

# Projecting Semantic Features\*

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## Abstract

This study argues that the availability of both a container and a containee reading of a container measure construction such as *three bottles of water* is the result of two possible routes of projection of semantic features: from the syntactic head and from the non-head element. The paper proposes that such an optionality correlates with the parallelism of other formal properties of the two nominals of the construction. Theoretically, it demonstrates how this projection optionality challenges the current theories of feature projection, and how semantic feature projection is different from syntactic feature projection: they do not have to be projected from the same element.

## 1. Introduction

Syntactic projection has been understood as representing the syntactic features, especially categorical-features (c-features), of a mother by those of the head daughter. The features of the non-head daughter play no role in the projection (Chomsky 1995: 244; López 2001). This short paper clarifies a hitherto unclear issue: is it possible to project semantic features (s-features) from an element that is not a syntactic head? A positive answer and relevant constraints will be presented.

Not much work has been devoted to the projection of s-features. This is probably because of the assumption that “the only features accessible to the syntax are those that can affect syntactic processes, i.e., grammatical features but not ‘purely semantic features’” (Schütze 2001: 128, following Emonds 1985). However, as we will see in this paper, identifying the mismatch between syntactic and s-feature projection will help us to get a better understanding of the relation between syntax and semantics.

The empirical question to be considered for the theoretical issue is how to compute the selectional restrictions of the verb that takes a container measure nominal as its complement. The Chinese examples in (1) through (3) all have such a nominal as internal argument. In the a-sentences, the verb s-selects the containee, whereas in the corresponding b-sentences, the verb s-selects the container (the elements that are in an s-selection relation are underlined). In (1a), for example, the verb *he* ‘drink’ s-selects an argument with a [+liquid] feature. *Ping* ‘bottle’ does not satisfy this selection, whereas *pìjiu* ‘beer’ does. In contrast, in (1b), the verb *kai* ‘open’ s-selects an argument with a [-liquid] feature. *Ping* ‘bottle’ satisfies this selection, whereas *pìjiu* ‘beer’ does not. The container measure constructions in (1) through (3) have a containee reading in the a-sentences, but a container reading in the b-sentences.<sup>1</sup>

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<sup>1</sup> Abbreviations used in the Chinese examples: PRF: perfect aspect; CL: classifier; DE: associative marker.

- (1)a. Baoyu he-le san ping píjiu.  
Baoyu drink-PRF three bottle beer  
'Baoyu drank three bottles of beer.'
- b. Baoyu kai-le san ping píjiu.  
Baoyu open-PRF three bottle beer  
'Baoyu opened three bottles of beer.'
- (2) a. Baoyu niang-le san ping mi-jiu.  
Baoyu brew-PRF three bottle rice-wine  
'Baoyu brewed three bottles of rice-wine.'
- b. Baoyu mifeng-le san ping mi-jiu.  
Baoyu seal-PRF three bottle rice-wine  
'Baoyu sealed three bottles of rice-wine.'
- (3) a. Baoyu du-le san bao baozhi.  
Baoyu read-PRF three bag newspaper  
'Baoyu read three bags of newspaper.'
- b. Baoyu chaikai-le san bao baozhi.  
Baoyu open-PRF three bag newspaper  
'Baoyu opened three bags of newspaper.'

As we know, the verb in each of the examples above takes the whole complex nominal, rather than either the container-denoting measure word or the containee-denoting noun, as its complement. The verb does not form a constituent with either the container measure or the containee-denoting noun. But the s-selection of the verb is satisfied by one of the two elements.

Since Selkirk (1977: 310ff; also Akmajian & Lehre 1976), the contrast between the two readings of such a construction in English has been studied. (4a) and (5a) have a containee reading, whereas (4b) and (5b) have a container reading.

- (4) a. She drank a bottle of that good wine.  
b. She broke a bottle of that good wine.
- (5) a. A cup of sugar was strewn on the floor.  
b. A cup of sugar smashed on the floor.

Corver (1998: 226) further notes that when a modifier of the container occurs to the right of the complex nominal, such as *with a long neck* in (6a) and *bigger than this* in (6b), only the container reading is available.

