proposed prototype, coverage of a surface, yet it does not extend to all uses of the applicative. Hence, as Wunderlich (1987) proposes, holism may be better explained via Lobner's Presupposition of Indivisibility which states that "[w]henever a predicate is applied to one of its arguments, it is true or false of the argument as a whole" (Lobner 2000: 18). M&R reject Wunderlich's explanation precisely because they argue that Lobner's Presupposition is too weak in not accounting for the more specific summative (but not integrative) denotation of *be*-verbs.

The existence of both summative and integrative applicatives in German favours Wunderlich's analysis over M&R's.

In summary, then, we have seen that many if not all of the verbs listed under M&R's various sense extensions can be subsumed under an affectedness reading. While transfer, iteration, and intensity 'resonate' in many of the verbs discussed here, most of them can be interpreted as involving an (intended) physical or mental change of state or the potential for it, e.g. by being the maleficiary or beneficiary of an action. One further observation supports this affectedness analysis. Beavers (2011) notes in passing that prior existence may be a factor relevant to affectedness: "perhaps something cannot be 'affected' if it did not exist prior to the event" (341). If prior existence were indeed a precondition on being affected, and applicative verbs favour affected direct objects, verbs of creation would be excluded from *be*-prefixation. A cursory glance at the first 200 be-verbs on M&R's list suggests that this may be true, as none of them takes a direct object that comes into existence via the verbal action. *Backen* 'to bake', a typical verb of creation, can take the applicative prefix, yet the direct object of *bebacken* is a recipient or beneficiary of baked goods rather than a baked good itself.

4.2   Constraints on *be*-prefixation and the applicative semantics

To highlight the role affectedness plays in the acceptability of applicative predicates, let us take a look at proposed constraints on *be*-prefixation in German. Brinkmann (1997) notes that accompanied motion verbs such as *ziehen* 'pull', *schieben* 'push', *schleppen* 'drag', and *tragen* 'carry' generally resist *be*-prefixation. These verbs focus on the manner in which a theme is moved, while the location towards which or where the theme moves is comparatively irrelevant. If, however, we coerce an affectedness reading for the location, it may surface as the direct object of an applicative verb:

(19)   a. *Du   willst dich doch nicht im   Ernst   mit   so   einem*
             you.NOM want REFL PART not   in.the.DAT earnest with such a.DAT

             *Monstrum   **be-schleppen**, um dem   Herrn Wulff bzw. seinem Amt*
             monstrosity APPL-drag   for the-DAT mister Wulff rather his.DAT office

             die   Ehre   zu geben.
             the.ACC honor to give
             'You do not seriously wish to be-drag yourself with such a monstrosity to give Mr. Wulff or rather his office the honour.' (on greeting then-Federal President Christian Wulff with an alphorn)
             [http://de.answers.yahoo.com/question/index?qid=20120308041931A A3qKTH, 9 December 2012]

          b. *Auf der   von Bernd Winnefeld ausgearbeiteten Strecke von gut*
             on   the.DAT by Bernd Winnefeld work.out.PTCP route   of roughly

             30 km mussten   verschiedene   Fahrbahnbelage bestritten
             30 km must.PST different.PL.NOM road-surface   deal.with.PTCP

werden. *Neben Asphalt, Schotter und Waldboden wurde auch*
AUX.PASS aside.from tarmac gravel and forest.soil AUX.PASS also

gelber Sandboden be-fahren bzw. *auch teilweise*
yellow.NOM sandy.ground APPL-ride.PTCP rather also partly

*„**be-schoben**“*.
 APPL-push.PTCP
'On the 30km path designed by Bernd Winnefeld several different road surfaces had to be covered. Besides tarmac, gravel, and forest soil, yellow sandy ground was be-ridden and partly be-pushed' (means of transportation: bike)
[http://www.ac-ahaus.de/files/aca-post_2-12.pdf, 9 December 2012]

In (19a) *beschleppen* is used reflexively and indicates that the thus be-dragged is slowed down or otherwise encumbered by carrying the alphorn, hence physically affected by the verbal action. The sandy ground in (19b), on the other hand, is presumably not changed by the bikers pushing their bikes across it, yet the surface contact implies force transmission, a prerequisite for physical change. *Beschoben* is used playfully, as the scare quotes signal, but legitimately, as the writer does not focus on the bikes being pushed but on the surface across which they were pushed.

   Further semantic classes of predicates proposed by Brinkmann (1997) to be barred from *be*-prefixation are verbs of non-directed motion, such as *rollen* 'to roll', *schleudern* 'to fling', or *wirbeln* 'whirl'; verbs of surface depression, for instance *stopfen* 'stuff' or *klopfen* 'to knock'; and verbs of position, such as *hängen* 'to hang', *stehen* 'stand' or *liegen* 'lie'. For each of these classes, instances of *be*-verbs can be found. *Berollen* in (20a), for instance, is based on a non-directed motion verb that instantiates M&R's coverage scenario: Berlin has the potential to be affected holistically by Poul Schacksen's be-rolling it with his wheelchair. Brinkmann (1997) cites example (20b) to illustrate the incompatibility of non-directed motion verbs with applicative *be-*, yet the *be*-flung yard is hardly affected by a few garbage bags littering it, the focus rests heavily on the manner of movement of the theme. If this focus is shifted towards how the goal of be-flinging is affected, *beschleudern* is acceptable, as example (20c) shows. Frequent attacks with metaphorical dirt are likely to affect a person's mental state, in this case, Bertolt Brecht's.

(20)   a. *Rollstuhlfahrer Poul Schacksen aus Kopenhagen willden 1997*
       erschienenen Wegweiser Handiguide Europa fortführen und zusammen
       *mit Movado Berlin **be-rollen**.*
       'Wheelchair user Poul Schacksen of Copenhagen wants to continue the guide 'Handiguide Europe', which came out in 1997, and be-roll Berlin together with Movado.' [M&R 2001: 99]

   b. **Sie **be-schleuderte** den Hof mit den Müllsacken*.
      'She be-flung the yard with the garbage bags.' [Brinkmann 1997: 70]

   c. *Wohl kein deutscher Literat des 20zigsten Jh ist in Ost und West*
      PART no.NOM German literary.figure the.GEN 20th c. be in East and West

*gleichermaßen dermaßen   mit Dreck **be-schleudert**   worden,*
equally   to.such.an.extent with dirt.DAT APPL-fling.PTCP AUX.PASS as

wie Bertolt Brecht.
as   Bertolt Brecht
'No other German literary figure of the 20th century was be-flung with dirt to
 equal degrees from the East and the West as Bertolt Brecht.'
[http://forum.spiegel.de/f7/literatur-lohnt-es-noch-zu-lesen-67-1729.html, 9
December 2012]

Example (3a) in section two illustrates that *stopfen* may serve as the base for
applicatives, and (21) shows the use of *be-* with intransitive verbs of position, namely
hängen and *liegen*. Note that in (21a), at least according to my intuition, the wall does
not have to be fully covered with pictures, but enough to be considered affected (e.g. in
that its aesthetic impression on the viewer changes from bare to decorated with pictures).
Likewise, the beds in (21b) are affected by cats lying on them in that, for example, they
lose copious amounts of hair on the sheets or tear holes into them (therefore, cats need to
be trained not to *be*-lie beds).

(21)   a. *Bilder **be-hängen** die Wand*.
             '*Pictures be-hang the wall*.' [M&R 2001: 103]

          b. *Sag ihr,   dass ihre   Katze pro Tag *mindestens* eine Stunde*
             tell she.DAT that   her.NOM cat   per day   at.least   one hour

             intensive Betreuung (Spielen/Schmusen) verlangt, sowie
             intensive care   play/   cuddle   demand as.well.as

             regelmässige erzieherische Aufmerksamkeit (Kratzbaum   mit
             regular   instructional attention   scratching.post with

             Nachdruck zum   Kratzen   nehmen lassen, nix   anderes, Tische,
             emphasis   for.the.DAT scratching take   let   nothing else   tables

             *erklettern, Betten **be-liegen** [...])*
             onto-climb bed.PL.ACC APPL-lie
             'Tell her that her cat requires *at least* an hour of intensive looking after
              (playing/cuddling) a day as well as regular attention to training (enforce the
              use of scratching posts - nothing else; [prevent] climbing up onto tables, be-
              lying of beds [...]).'
             [https://groups.google.com/forum/#!topic/de.rec.tiere.katzen/dJvwoHUtHtQ,
              12 August 2014]

     One class of verbs listed by Brinkmann (1997), however, shows that there are
true constraints on *be*-prefixation, namely directional verbs. *Fallen* 'to fall', *sinken* 'to
sink', *bringen* 'to bring' and *holen* 'to fetch' cannot be coerced into an applicative reading.
For example, native speakers of German presented with a scenario in which mobster

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bosses have let cement blocks (attached to the bodies of rival mobsters) sink into the Hudson River reject (22) as ungrammatical.

(22)   *_Die   Mafiosi   haben den   Hudson River   mit Zementblöcken_
        the.PL.NOM mobsters have   the.ACC Hudson River with cement.blocks

        be-sunken.
        APPL-sink.PTCP.
        'The mobsters have be-sunk the Hudson River with cement blocks.'

Brinkmann assumes that directional verbs "inherently denote direction" (1997: 186) and therefore do not allow a goal argument to be expressed overtly in a core argument function. The Hudson River in (22) can easily be construed as (having the potential to be) affected by the cement blocks, hence neither lack of affectedness or surface coverage block _besinken_, and, pending further research, we will adopt Brinkmann's explanation.

In summary, we have seen that providing the adequate context for an affectedness reading licenses many _be_-verbs that have been argued not to occur in the applicative. A small number of directional verbs are barred from _be_-prefixation for reasons other than inability to construe a sense in which the direct object is affected.

On the other hand, not all verbs that take the applicative prefix can be said to involve an affected direct object. One subgroup not described by M&R but emerging from their extensive list of _be_-verbs are applicative verbs that express the subject's opinion or attitude towards the referent denoted by the direct object. Among this rather sizeable subclass are _beanstanden_ 'criticise', _befürworten_ 'approve', _belächeln_ 'smile at', _begähnen_, literally 'be-yawn', and _beklatschen_, literally 'be-clap'. The semantic role of the direct object here may be losely defined as stimulus, they do not undergo physical or mental changes nor changes in location, nor are they consumed. One could argue that a positive or negative judgement from the subject has the potential to affect the typically human referents of these direct objects, yet potential for mental affectedness is not described in Beavers (2011) and cannot simply be transferred from physical affectedness. We can only speculate then that these applicatives exist because their objects have a potential for mental change or that the function of _be-_ here is simply valence creation or augmentation, since none of the nominal and verbal bases above _(Anstand_ 'propriety', _Fürwort_ 'good word', _lächeln_ 'to smile', _gähnen_ 'to yawn', and _klatschen_ 'to clap') take a direct object.

5.   Concluding remarks
The present study has reviewed the two major analyses of applicatives in German with a specific focus on the semantic interpretation of the direct object as well as a proposed semantic core for all verbs undergoing _be_-prefixation. I have shown that general principles account for the interpretation of the direct object better than construction-specific ones focusing on coverage of a surface with a theme, as suggested by M&R

(2000, 2001). In particular, the direct object referent needs to form part of an affectedness hierarchy and, if several arguments are available for the direct object slot, the one with the most prototypical patient properties is elected (see Beavers 2011, Dowty 1991).