- (6) a. a bottle of water with a long neck  
b. a can of gasoline bigger than this

This can be analyzed as follows. Like in an extraposition construction, the separation of the container measure from its modifier makes the container reading focused, and thus the reading becomes the only reading accessible. In (7) and (8) (cited from Wright & Kathol 2003: 378), *mouth-watering* modifies the containee *beans*, which satisfies the s-selection of the verb *eat*, but not the verb *smash*. It is the container measure *can* that satisfies the s-selection of *smash*. The separation of the containee noun from its modifier in (7b) makes the containee reading focused, and thus block the container reading, as shown in (8):

- (7) a. I ate a can of mouth-watering beans.  
 b. I ate a mouth-watering can of beans.
- (8) a. In protest, I smashed a can of their mouth-watering beans against my head.  
 b. \*In protest, I smashed a mouth-watering can of their beans against my head.

Similar contrast can be found in Mandarin Chinese. In (9) and (10), *nongnong* ‘thick’ modifies the containee *tang* ‘soup’, which satisfies the s-selection of the verb *he* ‘drink,’ but not the verb *da-fan* ‘knock-down’. It is the container measure *wan* ‘bowl’ that satisfies the s-selection of *da-fan*. The separation of the containee noun from its modifier in (9b) makes the containee reading focused, and thus block the container reading, as shown in (10):

- (9) a. Shufen he-le yi wan nongnong de tang. [containee]  
 Shufen drink-PRF one bowl thick DE soup  
 b. Shufen he-le nongnong de yi wan tang.  
 Shufen drink-PRF thick DE one bowl soup  
 BOTH: ‘Shufen ate one bowl of thick soup.’
- (10) a. Shufen da-fan-le yi wan nongnong de tang. [container]  
 Shufen knock-down-PRF one bowl thick DE soup  
 ‘Shufen knocked down one bowl of thick soup.’  
 b. \*Shufen da-fan-le nongnong de yi wan tang.  
 Shufen knock-down-PRF thick DE one bowl soup

The examples in (7) through (10) all show that the real contrast in Corver’s data is not that between the presence and absence of a modifier, but the contrast between the presence and absence of a non-local modifier, which bears a focus.

As for local modifiers, the following Chinese data in (11) show that when the container measure has a local modifier, such as *da* ‘big’, the two readings are still both available. Similarly, the examples in (12) show that when the containee noun has a local modifier, *da* again, the two readings are also both available.

- (11) a. Siyu chi-le san da xiang yingtao.  
 Siyu eat-PRF three big box cherry  
 ‘Siyu ate 3 big boxes of cherries.’
- b. Siyu dakai-le san da xiang yingtao.  
 Siyu open-PRF three big box cherry  
 ‘Siyu opened 3 big boxes of cherries.’
- (12) a. Siyu chi-le san xiang da yingtao.  
 Siyu eat-PRF three box big cherry  
 ‘Siyu ate 3 boxes of big cherries.’
- b. Siyu dakai-le san xiang da yingtao.  
 Siyu open-PRF three box big cherry  
 ‘Siyu opened 3 boxes of big cherries.’

The contrast between the containee and container readings is thus independent of the occurrence of modifiers.

If this issue is clarified, we wonder whether the two readings of a container measure construction correlate with different syntactic structures. The goal of this paper is to falsify such a correlation.

My argument will proceed as follows. After falsifying four previous analyses of the issue in Section 2, I make my proposal in Section 3 that the nature of the contrast between the two readings is the two possible ways of s-feature projection. In Section 4, I show that the two ways of projection are independently attested, in simple DP, possessive DP, Degree Phrase, and modification constructions. I then propose a constraint on the projection optionality in Section 5. A brief theoretical discussion is presented in Section 6. Section 7 concludes the paper.

## **2. Previous analyses**

### **2.1 The syntactic constituency analysis**

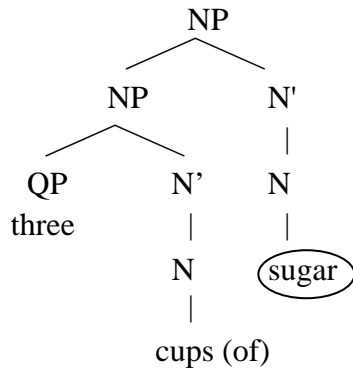
Both Selkirk (1977) and Corver (1998) propose contrastive syntactic structures for the two readings. However, the prediction made by their proposal is not born out.