Concerning a cover-all semantic schema associated with the applicative construction, we have seen such a variety of denotations of *be*-verbs that a common denominator would have to be equally broad as that uniting the denotations of transitive verbs. As I have shown, affectedness rather than coverage of a surface comes closest to uniting most *be*-predicates under its wings, hence rather than positing a polysemous structure with a coverage scenario at its center, I propose that the only common semantic denominator of applicative verbs is an affectedness reading for their direct objects. This analysis does not warrant positing a separate meaning for the applicative construction but allows viewing *be*-verbs as a subgroup of transitive verbs that imply affectedness of their direct objects.

Points for future research are, for example, whether all directional verbs are categorically blocked from applicative prefixation and how *be*-verbs with a stimulus direct objects could be integrated into the theory presented here.

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Revisiting the Semantics of the Portuguese Present Perfect[1]

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Abstract
This study reexamines the semantics of the Portuguese Present Perfect and proposes an analysis of this periphrastic past that does not appeal to type-shifting coercion mechanisms. Aspectual coercion was claimed to explain purported mismatches between selection restrictions of the Portuguese Present tense and the aspectual properties of the Perfect (Schmitt 2001). The present study proposes a truth-conditional compositional analysis of sentences with the Portuguese Present Perfect in which the lexical meaning of the auxiliary *ter* 'have' combined with the meaning of the Present Indicative tense (*ter*+PresInd) contribute a universal quantifier whose domain is the topic time interval.

1   Introduction

It is well known that the Portuguese Present Perfect does not exhibit some of the most prominent properties found across present perfects often cited in the literature (Giorgi and Pianesi 1997; Squartini and Bertinetto 2000; Ilari 2001; Schmitt 2001; Molsing 2007, 2010; Amaral and Howe 2009, 2012; Cabredo-Hofherr et al. 2010). In typological studies the semantic category perfect (PFCT) (Comrie 1976, Dahl 1985, Bybee et al. 1994, among others) has been identified and characterized as yielding at least four distinct meanings, which are summarized below and illustrated with English examples.

1. The *Universal perfect* expresses that a state or an event-in-progress holds throughout a time interval that stretches from some point in the past up to the present (Utterance Time). The utterance time is included in the interval across which the eventuality holds.

(1) My sister has been in the hospital for a while now.

2. *Experiential perfects* require the eventuality to hold at least once in the past over a period of time that extends up to the present.

(2) I've had oysters only once in my life.

3. The *perfect of result* is obtained when a past eventuality yields a resultant state. In perfects of result the predicate denotes a change of state and entails the existence of a result state at the time of utterance.

(3) Context: The speaker has taken the driving test today.
     S: I've passed the driving test.

4. The *perfect of recent past* or *Hot News* is used to refer to an eventuality that relates to utterance time by temporal proximity and is "salient due to its surprise

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value" (Schwenter 1994: 997). Hot news perfects are typically used in newspaper headlines and news broadcasts as a way to report recent information.

(4) Dear citizens, our President has died.

Most analyses of the Portuguese Present Perfect are based on the observation that this form cannot denote single events (5a), a constraint that prevents the sentences in which it occurs from having some of the interpretations we saw in (1)-(4). Only sentences expressing iterated events of the same type are acceptable to native speakers of Portuguese, illustrated in (5b).

(5) a. # Tenho   comido ostras   só   uma vez na   vida.[2]
             have:PRS.1SG eat-PTCP oysters only one time in.the   life
             'I've had oysters only once in my life.'
      b.   Tenho   comido ostras   muitas   vezes   na   vida.
             have:PRS.1SG eat-PTCP oysters many   times   in.the   life
             'I've had oysters many times in my life.'

The paper is organized as follows. Subsection 1.2 introduces the theoretical framework in which my analysis of the Portuguese Present Perfect is couched. I present the approaches assumed for temporal and aspectual reference, grammatical tense and aspect, and lexical aspect. Section 2 presents data from the Portuguese Present Perfect and compares it to prototypical perfects as described above. Section 3 discuses Schmitt's (2001) analysis and its shortcomings. Section 4 provides empirical evidence against a coercion-based analysis. Section 5 presents my own account which bases the semantic properties of this form on the interaction of context, eventuality structure and length of the topic time interval. Section 6 concludes the paper.

1.2 Theoretical framework

The theoretical framework assumed in this paper is a neo-Reichenbachian one. I assume that lexical aspect (see Dowty 1987 and Smith 1997) is a property of both lexical items and clauses. This means that lexical aspect can emerge compositionally, rather than being a property of single lexical items only. The lexical content of a sentence is the semantic content contributed by the lexical items without tense and aspect (Klein 1992, 1994; Cover & Tonhauser 2013). Lexical contents bear inherent aspectual properties. The sentence *Ann loves Paul* describes an Ann-loving-Paul eventuality, and its lexical content is <Ann love Paul>. There are five lexical aspect categories generally identified in the literature, namely, states, activities/processes, accomplishments, achievements, and semelfactives. All of them are characterized by different properties. States, activities/processes, and semelfactives are atelic, that is, there is no logical endpoint for their lexical contents. In contrast, achievements and accomplishments are telic since their lexical contents have a natural or inherent endpoint. The sentences in (6) illustrate the different kinds of lexical aspects.

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[2]Glosses abbreviations are: 1SG: 1st person singular; 2SG: 2nd person singular; 3SG: 3rd person singular; 1PL: 1st person plural; 2nd person plural; 3rd person plural; FUT: future; IMPFV: imperfective; PFTV: perfective; PRS: present; PTCP: participle; RFL: reflexive; SUBJ: subjunctive.

(6) a. States
Ann loves Paul.

    b. Activities/Processes
Paul danced last night.

    c. Accomplishments
Ann wrote a 50-page paper.

    d. Achievements
That car smashed a squirrel.

    e. Semelfactives
The gigantic eagle flapped its wings.

For the tense-aspect analysis of the Portuguese Present Perfect I adopt the Extended-Now Theory (*XN-theory*). This theory was originally proposed for the English Present Perfect (McCoard 1978, Bennett and Partee 2004, Dowty 1979) and later adapted for analyses of perfects in other languages (see Laca 2010 for Spanish; Cabredo-Hofherr et al. 2010 for Portuguese; Musan 2002 and Rathert 2001, 2003 for German). Under the *XN-theory*, the Portuguese Perfect denotes a time interval, the *extended-now* interval, which I will call *topic time* (TT). TT is the time an uttered clause is about (Klein 1994), and the perfect relates this time to the *eventuality time* (ET), the time at which the eventuality described by a clause is temporally located. The right boundary of the topic time is the *evaluation time*, or *utterance time* (UT) in the case of the Present Perfect. The evaluation time is the time relative to which the truth conditions of a clause are evaluated. Example (7) illustrates these two relations:

(7) Esse   ano   o   Nuno   tem   me   visitado   bastante.
      this   year   the   Nuno   have:PRS.3SG   me   visit-PTCP   a.lot
      'This year Nuno has visited me a lot.'

In (7), the frame adverbial *esse ano* 'this year' constrains the topic time interval, which is an interval that starts at the beginning of the year in which the sentence is uttered and ends at the time of utterance; the present tense in the auxiliary conveys the relation between the topic time and the evaluation time, the latter being the right boundary of the former. In matrix sentences the evaluation time is the utterance time, so that the truth of a matrix sentence is evaluated at UT. The eventuality time is the time at which the eventualities of the speaker's son's visits occur. These relations are represented in (8).

<p align="center">EVENTUALITY TIME</p>

$$ev_1....ev_2....ev_3...............ev_n ....$$

(8) a.   ———$[\underline{\hspace{4cm}}$ [UT] ———
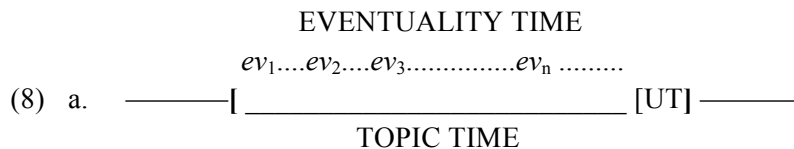
<p align="center">TOPIC TIME</p>

In (8), the Topic Time is the time between the outer brackets (in bold), the Utterance Time (UT) is the right boundary of the Topic Time, ([UT]), and the Eventuality Time is the time composed of the run times of the atomic eventualities $ev_1...ev_n$.

2   The Portuguese Present Perfect

Previous studies have observed that the Portuguese Present Perfect does not exhibit the array of readings typical of present perfects, which have been summarized above in the introduction. In contrast with languages like English and Spanish, Portuguese Present Perfect sentences cannot describe single events, as illustrated by the unacceptability of (9c) below:

(9) Context: Milton had a terrible car accident and was in the hospital for a long time. He finally arrives home.

    a.   Milton has arrived today.

    b.   Milton   ha   llegado   hoy.   (Span.)

          Milton   have:PRS.3SG   arrive-PTCP   today

          'Milton has arrived today.'

    c. #   O   Milton   tem   chegado   hoje.   (Port.)

          the   Milton   have:PRS.3SG   arrive-PTCP   today

          (Intended: Milton has arrived today.)

    d.   O   Milton   chegou   hoje.   (Port.)

          the   Milton   arrive-PST.PFTV.3SG today

          'Milton arrived today.'

The English and Spanish examples in (9) illustrate both a perfect of result and a recent past reading, which are unacceptable in Portuguese, (9c). (9d) says that the event of Milton's arriving has occurred today and that he is here now. This example shows that the perfective past is the form used for expressing the past occurrence of a single eventuality with a resultative reading. The example in (10) illustrates the unacceptability of existential readings in sentences describing single events.

(10) Context: Tiago is a choir conductor. He has received one invitation for his choir to sing at an important venue once in the past.

    #   Temos   recebido   um convite

        have:PRS.1PL   receive-PTCP   one invitation

        'We have received one invitation.'

    Present perfect sentences with stative lexical contents allow for readings in which the described eventuality holds continuously throughout the topic time interval, which stretches from some point in the past up to the time of utterance.[3] Thus, in (11), the sentence describes a state of Ana being continuously tired, which overlaps with the time of utterance. I will name this type of reading the *continuous-universal reading* (CU).

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[3]According to Cabredo-Hoffher et al. (2010) the Portuguese Present Perfect in the variety spoken in the city of Natal, Brazil (Northeast) does not exhibit continuous readings with stative lexical contents but rather iterative readings.

Portuguese sentences with stative lexical contents also pattern with sentences with eventive lexical contents in allowing for readings in which the described eventuality holds at discontinuous intervals, rendering what I will name the *iterative-universal reading* (IU). This type of reading is illustrated in (12), where the state of Ana being depressed does not hold continuously but occurs at intermittent intervals throughout TT. Finally, example (13) shows the iterative reading mandatory with eventive lexical contents.

(11) Context: Ana has been working extra hours lately and has been feeling constantly tired.

A	Ana	tem	estado	muito	cansada.	(CU)
the	Ana	have:PRS.3SG	be-PTCP	very	tired	

'Ana has been feeling very tired.'

(12) Context: Ana has been experiencing frequent episodes of depression.

A	Ana	tem	estado	com	depressão.	(IU)
the	Ana	have:PRS.3SG	be-PTCP	with	depression	

'Ana has been depressed.'

(13) Context: Ana has been working until 10 pm because of a close deadline.

A	Ana	tem	trabalhado	até	tarde.	(IU)
the	Ana	have:PRS.3SG	work-PTCP	until	late	

'Ana has been working until late.'