Selkirk (1977) proposes that the two readings of a container measure construction correlate with two different kinds of syntactic constituency of the construction. Before the publication of Selkirk’s paper, her analysis is cited and adopted in Akmajian & Lehrer (1976: 406). A similar analysis reappears in Rothstein (2009).

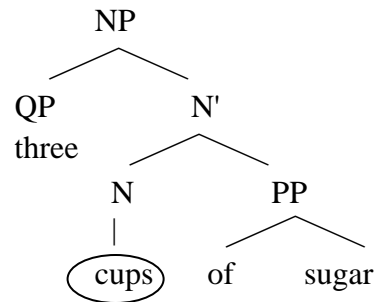
Selkirk (1977: 310) claims that in the containee reading, the containee-denoting noun is the syntactic head of the whole nominal complex, whereas in the container reading, the container measure is the syntactic head. In this analysis, the structure of *three cups of sugar*, for instance, is left-branching,  $[[\textit{three cups}] \textit{of sugar}]$ , for the containee reading, where *sugar* is the head, as shown in (13a). The word *of* has no syntactic status in this structure. Rothstein

(2009: 111) states that “*of* insertion is a late phenomenon, projecting no PP node, see Chomsky 1981”. In contrast, the same string has the right-branching structure [*three [cups [of sugar]]*], for the container reading, where *cup* is the head and the PP [*of sugar*] is its complement, as shown in (13b).

(13) a. the containee reading



b. the container reading



The contrast between the two structures, however, does not represent the contrast between the two readings of the construction. Consider extraposition first, which is used to test the complement status of a phrase in Selkirk’s same paper. PP complements may undergo extraposition, as seen in (14b) (Selkirk 1977: 309). The examples in (15a) and (16a) are intended to have a containee reading, and those in (15b) and (16b) a container reading. In the assumed structure in (13a), the containee phrase is not a PP complement, and thus fails to undergo the extraposition. Therefore the unacceptability of (15a) and (16a) is not unexpected. In the assumed structure in (13b), however, the *of*-phrase, which hosts the containee, is a complement, one thus expects the extraposition constructions in (15b) and (16b) to be acceptable. The expectation fails. The examples in (15) and (16) simply show that in neither reading of the examples may the *of*-phrases undergo extraposition.

- (14) a. A review of answers to your argument was given.
- b. A review was given of answers to your argument.
- (15) a. \*John drank three bottles yesterday (of) extremely expensive wine.
- b. \*John broke three bottles yesterday of extremely expensive wine.
- (16) a. \*Three bottles were drunk (of) extremely expensive wine.
- b. \*Three bottles were broken of extremely expensive wine.

On the other hand, Akmajian & Lehrer’s (1976: 407) following examples show that both readings allow extraposition. Again, the assumed structure contrast between (13a) and (13b) disappears.

- (17) a. Several bottles spilled of fine Spanish wine.

- b. Several bottles broke of fine Spanish wine.

Regardless of how one analyzes extraposition, the examples in (15) through (17) simply tell us that the constructions in the two readings behave the same with respect to extraposition, and they do not support the contrast between (13a) and (13b).

Second, consider cleft constructions:

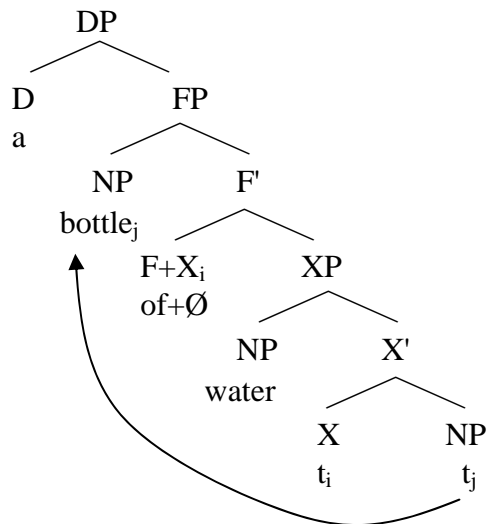
- (18) a. It was wine that John drank three bottles of.  
 b. It was wine that John broke three bottles of.

In English, the preposition *of* can be stranded from its complement. The examples in (18) show that *of* can be stranded for both readings. This suggests that the containee noun is the complement of *of* for both readings. Again, the contrast between (13a) and (13b) is hard to be maintained.

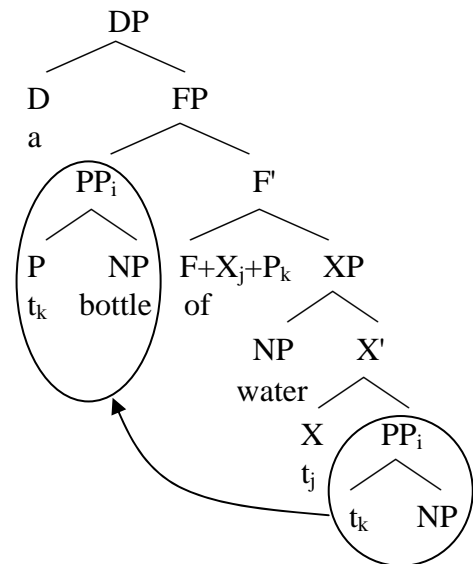
## 2.2 The predicate inversion analysis

In Corver (1998), the following two structures (on his p. 223 and p. 235, respectively) are proposed for the two readings of the container measure construction *a bottle of water*.

- (19)a. the containee reading



- b. the container reading



In both structures, the complement of X is a predicate (the bottom NP in (19a) and the lower PP in (19b)), the Specifier of X, the NP *water*, is the subject of the predicate, and the predicate moves across the subject. There are also several instances of head movement or incorporation in the structures, and the final realization of the elements at F is *of*.

In both constructions, the container noun is, or is hosted by, the complement of the functional element X, and the entire nominal projection, FP or DP, is claimed to be an

extension of the complement. Considering the base-position of the container noun *bottle*, it is claimed that in (19b), the container noun “originates as the syntactic head of the entire extended nominal projection”, and thus it is not unexpected that an element external to the projection enters into a selectional restriction with the container noun, rather than the containee noun (p. 235). However, the base-position of *bottle* in (19a) has the same status. One thus expects the two structures enter the same selectional restriction. We can see that the containee-container contrast is not encoded in the contrast between (19a) and (19b).<sup>2</sup>

### **2.3 The containee-as-container analysis**

Hsieh (2008: 51) claims that the head of a container measure construction is consistent, i.e., it is always the last noun. For example, in the containee reading of *san ping kele* ‘three bottle coke’, *kele* ‘coke’ is the head, whereas in the container reading of this string, she claims that “when *ping* is used, *kele* ‘coke’ is considered to refer to the coke bottles and can thus be broken into pieces. In other words, it is marked with the [+solid] feature because the existence of *ping*.” In her analysis, *baozhi* ‘newspaper’ in (3b) should mean newspaper bags. Obviously, this analysis is ad hoc. Since *ping* also occurs in the containee reading of *san ping kele* ‘three bottle coke’, how can we make sure that in this case, the noun *kele* is not [+solid]? Moreover, if lexical items change their formal features when they are combined with other elements, the Inclusiveness Condition (Chomsky 1995: 228) is violated. Furthermore, if *kele* in *san ping kele* ‘three bottle coke’ meant coke bottles, bottles would be counted by the container measure *ping* ‘bottle’, however, bottles are never counted by *ping* ‘bottle’. Instead, they are counted by the classifier *ge* or other bigger container measures such as *xiang* ‘box’.