As I mentioned earlier, the Portuguese Present Perfect also yields existential iterative readings, although this fact has been overlooked in much of the literature. These readings are best illustrated by the occurrence of adverbs like *já* 'already' and vague iterative adverbials like *poucas vezes* 'a few times' or *várias vezes* 'several times'. The example in (14) illustrates this reading:

(14) O SIMBA – de quem já temos falado aqui
the Simba of whom already have:PRS.1PL speak-PTCP here
várias vezes, e que é um dos cão-panheiros com
several times and that is one of.the dog-panions with
necessidades especiais…
needs special

'Simba – of whom we have already talked several times here, and that is one of our *dogpanions* with special needs…'[4]

The occurrence of adverbs like *já* 'already', *poucas vezes* 'a few times' or *varias vezes* 'several times' is a good test for existential readings of perfects, and as shown in (14) they are perfectly compatible with the Portuguese Present Perfect. Thus, (14) involves the occurrence of multiple events of speaking about Simba, a dog with special

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[4](https://www.facebook.com/parquedaterranova/posts/10152758782535076)

needs, in the past throughout TT. Here the relation between ET and TT is that of proper inclusion, ET $\subset$ TT.[5]

To summarize, the division between states and events is relevant for the interpretations they yield in combination with the Portuguese Present Perfect. In general, Portuguese Present Perfect sentences can be characterized as describing either continuous or iterative eventualities with stative lexical contents and iterative eventualities with eventive lexical contents.[6]

2.2   Non-Present forms

Across Portuguese varieties, perfect forms with the auxiliary in non-present indicative tenses do not exhibit the restrictions found in the Present Perfect (see Cabredo-Hofherr et al. 2010, Schmitt 2001, Squartini 1998). Neither iterativity nor continuous-universal readings of statives are mandatory as illustrated in the following examples with the Future Perfect (15), and the Present Subjunctive (16) forms. In both examples the single eventualities described in the main clauses occur at an interval that precedes the TT interval, which is specified by the subordinate temporal clause in (16). In (17), the subordinate sentence in the perfect subjunctive describes a single eventuality of the addressee missing the train.

(15) Quando você   chegar,   já   eu   terei
     when   you   arrive:FUT.SUBJ.2SG already I   have:FUT.1SG
     acabado   a   minha   palestra.
     finish-PTCP   the my   lecture
     'When you arrive, I will have already finished my lecture.'

(16) Não   acredito   que você   tenha   perdido
     NEG   believe:PRS.1SG   that you   have:PRS.SUBJ.2SG   miss-PTCP
     o   trem.
     the   train
     'I can't believe that you just missed your train.'

This contrast between the Present Perfect and the non-present forms has been used as evidence to put forward analyses of the Portuguese Present Perfect attributing certain properties to the Perfect and (aspectual) selectional restrictions to the Portuguese Present tense. The next section discusses such analyses.

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[5]I do not fully address here the availability of existential readings in Portuguese Present Perfect sentences. For a more detailed discussion, see Molsing (2007, 2010).

[6]Most authors consider the Portuguese Presente Perfect to be a universal perfect. However, Molsing (2007, 2010) and Chamorro (2012) argue that the Portuguese Present Perfect exhibits iterative-experiential readings: multiple eventualities of the same type lie within the topic time interval and do not overlap with the utterance time. Example (i) illustrates the iterative-experiential reading:

(i)   Eu   já   tenho   visitado   outros   países   na   Europa.
      I   already   have:PRS.1SG visit-PTCP other   countries in.the   Europe
      'I have already visited other countries in Europe.'

The variety of Natal, Brazil is excluded since it has been argued by Cabredo-Hofherr et al. (2010) that the Present Perfect in this area only exhibits universal readings.

3 Previous analyses: A coercion-based analysis

Schmitt (2001) proposes an account of iterativity in Portuguese sentences with the Present Perfect based on coercion (following de Swart 1998). According to de Swart, coercion is an implicit contextually governed process of reinterpretation that comes into play whenever there is a mismatch between the lexical aspect of the eventuality description[7] and the input condition of an aspectual operator with which the eventuality description combines. Mismatches between aspectual restrictions on functors and aspectual properties of their arguments are resolved then by the introduction of reinterpretation mechanisms that type-coerce the arguments into the desired aspectual type (see Deo & Piñango 2011).

Schmitt assumes a classification of eventuality descriptions in states, processes, and events, the latter comprising achievements and accomplishments (cf. de Swart 1998). States and processes are classified as atelic (or homogeneous in Schmitt's words), both having the properties of cumulative and divisive reference (parts of an eventuality of *John sleeping* are themselves eventualities of *John sleeping*). On the other hand, achievement and accomplishment events are telic and have quantized reference (parts of an event of *Mary drawing a circle* are not themselves events of *Mary drawing a circle*). Aspectual operators apply to eventuality descriptions taking as input an eventuality description of an aspectual class and returning as output an eventuality description of the same or different aspectual class. Example (17) illustrates how the imperfective aspectual operator takes the telic eventuality description <run ten miles> and returns an atelic eventuality description.

(17) Matt now is running ten miles (every day). (Atelic)

Following de Swart's (1998) proposal for French Passé Simple and Imparfait, Schmitt (2001) assumes that tenses may present semantic selectional restrictions on the eventuality descriptions they take as input. According to Schmitt, in the Portuguese Present Perfect, there is a mismatch between the aspectual restrictions of the Present tense and the aspectual properties of the Perfect. Schmitt claims that in Portuguese the Present tense selects stative verbal predicates and that the Perfect outputs eventive verbal predicates. In order to make the eventive eventuality description compatible with the aspectual requirements of the Present tense, coercion is applied forcing habitual or iterative readings.

Schmitt presents the contrast in acceptability between (18a) and (18c) as evidence for the aspectual requirements of the Portuguese Present tense. When the argument of the Present tense operator is a process, an event-in-progress reading is not possible, (18a). The input process must be coerced into a state, giving rise to a habitual reading, as illustrated in (18c). In contrast with (18a-b), example (19) shows no coercion since the input is a state and yields a continuous reading. Schmitt presents the data in (18a-c) as evidence for the inability of the Portuguese Present tense to yield process interpretations.[8]

(18) a. * O Pedro canta neste momento.

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[7]The notion of *eventuality description* presented in de Swart (1998) belongs to the level of predicate-argument without tense and grammatical aspect.

[8]I believe that what Schmitt calls *process interpretations* are characterized as *progressive or event-in-progress* readings of imperfective aspect in current approaches on aspect (see Deo 2006, 2010).

<div align="center">

the Pedro   sing-PRS.3SG   in.this   moment

</div>

     b.   *   'Peter sings (right now).'

     c.   O   Pedro   canta   (Habitual reading)

            the   Pedro   sing-PRS.3SG

            'Peter sings.'

(19)   O   Tiago   mora   em   Sumaré.   (Continuous reading)

                  the   Tiago   live-PRS.3SG   in   Sumaré

                  'Tiago lives in Sumaré.'

In Portuguese the coercion operator always applies because the Perfect does not output states but rather events. Schmitt illustrates this with the examples presented in (20) and (21), (Schmitt 2001: 440, examples (63) and (64)):[9]

(20)   O   Pedro   tem   discutido   o   problema   com

            the   Pedro   have:PRS.3SG   discuss-PTCP   the   problem   with

            a   Maria.

            the   Maria

            'Pedro has been having discussions with Maria about the problem.'

(21) #   O   Pedro   tem   morrido.

            the   Pedro   have:PRS.3SG   die-PTCP

      #   'Pedro has died repeatedly.'

According to Schmitt, in (20) the coercion operator applies to an eventive eventuality description <Pedro ter discutido o problema com a Maria> (<Pedro have discussed the problem with Maria>), which is the output of the Perfect. Compared to (20), example (21) is not acceptable because coercion generates a pragmatically odd interpretation of Pedro dying multiple times.

Schmitt also claims that the Portuguese Perfect outputs events out of states. She supports this claim using a Present Perfect example containing the stative verb *saber* 'to know', (22a), which is contrasted with an example in the Present tense, (22b). The pair of sentences is intended to show that in (22b) the lexical aspect of the verb *saber* 'to know' does not need to be coerced into a stative since it is already stative; (22b) predicates a property of the individual Claudia. In (22a), the sentence asserts that there are multiple events of Claudia showing her knowledge of French. According to Schmitt, this difference in interpretation correlates with a difference in lexical aspect between the input predicates: *ter sabido francês* 'to have known French' is an event, while *saber francês* 'to know French' is a state. In the former, the Perfect type-shifts the stative predicate into an event, and the only way to make the event compatible with the Present tense is to force a habitual or an iterative reading via coercion.

(22) a.   A   Cláudia   tem   sabido   francês.

          the   Claudia   have:PRS.3SG   know-PTCP   French

          'Claudia has known French.'

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[9] For consistency, glosses for data taken from other authors are mine. English translations are kept as in the original examples.

b. A   Cláudia   sabe   francês
   the   Claudia   know-PRS.3SG   French
   'Claudia knows French.'

<div align="right">(Schmitt 2001: 441, example (66))</div>

In the next section I discuss Schmitt's proposal. The discussion centers on the fact that it fails to account for the new data presented in this paper. I propose an analysis that accounts for both the data she provides and the new data that her analysis cannot account for.

4   Evidence against coercion

In this section I will provide empirical evidence in support of two claims: (i) the Present tense in Portuguese does not present the selectional restrictions presented above and (ii) the Portuguese Perfect outputs both states and events. I will suggest that the source of iterativity is not coercion. Rather, iterativity is part of the core meaning of the Portuguese Present Perfect (see Amaral and Howe 2012 and Molsing 2010 for a similar view).

4.1   Continuous readings

Continuous readings of Present Perfect sentences (cf. section 1) are left unexplained in Schmitt's analysis.[10] These readings can arise with stage-level states. The coercion-based analysis fails to account for these readings. In fact, it makes the wrong prediction: Portuguese Present Perfect sentences with stative lexical contents always output iterative interpretations since coercion applies because the Perfect outputs events from stative inputs.

Examples (23) and (24) illustrate the availability of continuous readings. They assert that the states of Ana-being-tired and of Pedro-being-very-sick hold at intervals coextensive with TT.

(23) Context: Ana has been working extra hours lately and has been feeling
     constantly tired.
     A   Ana   tem   se   sentido   muito   cansada.
     the   Ana   have:PRS.3SG   RFL   feel-PTCP   very   tired
     'Ana has been feeling very tired.'
(24) Context: Pedro has missed classes for a while now. He's been sick without
     interruption.
     O   Pedro   tem   estado   muito   grave.
     the   Pedro   have:PRS.3SG   be-PTCP   very   sick
     'Pedro has been very sick.'

All consultants accepted the continuous readings in both (23) and (24). They also accepted the iterative reading for both in a context that specifies that the eventualities held intermittently.[11]

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[10]All my consultants, who are from different parts of Brazil and from Portugal, accept continuous readings with stage-level predicates.

[11]As an anticipation of my analysis (section 5), the temporal relation between ET and TT is ET is included in TT (ET $\subseteq$ TT). ET may be properly included in TT in the case of existential readings or the two

Under the coercion analysis, (23) and (24) would not be acceptable and could only be interpreted iteratively. (25) illustrates how this analysis would not produce the continuous interpretation for (23).

(25) a.   The Perfect outputs an event:
       A Ana **ter estado** muito cansada 'Ana have been very tired'
    b.   The Present tense coerces the event into a state by iteration:
       A Ana **tem estado** muito cansada 'Ana has been very tired (repeatedly)'

(25a-b) shows that the coercion mechanism undergenerates, an undesired result given that it predicts only the availability of iterativite readings in all Portuguese Present Perfect sentences.

Sentences with non-Present Perfects yielding continuous readings present another problem surrounding the idea that the Perfect outputs events. If we assume that the Present requires states as inputs and that the Perfect outputs events, combining non-Present forms of the auxiliary *ter* 'have' with the Perfect should always return eventive predicates. Example (26) challenges this prediction.