### **2.4 The individual-quantity contrast analysis**

X. P. Li (2011), following Rothstein (2009), correlates the container reading with an individual reading (= his counting reading), which is assumed to have a right-branching structure, and correlates the containee reading with a quantity reading (= his quantity reading), which is assumed to have a left-branching structure. However, our following examples show that the two correlations are not justified. In the two examples in (20), *shi ping jiu* ‘ten bottle wine’ has a containee reading, and the word *zuzu* ‘as much as’ provides a quantity context in (20a), and thus a quantity reading is available. In X. P. Li’s approach, the expression has a left-branching structure. However, the reduplicate form of *ping-ping* ‘bottle-bottle’ provides an individual context (X. P. Li 2011: 116) in (20b) and thus *shi ping jiu* should have an individual reading. Likewise, container reading of *shi ping jiu* in (21) can have either a quantity reading, as in (21a), or individual reading, as in (21b).

<sup>2</sup> The two structures in (19) contain other unclear parts. For instance, it is claimed that a measure is a DP-internal predicate, which undergoes predicate inversion, and a numeral is out of the domain of the inversion (Corver 1998: 229). However, in all of the examples to show the predicate status of a measure, a numeral is always next to the measure. Also, when the PP in (19b) moves, its head has already moved out. Such headless remnant movement is not a generally recognized operation (see Takano 2000: 146, among others).

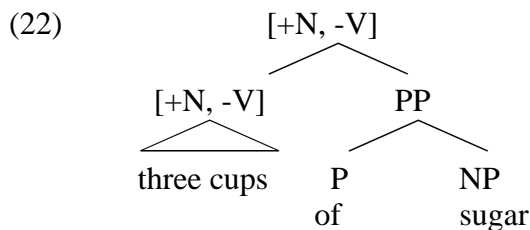
- (20) a. Wusong zuzu he-le shi ping jiu. [Containee, quantity]  
 Wusong as.much.as drink-PRF ten bottle wine  
 ‘Wusong drank as much as ten bottles of wine.’
- b. Wusong he-le shi ping jiu, ping-ping dou hen ku. [Containee, individual]  
 Wusong drink-PRF ten bottle wine bottle-bottle all very bitter  
 ‘Wusong drank ten bottles of wine, and every bottle was very bitter.’
- (21) a. Wusong lin-lai-le zuzu shi ping jiu. [Container, quantity]  
 Wusong bring-come-PRF as.many.as ten bottle wine  
 ‘Wusong brought as many as ten bottles of wine.’
- b. Wusong dasui-le shi ping jiu, ping-ping dou hen man. [Container, individual]  
 Wusong break-PRF ten bottle wine bottle-bottle all very full  
 ‘Wusong broke ten bottles of wine, and each bottle was very full.’

All of these facts simply show that the three contrasts are independent of each other: container vs. containee reading, quantity vs. individual reading, and the left-branching vs. right-branching structure.

### **3. Projecting s-features from the same structure**

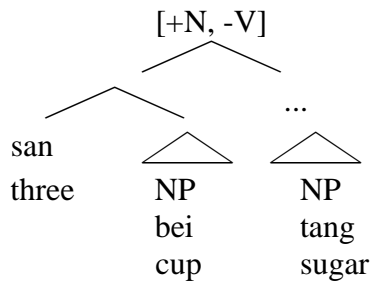
#### **3.1 Unified left-branching constituency**

From the discussion in Section 2, we can see that the two readings have no syntactic contrast. It is possible that for both readings of the English constructions, the containee noun is the complement of *of*, and the numeral and the container measure form a constituent. A possible simplified structure is (22):

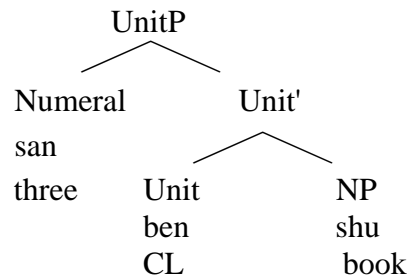


In Chinese, like in many other languages, no linking word parallel to the English *of* occurs in a container measure construction. Other than that, the word order of the construction is the same as in English. If the two trees in (13) were both correct, one would expect a left-branching structure for a containee reading and a right-branching structure for a container reading. However, in the spirit of Zhang (2011), the left-branching configuration in (23a) is the structure of container measure constructions, while the right-branching configuration in (23b) is the structure of the constructions of individual classifiers such as *ben* (for books) and individuating classifiers such as *di* (for liquid), in the language.