(26) Eu tinha   morado   até os   sete   anos   em
     I   have:PST.IMPFV.1SG live-PTCP   until the seven   years   in
     São Paulo,   e   aos   sete   anos   a   gente   foi   para
     São Paulo   and at-the   seven   years   the people   went   to
     Belo Horizonte.
     Belo Horizonte.
     'I had lived in São Paulo until I was seven and at seven we moved to BH.'

In (26), the state of the subject living in São Paulo holds true throughout an interval that starts at birth up to the time specified by the second conjunct of the coordination, when the speaker moved to Belo Horizonte at age seven.

4.2 Accounting for *ter sabido* 'have known' cases

We have seen thus far that the Portuguese Present Perfect is compatible with continuous readings when combined with stative lexical contents. We still need to account for data like (22a), which force iterative readings. One must differentiate between two types of statives according to whether they can have both continuous and iterative interpretations or just iterative ones in Portuguese Present Perfect sentences. Examples (23) and (24), and (22a) instantiate them respectively. Instances of stative predicates that can have both are *morar* 'to live', *estar doente* 'to be sick', *amar* 'to love'. The predicate *saber* 'to know' belongs to the second type. We must account for the fact that the ones that only present iterative readings seem to belong to a particular class of statives, namely, individual-level predicates, while the ones that allow both readings belong to the stage-level group.

I will propose that the different behavior of statives when combined with the Portuguese Perfect is related to *episodicity* (Kratzer 1995, Carlson 1977, Carlson et al.

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intervals may be coextensive in the case of universal readings. I consider that if ET goes beyond TT this is not part of the asserted meaning.

1995). Episodicity is a property of eventualities. While all non-stative predicates are episodic, stative predicates can be further classified as episodic and non-episodic. As Deo (2009: 61) explains, "episodic properties are properties of spatio-temporally delimited eventualities; eventualities that are crucially located in time and space. Sentences with episodic predicates describe particular events or episodes, while sentences with non-episodic predicates report a generalization over instances of individuals or eventualities." Predicates like *ser inteligente* 'to be intelligent', *ter olhos verdes* 'to have green eyes', *ser de cor laranja* 'to be orange' are non-episodic predicates, while *morar* 'to live' or *amar* 'to love' are episodic predicates. Episodic stative sentences can be spatio-temporally located by adverbial expressions like *in the East Coast* or *in the morning*, whereas non-episodic stative sentences describe generalizations that are true in general rather than at particular spatio-temporal locations. This contrast is illustrated in (27a-b).

(27) a. O   menino tem   olhos   verdes.   (*non-episodic*)
         the   child   have:PRS.3SG eyes   green
         'The child has green eyes.'
     b. # O   menino tem   tido   olhos   verdes.
            the child   have:PRS.3SG have-PTCP eyes   green
     c. # The child has had green eyes.

While the sentence in (27a) describes a generalization (i.e., have green eyes) over an individual (i.e., the child), the sentence in (27b) renders an odd interpretation because the property denoting predicate 'have green eyes' is not compatible with an episodic interpretation, which is required by the use of the Present Perfect.

Thus, the explanation I propose is based on the idea that the semantic contribution of the Portuguese Perfect can be characterized in terms of episodicity. Some non-episodic states like <*ser inteligente*> <be intelligent> may be shifted into episodic predicates via iterativity, as in the case of Schmitt's example in (22a). In these cases the Perfect returns an episodic predicate. Consider the English examples in (28a-b) and (29a-b). In (28a), we have a non-episodic property-denoting clause. The predicate *build model airplanes* can be true of John without John having built a single airplane. In (28b), the sentence with the Present Perfect has an episodic reading: there must have been actual repeated occurrences of John building model airplanes for the sentence to be true. In (29a), the predicate is non-episodic, and in (29b) it is shifted into an episodic predicate.

(28) a. John builds model airplanes.   (*non-episodic*)[12]
     b. John has built model airplanes.   (*episodic*)
(29) a. John is intelligent.   (*non-episodic*)
     b. John has been intelligent (during the meeting). (*episodic*)

In Portuguese, there are non-episodic predicates that can be shifted into episodic ones via iteration, which guarantees that the predicate is instantiated at discontinuous subintervals of the TT. Such is the case of example (22a) for Portuguese, which can only be interpretable if there are actual instances of Ana showing her knowledge of French. Some non-episodic predicates cannot be shifted into episodic ones because they express

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[12]Adapted from Deo (2009: 61, example (18e)).

permanent properties of individuals, properties independent from spatiotemporal locations.

Summing up, the data with continuous readings provide empirical support to propose that the Perfect in Portuguese outputs not only events but also states. The aspectual properties of the lexical contents are maintained in the output when combined with the Perfect. These data provide evidence against treating the Present tense as imposing aspectual restrictions on its arguments and coercing an atelic interpretation upon a telic Perfect predicate. This approach makes the undesired prediction that Present Perfect sentences with stage-level predicates must produce iterative interpretations. I offered an explanation based on episodicity for mandatory iterativity with certain individual-level predicates. This explanation is compatible with the availability of continuous readings with stage-level predicates. Stage-level predicates are inherently episodic and therefore a reading in which a single eventuality holds at an interval that properly includes TT is unproblematic.

5   Toward an analysis

In this section I propose and develop a universal quantifier analysis of the Portuguese Present Perfect that predicts both the availability of iterative and continuative readings. The analysis is grounded in Chamorro's (2012) work on the *tener*-perfect form in the Spanish of Galicia as denoting a universal quantifier.[13] It offers a compositional analysis by which the lexical meaning of the auxiliary *ter* and the Present tense semantics are combined. As a consequence, the inflected auxiliary contains a "weak" universal quantifier[14] the domain of which is the topic time interval. The domain of quantification is "weak" in the sense that the quantifier does not always require quantification over all subintervals of TT, as in continuous readings, but over relevant subintervals of the TT interval, as in iterative readings. Weak quantification makes the truth conditions of a universal quantifier less strong, allowing quantification over relevant parts of an interval. Within this analysis iterativity is taken to be part of the core semantics of the Portuguese Present Perfect and not as a consequence of mismatches between functors and their arguments. Both iterativity and continuativity will depend upon the interaction of the structure and duration of the eventualities, the length of the topic time interval and discourse context.

Section 3 showed that in Portuguese the Present Perfect, when combined with episodic stative lexical contents, can produce two readings: continuous and iterative. They are illustrated again in (30) and (31), respectively.

(30) Context: Maia has lived in the same neighborhood during graduate school.

A	Maia	tem	morado	só	na	Urca.
the	Maia	have:PRS.3SG	live-PTCP	only	in.the	Urca

'Maia has lived only in Urca.'

(31) Context: Maia has lived in the same neighborhood on different occasions during graduate school.

A	Maia	tem	morado	na	Urca.

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[13]Chamorro's (2012) proposal for the Galician Spanish construction builds on Deo's (2006, 2010) analysis of the progressive aspect, and on Deo & Piñango's (2011) analysis of *for*-adverbials).

[14]The notion of *weak universal quantifier* is taken from Deo & Piñango's (2011) analysis of *for*-adverbials, which means that the domain of quantification of the *for*-adverbial is contextually determined.

	the	Maia	have:PRS.3SG	live-PTCP	in.the	Urca

'Maia has lived in Urca (repeatedly).'

Examples (30) and (31) show that the availability of both continuous and iterative readings has to do with the presence of a stage-level predicate, the length of TT, and the role of context. TT has to be sufficiently long to allow the instantiation of Maia-living-in-Urca. These data show that quantification over TT (the years of graduate school up to the time of utterance) is context-sensitive. Both sentences can be true in both situations presented by the context. In the continuous reading, (30), TT is coextensive with the runtime of a single state denoted by the predicate. Iterative readings, on the other hand, involve the occurrence of multiple events of the same type included in TT. Note also that the iterative reading in (31) is compatible with discussions or questions related to the other place(s) Maia lived during graduate school, while the continuous reading in (30) is incompatible.[15]

When the Present Perfect combines with eventive lexical contents, it naturally returns multiple discontinuous events of the same type that are mapped onto regular partitions of the TT interval. The length of TT and the partition measure have to be sufficiently long for the occurrence of the events at regular subintervals of TT. This is illustrated by (32a-b), where the eventualities of Maia training in the morning are regularly distributed across daylong partitions of a six-month interval (TT) whose right boundary is the utterance time (UT). (32b) represents the relations between UT and TT, and between TT and ET, where TT (six months) is delimited by the outermost brackets. UT is the right boundary of TT. The vertical lines across TT mark the regular partitions of TT across which each atomic eventuality of Maia training is located.

(32) a.　Context: For six months now Maia has been training for a marathon.

	A	Maia	tem	treinado	de	manhã.
	the	Maia	have:PRS.3SG	trained-PTCP	of	morning

'Maia has been training in the morning.'

　　b.　　　　　　　Topic Time (six months)　　　　　　UT
　　　[——(ev)——|——(ev)——|——(ev)——|——(ev)——|——(ev)——]——>
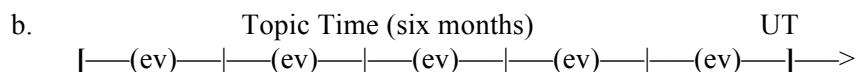
5.1　The analysis

The (weak) universal quantifier contained in *ter* + PresInd (i.e. auxiliary *ter* inflected for Indicative Present tense) quantifies over a regular partition R of the topic time interval i, R_i. A regular partition R is defined as a set of collectively exhaustive, non-overlapping, and equimeasured subintervals. The length of the partition measure, that is the length of each partition-cell, is an existentially bound variable[16] whose value will be determined by linguistic (e.g., frequency or iterative adverbs such as *raramente* 'rarely' or *várias vezes* 'several times') or extra-linguistic context.

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[15]Thanks to Timothy Gupton for bringing this point to my attention.

[16]In Deo (2009) and Deo & Piñango (2011), the partition-measure R is a free variable whose value will be determined by context. The present study departs from these authors' characterization of R in that R is an existentially-bound variable whose value may be specified by co-occurring frequency or iterative adverbials.

Eventualities: I assume a domain of eventualities *Ev*. I take sentence radicals as predicates of eventualities with lexical contents that describe eventualities (states or events).

Intervals: I assume an interval-based semantics of time with a time structure $\langle I, <, \circ, \subseteq, \subset \rangle$ where *I* is a set of intervals *j, k,…n*, represented in (33). Intervals may stand in the temporal relations stated in (34).

(33) $I = \{j, k, \ldots n\}$

The temporal relations between two intervals *j* and *k*, members of *I*, are stated below in (34a-d):

(34) a. $<$ 'precedence' $(j < k \leftrightarrow \forall t \forall t'(t \in j \land t' \in k \rightarrow t < t'))$

The definition in (34a) says that the precedence relation is a strict partial ordering of the set *I*. An interval *j* temporally precedes an interval *k* if and only if for all times *t* in *j* and all times *t'* in *k*, *t* temporally precedes *t'*.

   b. $\circ$ 'overlap' $(j \circ k \leftrightarrow \exists t (t \in j \land t \in k))$

The definition in (34b) states that two intervals *j* and *k* are in the overlap relation if and only if there is an interval *t*, which is a member of both *j* and *k*.

   c. $\subseteq$ 'subinterval' $(j \subseteq k \leftrightarrow \neg \exists t (t \in j \land t \notin k))$

(34c) defines the subinterval relation: the interval *j* is a subinterval of the interval *k* if and only if there is no time *t*, member of *j* that is not a member of *k* (or if and only if all times *t*, members of *j*, are also members of *k*).

   d. $\subset$ 'proper subinterval' $(j \subset k \leftrightarrow \neg \exists t (t \in j \land t \notin k) \land \exists t'(t' \in k \land t' \notin j))$

And in (34d) the proper subinterval relation is defined as follows: the interval *j* is a proper subinterval of the interval *k* if and only if there is no interval *t* member of *j* that is not a member of *k* and there is an interval *t'* member of *k* that is not a member of *j*.

   I adopt Krifka's (1998) temporal trace function τ_{ev}, which is a function from U_{ev} to U_I. The temporal trace function maps eventualities to their runtime, that is, the time at which an eventuality takes place.

   For any $i \in I$, a regular partition of *i*, R_i, is the set of non-empty collectively exhaustive, mutually exclusive, equimeasured subsets of *i*.

(35) R_i is a regular partition of *I* if R_i is a set of intervals $\{j, k...n\}$ such that

   a. $\bigcup \{j, k...n\} = i$ collectively exhaustive
   b. $\forall j, k \in R_I \rightarrow j \cap k = \emptyset$ if $j \neq k$ mutually exclusive

c. $\forall j, k \in R_I \rightarrow \mu(j) = \mu(k)$ equimeasured

<div align="right">(Adopted from Deo & Piñango 2011: 305)</div>

The COINcidence relation, in (36), is defined as the instantiation of a predicate P over eventualities, $P(ev)$ or over intervals, $P(I)$, at an interval i.

$$(36)\ \textbf{COIN}\ (P, i) = \begin{cases} \exists ev[P(ev) \wedge \tau(ev) \circ I] & \text{if } P \subseteq E \\ P(I) & \text{if } P \subseteq I \end{cases}$$

5.2 Iterative readings

With eventive lexical contents iterative readings arise naturally. The partition measure (the size of each cell j) will depend on the interaction between the structure of the event, the length of the topic time interval, and the context. With states the partition measure R_i is also set to a non-infinitesimal value. Retrieving this value will depend on information about the length of the topic time and context (linguistic or extra-linguistic).

The translation of the auxiliary *ter* combined with the Present tense is presented in (37). The type is *<it, it>*. The sample sentence in (38) is true at an interval i iff the duration of i is sufficiently long and every member j of a contextually determined regular partition of i, R^c_i COINcides with P. A step-by-step translation derivation of (38) is given in (39). The auxiliary in the present indicative combines with the untensed participial radical to yield a formula of type *<it>*. This formula combines with a zero-morpheme frame adverbial to yield a formula of type t. The predicate S is true at (topic time) interval I iff every cell j, a member of the partition R of I, coincides with S.

(37) *ter*+PresInd $= \lambda S \lambda I \exists R[now \subset_{final} I \wedge S(I) \wedge \forall j(j \in R^c_I \rightarrow \text{COIN}(S, j))]$

(38) A   Maia   tem   cantado.

   the   Maia   have:PRS.3SG   sing-PTCP

   'Maia has sung repeatedly.'

(39) Translation derivation of (38)

   a. Maia cant-   'Maia sing'$_{\langle ev, t\rangle}$

       = *sing'*(m)

   b. ter -ado 'PTCP'$_{\langle\langle ev, t\rangle, \langle i, t\rangle\rangle}$

       = $\lambda P \lambda i_{Top} \exists ev[P(ev) \wedge \tau(ev) \subseteq i_{Top}]$

   c. Maia ter cantado 'Maia have sing-PTCP'$_{\langle i, t\rangle}$

       = $\lambda i_{Top} \exists ev[sing'(m)(ev) \wedge \tau(ev) \subseteq i_{Top}]$

   d. tem 'have:PRS.3SG'$_{\langle\langle i, t\rangle, \langle i, t\rangle\rangle}$

       = $\lambda S \lambda I \exists R[now \subset_f I \wedge S(I) \wedge \forall j(j \in R^c_I \rightarrow \text{COIN}(S, j))]$

   e. Maia tem cantado 'Maia has sung'$_{\langle i, t\rangle}$

       = $\lambda I \exists R[now \subset_f I \wedge \exists ev(sing'(m)(ev) \wedge \tau(ev) \subseteq I) \wedge \forall j(j \in R^c_I \rightarrow$

$$\exists ev'\,(sing'(m)(ev') \wedge \tau(ev') \circ j))]$$

f. $\varnothing$ 'TAdv' $_{\langle i,\,t,\,t\rangle}$

  = $\lambda P \exists I_{Top}[P(I_{Top})]$

g. $\varnothing$ 'TAdv' Maia tem cantado $_t$

  = $\exists I_{Top}\,[\lambda I \exists R[now \subset_f I \wedge \exists ev(sing'(m)(ev) \wedge \tau(ev) \subseteq I) \wedge \forall j(j \in R^c_I \to$

     $\exists ev'\,(sing'(m)(ev') \wedge \tau(ev') \circ j))](I_{Top})]$

  = $\exists I_{Top}\,[\exists R[now \subset_f I_{Top} \wedge \exists ev(sing'(m)(ev) \wedge \tau(ev) \subseteq I_{Top}) \wedge \forall j(j \in R^c_{ITop}$

     $\to \exists ev'\,(sing'(m)(ev') \wedge \tau(ev') \circ j))]]$

The formula in (39g) says that the utterance time *now* (which is the evaluation time of the sentence) is a final subinterval of TT and that Paula's singing is true at TT and that for every subinterval *j*, a member of the regular partition of TT there is an eventuality of Paula singing that coincides with *j*.

    In (39b), I assume with Schmitt (2001) that the untensed auxiliary *ter* 'have' combined with the past participle form –*ado* 'PTCP' is the piece of morphology that conveys the Perfect meaning, that is, the relation between the eventuality time and the topic time, which is expressed as ET ⊆ TT. The formula denotes a function from predicates over eventualities to a function from intervals to truth-values. In (39d), the auxiliary in the present tense is translated into the formula of type *<it, it>*. The interpretation of the formula is a function from intervals to truth-values to another function from intervals to truth-values. The first two conjuncts of the formula state that *now* (which is a free variable of the utterance time) is the evaluation time and that it is a final subinterval of the topic time interval *I*. The auxiliary in the present tense also contributes the universal quantifier, and its semantics is specified in the fourth conjunct of the formula: for every cell *j*, a member of the regular partition *R* of the topic time interval, there is an eventuality denoted by the predicate *S*, the runtime of which coincides with *j*. The superscript *c* on *R* indicates that the partition of I_{top} is context dependent and it can be set by co-occurring frequency adverbials or by extra-linguistic context. *R* is existentially bound in order to be able to specify its partition measure with co-occurring frequency or iterative adverbials.

4.3 Continuous readings

Continuous readings only arise with episodic (stage-level) stative predicates. This shows that the universal quantifier is sensitive to the aspectual class of the predicates and, in the case of states, whether they are episodic or non-episodic. The two different readings, continuous and iterative, can be naturally captured by the context-induced variability of the partition-measure. For example, a sentence like (40) may be interpreted as either continuous or iterative depending on context, which provides a partition of the appropriate measure. If Maia has lived in Urca continuously during her graduate school years, then (40) will be true at all infinitesimal subintervals of the topic time interval. However, if Maia has lived in Urca on different occasions during graduate school, then (40) will be true at larger subintervals.

For continuous readings to arise, it is crucial that the partition measure of R_i be set at an infinitesimal value such that the predicate holds at all infinitesimal subintervals of the topic time interval (R_i^{inf}). If every infinitesimal subset j coincides with an eventuality of Maia living in Urca then I coincides with an eventuality of Maia living in Urca. (41) offers a derivation for (40).

(40) A   Maia   tem   morado   na   Urca.

      the   Maia   have:PRS.3SG   live-PTCP   in.the   Urca

      'Maia has lived in Urca.'

(41) a.   A Maia mor- na Urca 'Maia live in Urca'

         =   *live-in-Urca′ (m)*

    b.   ter –ado 'have -PTCP'

         = $\lambda P\lambda i_{Top}\exists ev[P(ev) \wedge \tau(ev) \subseteq i_{Top}]$

    c.   A Maia ter morado 'Maia have live-PTCP'

         = $\lambda i_{Top}\exists ev[\textit{live-in-Urca}′(m)(ev) \wedge \tau(ev) \subseteq i_{Top}]$

    d.   tem 'have:PRS.3SG'

         = $\lambda S\lambda I\exists R[now \subset_f I \wedge S(I) \wedge \forall j(j \in R^C_I \rightarrow \text{COIN}(S,j))]$

    e.   A Maia tem morado na Urca

         = $\lambda I\exists R[now \subset_f I \wedge \exists ev(\textit{live-in-Urca}′(m)(ev) \wedge \tau(ev) \subseteq I) \wedge$

               $\forall j(j \in R^{Inf}_I \rightarrow \exists ev′(\textit{live-in-Urca}′(m)(ev′) \wedge \tau(ev′) \circ j))]$

    f. $\varnothing$ 'TAdv'

         = $\lambda P\exists I_{Top}[P(I_{Top})]$

    g. $\varnothing$ A-Maia tem morado nessa rua

         = $\exists I_{Top} [\lambda I\exists R[now \subset_f I \wedge \exists ev(\textit{live-in-Urca}′(m)(ev) \wedge \tau(ev) \subseteq I) \wedge$

               $\forall j(j \in R^{Inf}_I \rightarrow \exists ev′(\textit{live}′(m)(ev′) \wedge \tau(ev′) \circ j))](I_{Top})]$

         = $\exists I_{Top} [\exists R[now \subset_f I_{Top} \wedge \exists ev(\textit{live-in-Urca}′(m)(ev) \wedge \tau(ev) \subseteq I_{Top}) \wedge$

               $\forall j(j \in R^{Inf}_{I_{Top}} \rightarrow \exists ev′(\textit{live-in-Urca}′(m)(ev′) \wedge \tau(ev′) \circ j))]]$

The formula in (41g) says that the utterance time *now* is a proper final subinterval of TT and that Maia living in Urca is true at TT and that for every subinterval j, a member of the regular partition of TT there is an eventuality of Maia living in Urca that coincides with j. Since R is set at an infinitesimal value a continuous reading is obtained.

     We have seen that the Portuguese Present Perfect is sensitive to episodicity. Non-episodic predicates are not interpretable if they cannot be episodicized. But the ones that can be episodicized are interpretable by way of iteration. In brief, iteration guarantees the

availability of temporal gaps. Thus, *ter*+Pres. quantifies over partitions of TT the same way it does with eventive predicates (cf. § 5.1).

6   Conclusion

The analysis of the Portuguese Present Perfect provided in this paper involves the presence of a 'weak' universal quantifier over interval partitions of TT. The interpretation of Present Perfect sentences does not require the insertion of covert coercion operators that resolve aspectual mismatches. A coercion operator that maps eventive predicates onto stative ones is not necessary to explain iterativity. Iterative readings arise by the interaction between the structure of the eventuality, the length of TT and context.

Another advantage of the present analysis is that it offers a more transparent approach that aims to build meaning compositionally from overt morphology. Thus iterativity is now placed on overt morphology. The aspectual contribution of the Perfect expressed by *ter* + '-PTCP' involves the relation between TT and ET. In addition to the TT and ET relation, the Perfect returns eventive as well as stative predicates allowing for both continuous and iterative readings. In this approach it is the combination of the lexical semantics of the auxiliary *ter* and the Present tense that involves universal quantification over interval partitions. Finally, the analysis also brings to the foreground the contribution of context and its interaction with the temporal structure of eventualities, their length, and the length of the topic time.