(23) a. Container measure construction



b. Classifier construction



### 3.2 S-feature projection

If the contrast between the containee reading and the container reading of a container measure construction is neither a contrast in syntactic structure nor a contrast in the lexical semantics of a certain word in the construction, what is the nature of the contrast? It is clear that the s-features of the whole nominal are those of the containee in the containee reading, but are those of the container in the container reading. I thus claim that the contrast is related to the s-feature projection.

In each container measure construction, both the containee noun and the container measure start from an N position and thus are s-feature holders. It must be the case that the s-features of either element are projected to the whole complex nominal, so that the nominal can satisfy the selectional restriction of the relevant verb or predicate. We have shown that the structure in (22) and the structure in (23a) can be possible structures for such a construction in English and Chinese, respectively. In these structures, the containee noun and the container measure are also hosted in the two daughters of a certain node (the top [+N, -V] in (22) and (23a)). In fact, in all other structures proposed in the literature, the containee noun and the container measure are hosted in the two daughters of a certain node, respectively. We know that in every binary branching structure there is only one syntactic head. If s-features can be projected from either the container measure or the containee noun, we see that s-features may be projected from an element that is not a syntactic head, at a certain level of the syntactic derivation.

This is in contrast to the projection of syntactic features. C-features may not be projected from non-head sisters (Chomsky 1995: 244). Similarly, Cole et al. (1993: 110) show the impossibility of syntactic feature projection from complements in reflexive binding, and citing Harbert (1990), they also show the impossibility for wh-features to be projected from complements of verbs (p. 111). Likewise, López (2001) demonstrates the impossibility for Case features and theta-features to be projected from complements. Cole et al. (1993: 110, 113 fn.2) propose a feature percolation condition on syntactic features: “No feature can be percolated out of a lexical complement structure.” Brody (1998) calls the principle that a projection inherits all the properties of its head and nothing else Principle of Uniqueness.

#### **4. Two separate routes of s-feature projection**

Generally, s-features are projected from the syntactic head exclusively. In (24), for instance, the semantic features of *goat*, which is not the head of the nominal *goat milk*, are not projected, and thus the selectional restriction of *drinks* is satisfied by the s-feature [+liquid] of *milk*, and the feature [-liquid] of *goat* does not affect the computation.

(24) John drinks [goat milk].

In contrast to this situation, one situation in which s-features are projected from the non-head element exclusively has been recognized in the literature. This is the situation when the head is not specified with the relevant features, especially when the head is a functional category. Let us look at four specific cases.

##### **4.1 Simple DP**

In a simple DP headed by a determiner, the s-features of the complement are projected (Cowper 1987: 330). In (25), the head of the object DP is *the*. However, it is the s-features of the NP *wine* (i.e., [+liquid]) that are projected to the whole DP, satisfying the s-selection of the verb *drank*. The D-head *the* has no relevant s-features.

(25) John drank the wine.

This issue is also discussed in Jackendoff (1968: 431-432). Here are his examples:

- (26) a. I proved {the theorem/\*the boy}  
b. I socked {\*the theorem/the boy}
- (27) a. I proved {some of the theorem/\*some of the boy}  
b. I socked {\*some of the theorem/some of the boy}
- (28) a. I proved {a bunch of theorems/\*a bunch of boys}  
b. I socked {\*a bunch of theorems/a bunch of boys}

In all of these examples, only the noun *theorem* or *boy* is specified with the semantic features that are selected by the verb.

Jackendoff uses these examples to show that if one insists that only the s-features of the head be projected, the noun *theorem* or *boy* should be analyzed as the head of all of the object nominals in (26) through (28). However, such an analysis is “unnatural for other reasons” (p. 432). Our current theory of the syntactic structures of nominals also rules out the syntactic head status of the two nouns in these examples. Jackendoff claims that “selectional restrictions are not applied to only the head noun of a noun phrase. Instead, the selection is performed on the basis of the semantic reading of the entire noun phrase” (p. 432). The same

conclusion is also found in McCawley (1968: 134). We can see that it is s-features, rather than c-features, that are the issue here.