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Structure Building by Phase-Heads[*]

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This paper explores an alternative way of structure building in minimalism and proposes that along with other operations in Narrow Syntax such as Feature-Inheritance and Transfer, structure building is also initiated only by phase heads. Consequently, this paper takes one step further Chomsky's (2007, 2008, 2013) generalization that all operations in Narrow Syntax are restricted to the phase level. It further investigates the implications of phase-head initiated structure building for the motivations for Feature-Inheritance and Transfer (Chomsky 2007, 2008, Richards 2007) and shows 1) that no derivation can converge at the C-I interface without Feature-Inheritance (i.e., Feature-Inheritance is necessitated to satisfy interface conditions) and 2) that the operation Transfer is a natural by-product of (Internal) Merge.

Keywords: Structure-building, Phase-head, Feature-Inheritance, Transfer, Internal Merge

1. Introduction

In minimalism (Chomsky 1995 *et seq*.), structure building has been assumed to proceed in a bottom up fashion by recursive application of a set-forming operation called Merge. What has been further assumed (implicitly at least) in this framework is that the derivation starts with V. Take, for example, the generation of the v*P domain of a typical transitive construction: we start with V, merge it with its complement DP, and create the first set, {V, DP}. Then we introduce v* into the workspace and merge it with the existing structure, which gives us {v*, {V, DP}}. We complete the v*P domain by introducing another DP and merging it with {v*, {V, DP}. As a result, we have {DP, {v*, {V, DP}.

The question this paper discusses is concerned with the very beginning of the above derivation. That is, among many other lexical items, why is it V that is first chosen and introduced into the workspace? In other words, how does syntax know such is (or must be) the case?

The aim of this paper is two-fold. First, focusing on the v*P domain, I will explore an alternative way of structure-building where the first element introduced to the workspace is not V but the phase head v*. Consequently, I will argue that along with other operations in Narrow Syntax (NS) such as Feature-Inheritance and Transfer (Chomsky 2007, 2008), structure-building is also initiated only by phase heads. Second, I will examine some theory-internal implications of phase-head initiated structure building for the formulation of Feature-Inheritance and Transfer proposed in current minimalism (Chomsky 2007, 2008, Epstein et al. 2011, Richards 2007) and propose that the former is necessitated by interface conditions and the latter is a by-product of (Internal) Merge.

The organization of the paper is as follows: In section 2, I briefly overview structure building in the v*P-phase level (implicitly) assumed in minimalism (Chomsky

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1995 *et seq*.) and point out some conceptual problems with it. In section 3, I introduce six conditions, all of which are either a modification or a specification of existing conditions/postulates proposed at various stages in minimalism. Based on the conditions developed in section 3, I show in section 4 how structure building can also be initiated only by phase heads. In section 5, I explore implications of phase-head initiated structure building for Feature-Inheritance and Transfer and show that these operations can be better motivated with phase-head initiated structure building. Section 6 concludes the paper.

2. Structure building: the puzzle

In minimalism (Chomsky 1995 *et seq*.), structure building has been assumed to proceed in a bottom up fashion by recursive application of a (two-membered) set-forming operation called Merge defined below in (1):

(1)   **Merge**
        Merge takes two objects, X and Y, to form a set $\{X, Y\}$.[1]

If X above is external to Y, Merge of X and Y is called External Merge (EM), while, if X is internal to or part of Y, Merge of X and Y is called Internal Merge (IM).

    Let us now examine how a typical transitive construction as illustrated in (2) is generated by recursive application of EM, where EA and IA reflexively refer to External and Internal Argument.

(2)   Step I: $\{V, IA\}\}$
        Step II: $\{v^*, \{V, IA\}\}$
        Step III: $\{EA, \{v^*, \{V, IA\}\}\}$

In Step I, V and its complement, IA[2], undergo Merge to form a set, $\{V, IA\}$. Then, in Step II, v^* is introduced and merges with the existing set, $\{V, IA\}$, to form another set, $\{v^*, \{V, IA\}\}$. Finally, in Step III, EA is introduced and undergoes Merge with the existing set, $\{v^*, \{V, IA\}\}$, to form yet another set, $\{EA, \{v^*, \{V, IA\}\}\}$.

    The puzzle in the above derivation (conventionally-assumed) in current minimalism is, among many other lexical items (i.e., heads) in the lexicon (or in the Numeration), why is it that V is first chosen and introduced into workspace? In other words, how does syntax know in advance that such is (or must be) the case? One possible answer to this question might be to assume that syntax 'somehow' knows that the derivation will crash (or will be interpreted as gibberish) if it makes other choices than V since they will all eventually create a structure that would lead to a violation of the Extension Condition defined as in (3):

(3)   Extension Condition (Chomsky 1995)
        Merge must extend the root of the structure it applies to.

Suppose, for example, that EA (instead of V) is chosen first and subsequently undergoes EM with v^*, creating $\{EA, v^*\}$. Suppose further that V is later introduced and undergoes EM with the existing structure. There seem to be at least two different ways this EM of V

[1.] The internal structure of X or Y can be either simple (i.e., a head) or complex (i.e., an outcome of Merge).
[2.] If IA itself is a set (e.g. $\{D, N\}$), what V merges with is the set, $\{D, N\}$. Throughout the paper, however, IA (and EA) is assumed to be a simple lexical item like *John* and often used interchangeably with D unless otherwise mentioned.

can proceed. One is that V undergoes EM with the existing set, creating another set, {V, {EA, v*}}. Although the resulting structure conforms to the Extension Condition (3), it is not what we would want to generate because the C-I interface would incorrectly interpret the head V as the Spec of v*. The other option would be that V undergoes EM with the head v* as discussed in Chomsky (2000). This would create a structure as in (4b):

(4) a.

EA   v* $\Longrightarrow$ b.

EA   v*

v*   V
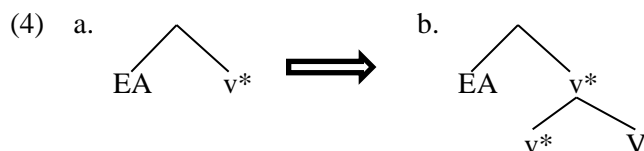
Although the resulting structure in (4b) is what we want to derive, the way V merges with v* violates the Extension Condition (3) because merging V with the head v* does not extend the root of the previously-generated structure. Assuming, however, that syntax thus somehow knows 'in advance' which derivation will lead to a violation of the Extension Condition and for that reason, syntax must start with V (and IA), immediately and inevitably runs into a problem because it invokes look-ahead properties.[3]

3. Phase-head initiated structure building

Concerning the operations in NS with respect to phase heads, Chomsky (2008) proposes the following generalization (author's italics)[4]:

> It is also natural to expect that along with Transfer, all other operations will also apply at the phase level. That implies that IM should be driven onl*y* by phase heads [i.e. C and v*]. If *only phase heads trigger operations* …

If the above proposal is indeed on the right track, it should be (at least) conceptually natural to assume that structure-building, an operation in NS, is also triggered only by phase heads. Taking Chomsky's generalization one step further, I will show in what follows that structure-building can also proceed with a phase head.

3.1 Selectional features and their satisfaction

Let us first briefly clarify technical terms for an alternative account of how structure building proceeds. First, I assume a group of features of a head H distinct from the rest of the features of it, calling the former 'selectional features' of H. To be more specific, selectional features of H include: 1) features for (thematic) argument(s) that H takes and 2) features for another head that H subcategorizes for.[5] In a simple transitive structure, for example, the head V (immediately dominated by v*) bears only one selectional

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[3.] Another possible answer to the question might be to argue that all other possible derivations are indeed tried out and only one (converging) derivation survives among them. Although this solution does not invoke look-ahead issues as the first answer does, it will impose more complexity on the Computational System of Human Language (C_{HL}, Chomsky 1995) since in the worst-case scenario, C_{HL} will need to try out three alternative derivations (i.e., v*, IA (= D/N), and EA (= D/N)), which will all ultimately lead to a violation of the Extension Condition.

[4.] Similar proposals are found in Chomsky (2007, 2013).

[5.] These selectional features encompass what Collins (2002) calls Theta(X, Y) and Subcat(X, Y) relations where X is the head that requires Y.

feature, namely, the feature that requires a DP/NP (as its complement)[6], whereas the head v* has two, i.e., the feature that requires a DP/NP for its argument and the feature that requires V for its subcategorization. I will call a head H with these selectional features a 'selector'. Hence, V and v* are a selector (while a DP is not). I further assume that these selectional features are uninterpretable so that a structure will crash at the interfaces if it reaches the interfaces with unsatisfied selectional feature(s). Therefore, all selectional features of a selector must be satisfied before a derivation reaches each of the interfaces.

3.2 The operation SELECT and the summoning condition

Following Chomsky (1995), I assume an operation SELECT but unlike Chomsky's, our SELECT 'directly' access the lexicon, chooses a head, and puts it into the workspace. In other words, our SELECT does not access an intermediate buffer such as the Numeration as proposed in Chomsky (1995). However, both come free as suggested in Chomsky (1995):

> Note that no question arises about the motivation for application of Select […] If Select does not exhaust the numeration, no derivation is generated […] The operations Select and Merge are "costless".

Although I agree that the motivation for the operations (i.e. Select and Merge) themselves are conceptually natural, I will put a restriction on the operation SELECT and propose that like any other operations, it can be initiated only by phase heads (i.e. either C or v*). In other words, I assume that the only lexical items in the lexicon that are visible to the initial search by SELECT are phase heads.[7]

A question that immediately arises at this point is, how can non-phase heads then be chosen from the lexicon if phase heads are the only legitimate lexical items that can be accessed by SELECT? I propose the following condition on the operation SELECT to address this issue.

(5)   **Summoning Condition on SELECT**
        SELECT can access a non-phase head H only if H is required to satisfy a selectional feature of a head that has already been introduced into workspace.

Once a phase head is introduced into a workspace by (the initial search of) SELECT and non-phase heads are subsequently accessed and introduced into the workspace by SELECT under the Summoning Condition,[8] EM begins to operate on them so that the Selectors and the heads summoned undergo EM to satisfy selectional features of the Selectors. From this perspective, the function of EM can be taken to construct a structure where all the selectional requirements of a head are satisfied, and what motivates EM can

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[6.] I will put aside the situation where this type of V takes a clause as its complement since the issue here is not concerned with the categorical status of complement.

[7] One might wonder if it is a mere (extra) stipulation that the initial search by SELECT can only see phase heads. If we consider, however, the pivotal roles of phase heads in current minimalism as the initiator of NS operations (e.g. Feature-Inheritance, Transfer), the idea is not much of a stipulation.

[8] The idea behind the Summoning Condition is not identical but similar to that of Feature-Inheritance (Chomsky 2007, 2008) where T, which is not an inherent probe, is assumed to be able to function as a probe only after it inherits φ-features from C.

be viewed as the selectional features of the head.[9]

3.3 Restriction on EM

Chomsky (2000) claims that "[p]roperties of the probe/selector α must be satisfied before new elements of the lexical subarrary are accessed to derive further operations." Modifying Chomsky's claim, Collins (2002) proposes the following Locus Principle (italics are mine):

(6)   **Locus Principle**
        Let X be a lexical item that has one or more probe/selectors. Suppose X is chosen from the lexical array and introduced into the derivation. Then *the probe/selectors of X must be satisfied   before any new unsaturated*[10]*lexical items are chosen from the lexical array*. Let us call X the locus of the derivation.

Let us consider how the above Locus Principle blocks unwanted derivations such as (7a) and (7b) (taken from Collins (2002)):

(7)   a. {I' will {VP John arrive}}
        b. (C, {I' will {VP John arrive}})

Suppose that a derivation reaches the stage in (7a), where (E-)Merge of I with VP creates I'. Suppose further that at the next stage in (7b), C is chosen and introduced into the workspace. (E-)Merge of C with I' is blocked by the Locus Principle (6) since at this stage I' still has (at least) one more feature to be satisfied (i.e., its EPP feature) and C also has its own features to be satisfied (e.g., its subcategorization feature). In other words, "two unsaturated lexical items [i.e. C and I'] occupy the workspace simultaneously" and therefore, "the derivation is ruled out by the Locus Principle." Adopting the basic idea in Chomsky's claim and Collins' Locus Principle, I propose the following principle:

(8)   **Repulsion Principle**
        Two selectors, each bearing one or more unsatisfied selectional features, cannot undergo EM with each other.

Notice that the above Repulsion Principle is a weaker version of Collins' Locus Principle since the former does allow more than one selector with unsatisfied selectional feature(s) to be introduced into the same workspace, whereas the latter preempts this possibility. The result, however, is predictively identical, i.e., they both block the possibility of EM between two selectors each of which bears one or more unsatisfied selectional features ('unsaturated lexical items' in Collins' terms).
        Finally, I propose a condition on the interpretation based on the Label Accessibility Condition (LAC) proposed in Epstein, Kitahara and Seely's (2011,

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[9] This implies that the Edge-Feature proposed in Chomsky (2007, 2008) is not necessary (at least) for EM in our framework. It further implies that the expletive *there* in English cannot be introduced by EM as it is not required by a selectional feature as we defined it. In fact, there have been proposals that the expletive *there* is base generated in Spec-D and subsequently moves to Spec-T to satisfy the EPP-feature of T. See Waller (1997), among others. I will put aside this interesting issue here without further discussion.

[10] A lexical item that contains at least one unsatisfied probe or selector is *unsaturated*. (Collins 2002).

henceforth EKS):

(9)   **Label Accessibility Condition (LAC)**
        Only the label of an entire syntactic object, the root, is accessible to Narrow Syntax.

EKS (2011) proposes the LAC, arguing that 'LAC itself is deducible since any system must access something and given third factor considerations[11], access is made with least effort. I assume EKS' LAC without further discussion but modify it to a condition on interpretation at the interfaces as below:

(10)   **Single Label Condition on Interpretation**
        An expression must have a single label to be interpreted at the interfaces.

It may seem that adding the three conditions I have proposed in this section imposes more complexity on NS but as I mentioned at the end of section 1, each of these conditions is either a modification or a specification of an existing condition. Therefore, they do not add more complexity to NS.

        To sum up, I list all the three proposed conditions below:

(5)   **Summoning Condition on SELECT**
        SELECT can access a non-phase head H only if H is required to satisfy a selectional feature of a head that has already been introduced into workspace.
(8)   **Repulsion Principle**
        Two selectors, each bearing one or more unsatisfied selectional features, cannot undergo EM with each other.
(10)   **Single Label Condition on Interpretation**
        An expression must have a single label to be interpreted at the interfaces.

4. Derivation

Consider now how the selection structure of typical transitive constructions such as *John loves Mary* is built under the conditions I have proposed so far.[12] First, v* is introduced into a workspace by the operation SELECT as we assume that phase heads are the only lexical items visible to the initial search by SELECT.[13] Subsequently, non-phasal lexical items are accessed and introduced into the same workspace by SELECT under the Summoning Condition (5): V and D_{John} (=EA) are introduced since they both are required by the selectional features of v*; D_{Mary} (=IA) is subsequently introduced into the workspace as it is required by the selectional feature of V. We now have four lexical items in our workspace, namely, v*, V, D_{John}, and D_{Mary}. (11) below lists two of conceivable EMs between these four lexical items[14]:

[11.] Chomsky (2005) argues that "[…] the third factor […] includ[es] principles of efficient computation."
[12.] I assume the categorical status of proper nouns (e.g., John, Mary) to be D and represent them as $D_{Proper\ Noun}$ in tree diagrams.
[13.] One may wonder why SELECT chooses v* first rather than C and what regulates the choice. Although it is unlikely that the choice (or order) between v* and C will make any difference, I will limit my discussion to the v*P-domain because space does not permit us to discuss it here.
[14.] We do not assume that there is any order in the two instances of EM in (11a) and (11b), although they are described as if there were ordered.

(11) a. EM Option I: {v*, V}, {D$_{John}$, D$_{Mary}$}
      b. EM Option II: {v*, D$_{John}$}, {V, D$_{Mary}$})

Option I is ruled out by the Repulsion Principle (8). That is, v* and V cannot undergo EM with each other since at this point, each has their own unsatisfied selectional features. D$_{John}$ and D$_{Mary}$ also cannot undergo EM with each other as neither D$_{John}$ nor D$_{Mary}$ carries any selectional features as we defined them. In contrast, no conditions developed so far prevents Option II: v* can undergo EM with D$_{John}$ since the former has an unsatisfied selectional feature (i.e. a feature requiring an External Argument), whereas the latter does not bear any unsatisfied selectional features. In the same vein, V can undergo EM with D$_{Mary}$ because V has its own unsatisfied selectional feature, whereas D$_{Mary}$ does not bear any.[15] Therefore, the two instances of EM in Option II are legitimate, constructing the following structures:

(12) First two structures created by EM:

Consider now how the next stage of the derivation proceeds. v* still has one more selectional feature to be satisfied, i.e., the feature that requires V for subcategorization. Now the question is, what does v* undergo Merge with; is it the head V or the entire set {V, D$_{Mary}$}? The answer seems to lie in the notion of Minimal Search which can roughly be defined as less being simpler than more (Chomsky 2007, 2008, 2013). In our case, then, searching for a member of a set (i.e. the head V) requires deeper search than that for the set itself (i.e., {V, D$_{Mary}$} and therefore, Merge of v* with the entire set {V, D$_{Mary}$} is computationally more efficient than with the head V which is more deeply embedded. So I propose the following structure for the outcome of Merge between (12a) and (12b):

(13)
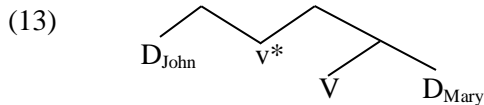
One noticeable peculiarity about the structure in (13) is that there is no single label, whether projected or determined as suggested in Chomsky (2013), in the structure.[16,17] This is a clear violation of Condition (10).

Let's turn to next section to discuss in more detail the two-peaked structures created by EM in our analysis with respect to (its implications for) the operations Feature-Inheritance and Transfer proposed in Chomsky (2007, 2008).

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[15] v* and V can undergo EM with different noun phrases. That is, v* merges with D$_{Mary}$ and V merges with D$_{John}$. In this case, however, what we get is '*Mary loves John*', not '*John loves Mary.*'

[16] In set-theoretic notation, the structure in (13) would be represented as {{D$_{John}$, v*}, {v*, {V, D$_{Mary}$}}}, where v* exists as a member in two sets simultaneously. I will discuss this issue in more detail in Section 5.2.

[17] This type of two-peaked structure, however, is not unique to our analysis but is also argued to be created in structures generated by countercyclic IM by EKS (2011). Citko (2005, 2008) also employs two-peaked structures created by her Parallel Merge to better account for the so-called across-the-board *wh*-questions such as *what did Mary write t$_{what}$ and John review t$_{what}$*. However, we will not discuss this approach further here.

5. Implications: feature-inheritance and transfer

5.1 Feature-inheritance and transfer in Chomsky (2007, 2008) and Richards (2007)

Chomsky (2007, 2008, 2013) proposes that all operations in NS are triggered only by uninterpretable features (or probes) of phase heads (i.e. C and v*). He further claims that when the derivation reaches a stage where C merges with T, uninterpretable φ-features on C are passed down to its complement's head, T, by the mechanism he calls Feature-Inheritanc[18], whereas the (uninterpretable) EF of C remains in-situ. Chomsky (2008) deduces the rationale behind Feature-Inheritance from considerations of the C-I interface conditions, arguing that the C-I interface requires NS to *structurally* distinguish between A- and A'-positions and that Feature-Inheritance is the simplest mechanism that fulfills this C-I imposed requirement.

     Richards (2007) attempts to find an alternative account of the motivation for Feature-Inheritance on the basis of the following two premises:

(14)   **Premise 1:**
        Valuation and Transfer of uninterpretable features must happen together.[19]
        Premise 2:
        The edge and nonedge (complement) of a phase are transferred separately.

Uninterpretable features must be deleted before they reach the C-I interface. Otherwise, the derivation will crash at the interface. However, once valued, these uninterpretable features are indistinguishable from their matching interpretable counterparts, so if Transfer takes place *after* valuation, these indistinguishable uninterpretable features cannot be deleted, leading to a crash at the C-I interface. The problem remains the same even if Transfer occurs *before* valuation since a derivation with transferred unvalued uninterpretable features still crashes at the C-I interface. To tackle this timing dilemma, he argues that 'valuation must be *part* of Transfer (Premise 1).' In other words, Transfer and valuation takes place simultaneously. Otherwise, no derivation can converge.

     Premise 2 states that as soon as all operations in the C phase-level (PH below) have been completed, the complement of the phase head C ('nonedge' in Richards' terms), i.e., TP is transferred to each of the interfaces, whereas the phase head C and its Spec, collectively called "the edge", remain in the workspace and they are carried over to the next phase.

(15)   [PH (= CP) C$_{[u\varphi]}$] [$_{TP}$ Spec   T ...]]

                    edge   nonedge ⟹ *Transfer*
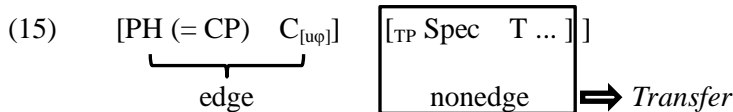
In a framework without C-to-T Feature-Inheritance, uninterpretable φ-features (indicated [uφ] in (15)) would get valued not on T but on C. However, as shown in (15), what is transferred at the point of this feature valuation is not C (or CP) but TP. In other words,

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[18.] In other words, φ-features are no longer lexically inherent to T in his system but they are syntactically derivative. He argues the same for the relation between v* and V, that is, φ-features originate from v* and in the course of NS derivation, they are passed down to V by Feature-Inheritance. For expository purposes, however, I will focus on Feature-Inheritance in the C-T domain.

[19.] Premise 1 was originally pointed out by Epstein and Seely (2002), as Richards notes.

uninterpretable φ-features on C cannot be transferred at the point of valuation and this leads to a violation of Premise 1. He thus argues that 'feature-inheritance is the only device that can reconcile Premise 1 and 2 and thus ensure convergence at the interfaces.' Without Feature-Inheritance, no derivation is ever possible beyond the first phase level.

5.2 Feature-inheritance and transfer in the v*P-domain

Before discussing how Transfer and Feature-Inheritance can be incorporated into our framework and consequently how Merge can be reinterpreted in our system, let us first consider our final (C-I offending) structure (15), repeated here as (16).

(16)
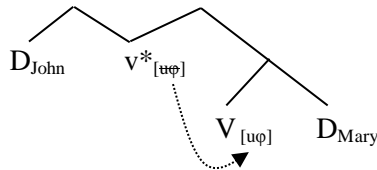
I follow Chomsky (2008) in assuming that (uninterpretable) φ-features, which originate from v*, are inherited by V and they induce an EPP effect. In other words, once φ-features are inherited by V, they trigger movement of D_{Mary} in (16). A question that immediately arises at this point is, where does D_{Mary} move to?