#### **4.2 Possessive DP**

In a possessive DP, the s-features of the possessee NP are projected, although the NP is not the syntactic head of the DP. In (29), the possessee NP *wine* satisfies the s-selection of the verb *drank*. The D head of the DP has no relevant s-features (i.e. [+/-liquid]).

(29) John drank Mary's wine.

#### **4.3 Degree Phrase**

In a Degree Phrase, the head is a degree word and its complement is an AP (or AdvP). It is the s-features of the AP that are projected. For instance, the verb *feel* s-selects an element that denotes a stage-level state. In (30), the requirement is satisfied by the AP *tired*, not the degree head element *very*, which has no relevant s-features.

(30) John felt [very tired].

#### **4.4 Modification Construction**

McCawley (1968: 133) discusses the following three examples:

- (31) a. \*My buxom neighbor is the father of two.  
b. \*My sister is the father of two.  
c. My neighbor is the father of two.

(31a) violates the same selectional restriction as does (31b), but the violation of the selectional restriction in (31a) has nothing to do with the head noun *neighbor*, since (31c) contains no selectional violation. In this case, it is the semantic features of the modifier *buxom* rather than those of the modified noun *neighbor* that violate the selectional restriction of the predicate *is the father of two* (cf. Bruening 2010: 533). We can see that the head noun *neighbor* is not specified with a gender feature, and thus it must be the case that the feminine feature of the modifier *buxom* is projected to the whole subject nominal.

#### **4.5 Cowper's (1987) convention**

In all of the cases discussed in 4.1 through 4.4, s-features are projected from an element whose sister has no relevant s-features, or underspecified with the relevant features. This kind of feature projection is predicted to be possible in Cowper's (1987: 324) following convention:

- (32) In a structure [ $_{\alpha}$   $\beta\gamma$ ], or [ $_{\alpha}$   $\gamma\beta$ ],  $\alpha$  projection of  $\beta$ , features from  $\gamma$  will percolate to  $\alpha$  iff  $\beta$  is not specified for those features.

Cowper does consider s-features in the convention, since she mentions (p. 330) that in the phrase *the dog*, the features [+animate], [-human], etc., of the NP *dog* are percolated to DP, simply because the D head *the* is not specified for these features.

In this section, we have seen that s-features are projected from either the syntactic head exclusively, as in (24), or the non-head element exclusively, as in (25) through (31a). The two possible projecting routes show the general availability of the two ways of s-feature projection.

However, container measure constructions are special, as pointed out by Akmajian & Lehrer (1976: 406), in the fact that the container-denoting element and the containee-denoting element have conflict semantic features ([-liquid] vs. [+liquid]), with respect to the selecting verbs. Since such a construction is acceptable in both container and containee readings, I claim, s-features must be projected from either the head or the non-head sister. It is clear that the convention in (32) is not applicable to container measure constructions, in which both sisters of the structure host relevant s-features.

## **5. The role of parallelism**

It is not always possible for either of the two contrastive s-features to be projected, from two sisters. We have seen the example of *goat milk*, the feature [-liquid] of *goat* is not projected. Another clear case is that if an element is an argument of another element, or if an element receives a theta-role from another element, its s-feature is not projected.

### **5.1 A thematic relation**

A thematic relation means one element assigns a theta role to another element. If one sister assigns a theta role to the other sister, the s-features of the latter are never projected. For instance, *yao* ‘want’ can s-select either an action-denoting element, such as *bao na ge xiaohai* ‘hug that CL kid’ in (33a), or an entity-denoting element, such as *na ge xiaohai* ‘that CL kid’ in (33b). In (33a), the nominal *na ge xiaohai* ‘that kid’ receives a theta role from the verb *bao* ‘hug’. In the VP complement of *yao*, *bao* ‘hug’ is the head and *na ge xiaohai* is not the head. If s-features were projected from the non-head element here, the individual meaning of *na ge xiaohai* would be projected to the whole VP, and (33a) would allow a reading similar to that of (33b). However, this is not true.

- (33) a. Wo yao [<sub>VP</sub> bao na ge xiaohai].      b. Wo yao [<sub>DP</sub> na ge xiaohai].  
 I want hug that CL kid                      I want that CL kid  
 ‘I want to hug that kid.’                      ‘I want that child.’  
 Not: ‘I want that child.’