Since the movement of D_{Mary} is triggered not by v* but by V, D_{Mary} must be somehow merged with V. Furthermore, this movement of D_{Mary} has nothing to do with selectional features of V (hence, the name *Extended* Projection Principle). In other words, the movement of D_{Mary} is not driven to satisfy 'selectional' requirements of V itself but rather, if we adopt Chomsky's (2007, 2008) Feature Inheritance, it is a requirement that is *added* to V by v* in the course of the derivation; the requirement is *not inherent* to V. Therefore, it should be natural to assume that the movement of D_{Mary} need not target the head V itself. But again, where does it then move to? Below are some of the conceivable landing sites for D_{Mary}.
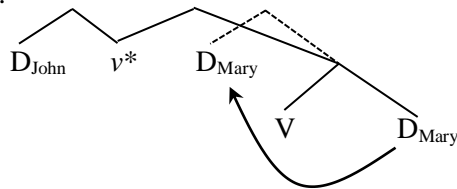
(17) a.   b.
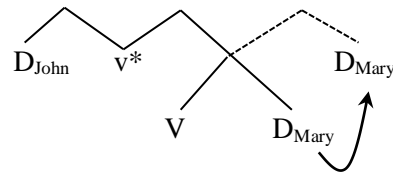
In (17a), where D_{Mary} moves to the Spec-V position, the movement of D_{Mary} creates even more peaks so that the resulting structure still cannot be interpreted at C-I interface (Condition (10)). The situation does not improve in (17b), where D_{Mary} moves rightward.[20] Below is the structure that I propose is created after the movement of D_{Mary}:

[20.] In fact, (17a) and (17b) are exactly the same from the perspective of C-I if we adopt Chomsky's (2008) claim that "order does not enter into the generation into the C-I interface."

(18)
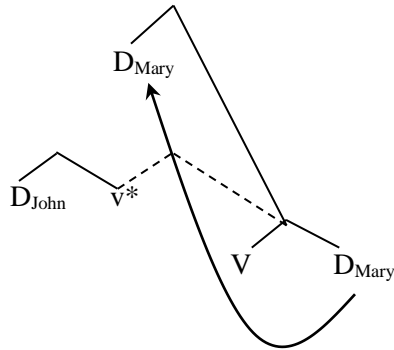
As discussed in Section 4, the status of head v* before the movement of D_{Mary} can be set-theoretically represented as below in (19a), where v* occurs as a member of two sets simultaneously:

(19)   a. $\{\{D_{John}, v^*\}, \{v^*, \{V, D_{Mary}\}\}\}$ Before movement of D_{Mary}
        b. $\{D_{John}, v^*\}, \{D_{Mary}, \{\cancel{v^*}, \{V, D_{Mary}\}\}\}$ Movement of D_{Mary}
        c. $\{D_{John}, v^*\}, \{D_{Mary}, \{V, D_{Mary}\}\}$ After movement of D_{Mary}

What the movement of D_{Mary} to Spec-V does in (18) (and in (19)) is to eliminate the existing relation between the head v* and the set $\{V, D_{Mary}\}$. What this means in set-theoretic terms is that IM of D_{Mary} eliminates one of the two occurrences of v*, that is, v* from the set $\{v^*, \{V, D_{Mary}\}\}$ as shown in (19b) and consequently, the structure in (19c) is created after IM of D_{Mary}. I take this eliminative operation by IM whereby a member of a set gets eliminated to be a trigger for the operation Transfer. In other words, Transfer gets activated via IM, transmitting the structure where IM has taken place to the interfaces. This in turn implies that Transfer occurs only when this type of eliminative IM takes place.

This type of relation-breaking (or member-deleting) IM may seem to violate the No Tampering Condition (NTC) proposed in Chomsky (2005, 2007, 2008) because it involves modifying the existing structure by eliminating the (existing) relation between the head v* and the set $\{V, D_{Mary}\}$. If we consider the following claims in Chomsky (2008), however, this type of IM is not unjustified:

(20)   **No Tampering Condition (NTC)**
        Merge of X and Y leaves two SOs unchanged.
(21)   **Strong Minimalist Thesis (SMT)**
        Language is an optimal solution to interface conditions that FL [the Faculty of Language] must satisfy.
(22)   SMT might be satisfied even where NTC is violated - if the violation has a principled explanation in terms of interface conditions (or perhaps some other factor).

An expression must have a single label for it to be interpreted at the interfaces (see Condition (10)) but we have just seen that the offending structure in (16) has no other alternatives to satisfy this interface-driven condition (hence conforming to SMT in (21)) than to remove either of the two peaks. Furthermore, IM we propose is not the only

operation that violates NTC defined in (20). Take, for example, feature-inheritance from v* to V and subsequent AGREE between V and a noun phrase. The former operation *adds* new features (i.e. φ-features) to V, *modifying* (the existing) featural specifications of V. The latter also changes the featural values of φ-features added to V since the operation AGREE renders *unvalued* φ-features of V *valued* by those of a noun phrase. Therefore, IM with a built-in eliminative ability can be justified (at least conceptually) even if it violates NTC.

Now, let us examine implications of our version of IM with a built-in eliminative operation as concerns the motivation for the mechanism Feature-Inheritance. Consider first the structure prior to the movement of D_{Mary}:

(23)
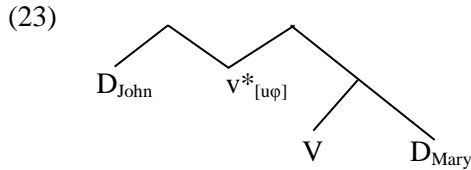
Without the operation Feature-Inheritance, uninterpretable φ-features would stay on v* and raise D_{Mary} to its Spec. Because the movement of D_{Mary} is triggered by unintepretable features on v*, D_{Mary} must somehow merge with v*. Below are three conceivable structures that can be created by the movement of D_{Mary}.

(24) a.   b.

   c.
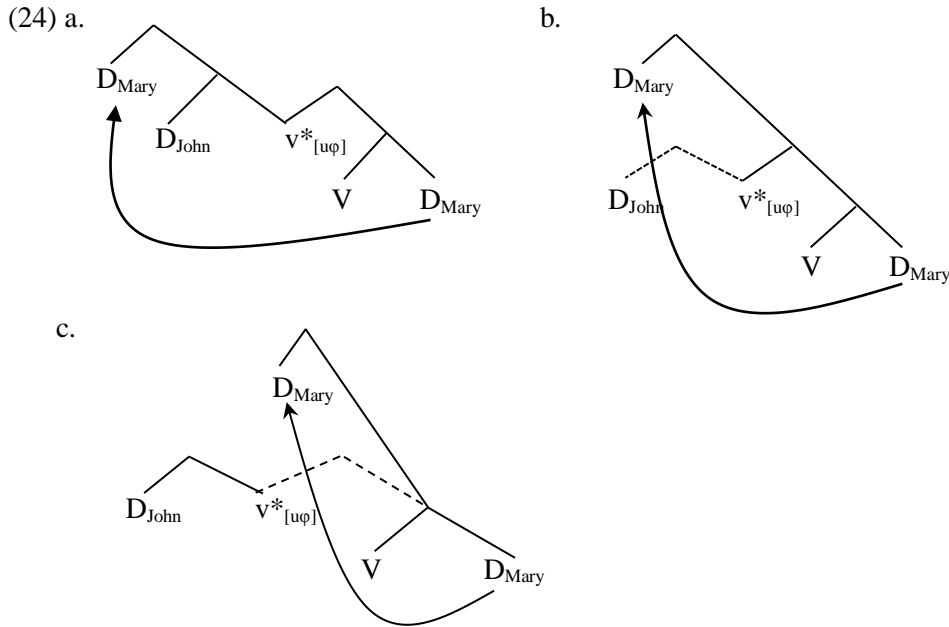
(24a) shows that D_{Mary} moves to Spec-v*. Notice, however, that IM of D_{Mary} does not involve any eliminative process and thus no structure can get transferred. Therefore, the derivation crashes due to a violation of Condition (10), i.e., it (still) does not have a single label that dominates all the lexical items. (24b), where D_{Mary} moves by eliminating the relation between D_{John} and v*, is also ruled out as D_{John} cannot participate in further EM and thus it will eventually reach the C-I interface without having its uninterpretable Case feature valued. (24c), where D_{Mary} moves by eliminating the relation between v* and the

set $\{V, D_{Mary}\}$ and becomes Spec of V, is the most problematic derivation. As mentioned above, D_{Mary} is required by v*, not by V, and therefore, it must be connected to v*. However, that is not the case in (24c). Furthermore, if we adopt the idea of what projects is always the Selector (Chomsky 2000), it is not clear how the projection would work in (24c). If we assume φ-feature-inheritance by V, however, all the problems found in the three derivations above disappear in (18), repeated here as (25):

(25)

D_{John} $v*_{[u\varphi]}$ D_{Mary} $V_{[u\varphi]}$ D_{Mary}
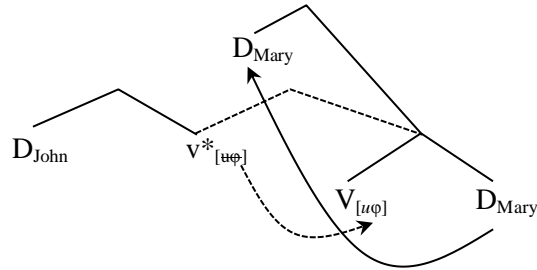
In (25), φ-features of v* are inherited by V. What this means is that D_{Mary} must be connected with V since the requirement for D_{Mary} now resides on V. Once D_{Mary} moves to Spec-V via our eliminative IM, V projects to become the label of the outcome as V is the Selector. In this application of Merge, we now can deduce the necessity of Feature-Inheritance, not from considerations of timing between valuation and Transfer as Richards (2007) suggests and Chomsky (2007) later adopts, but from considerations of interface conditions, i.e. Narrow Syntax conforms to Interpretation Condition (10) imposed by the C-I interface even by eliminating a member from the structure (i.e. eliminative IM) and thus violating NTC: language is *indeed* an optimal solution to interface conditions.

I conclude this section with a modified definition of Merge:

(26)   Merge
        Merge takes two syntactic objects (SOs), α and β, to form a set $\{\alpha, \beta\}$. In doing so, Merge can modify an existing relation if the modification is required by interfaces.

6. Conclusion and remaining issues

In this paper, I proposed that along with other operations in NS, structure-building can also be initiated only by phase heads and showed that this type of phase-head initiated structure-building inevitably creates a C-I uninterpretable structure with no single label dominating all the constituents in the v*P-domain. To resolve this dilemma, i.e., phase-head initiated structure building vs. two-peaked structure in the v*P-domain created by phase-head initiated structure building, I proposed that IM can eliminate a member from a set to satisfy interface conditions and that this eliminative IM gets the operation Transfer activated. Finally, I explored the implications of phase-head initiated structure building and eliminative IM for both Feature-Inheritance and Transfer and showed that both operations can be better motivated in phase-head initiated structure building.

However, there remain some issues I will leave open here. One issue is concerned with the structure of ditransitive verbs such as *put* and *give*. Unlike typical transitive

verbs, these ditransitive verbs will presumably create a three-peaked structure. For now, however, I have little to say how this three-peaked structure can be remedied by our eliminative (Internal) Merge. Another issue is concerned with the asymmetric c-command relation between the external argument and the internal argument. As we saw in previous sections, however, the external argument does not asymmetrically c-command the internal argument in our system. In fact, there seems to be no c-command relation between the two. I will leave all these interesting questions for future research.

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