The contrast between a thematic and non-thematic relation is one of the fundamental contrasts in language computation. Its effects are attested in many aspects. For instance, the movement chain of an element that has a thematic relation to another element shows no reconstruction effects in Condition C of binding, whereas the movement chain of an element that has no thematic relation to another element does show such an effect (see Takahashi & Hulseley 2009 for a recent review of the literature on the observation). It is thus not surprising that s-feature projection interacts with thematic relations.

If two elements have a theta-role relation, the major formal features of the two are in contrast. For instance, verbs or predicates have aspect specification, whereas their arguments do not; verbs or predicates may be modified by adverbs, whereas their arguments may not. This is different from container measure constructions, as shown in the next subsection.

## **5.2 Parallelism in container measure constructions**

Having identified certain cases in which s-features may not be projected from a non-head element, we start to investigate how special a container measure construction is, in order to find out why it allows s-features to be projected from either sister.

In none of the structures proposed in the literature are the container measure and the containee noun sisters in their base-positions. Instead, at least one of them is hosted in some functional or extended projection. In (22), the two daughters of the top node of the complex nominal have different categories: the left one is a nominal and the right one is a PP. This is different from the cases such as the nominal *goat milk* in (24). In this nominal, *goat* and *milk* are merged into a constituent directly. Accordingly, one of them must be the head, and the other is the non-head, of the complex nominal. They are not parallel. In a container measure construction, however, the competing sets of s-features come from nominals that are not directly merged together. They are independently hosted in different constituents. Therefore, it is possible for them to show parallel syntactic properties.

As noted in Grimshaw (2007), the two nominals of a container measure construction can each have number marking and the number of the two can be inconsistent. In (34a), the container measure *bottles* is plural whereas the containee *water* is not; in (34b), the container measure *box* is singular whereas the containee *cookies* is plural.

- (34) a. John {drank/broke} bottles of water.  
b. John {ate/opened} a box of cookies.

Moreover, both the container measure noun and the containee noun can be modified by an adjective, and the adjectives of the two can be inconsistent. In both (35a) and (35b), the adjective of the container measure is an antonym to the adjective of the containee noun. We add similar Chinese data in (36).

- (35) a. a large box of small berries  
 b. a small box of large berries
- (36) a. Siyu {chi-/dakai}-le yi da xiang xiao yingtao.  
 Siyu eat-/open-PRF one big box small cherry  
 ‘Siyu {ate/opened} one big box of small cherries.’  
 b. Siyu {chi-/dakai}-le yi xiao xiang da yingtao.  
 Siyu eat-/open-PRF one small box big cherry  
 ‘Siyu {ate/opened} one small box of big cherries.’

All of these show parallel properties of the two nouns in a container measure construction. Such a parallelism is not seen in other pairs of s-feature-hosting sisters, such as the cases discussed in 5.1. Therefore, the two possible routes of s-feature projection correlate with the parallelism of other formal properties of the two nominals of the construction.

## **6. Theoretical discussion**

We have shown that s-features can be projected from either a syntactic head or a non-head element, if the s-feature bearing elements hosted by the two sisters show certain parallelism in their formal properties. As shown by the literature cited before, this kind of flexibility is banned for syntactic features. The ban is also seen in Cole et al.’s (1993: 90) following principle:

- (37) If the features of the daughter nodes conflict, the mother node will have the features of the head nodes.

Cole et al. (1993: 113 fn 2) are careful in stating that this principle is for syntactic features, and they clearly indicate that they do not discuss non-syntactic features. We now can clarify that (37) does not work for semantic features, as seen in container measure constructions. In both constructions, if the s-features of two daughters conflict, the s-features of the mother may be either those of the syntactic head or those of the non-head.

S-feature projection from a non-head element is independently observed, as shown in Section 4. Our claim that in one of the two readings of a container measure construction, s-features are projected from a non-head element adds no new stipulation to our theory.

The finding that s-features may be projected from either a syntactic head or a non-head element helps us to see a difference between the projection of syntactic features and the projection of s-features: they do not have to be projected from the same element. A mismatch is possible.

## **7. Conclusion**

Empirically, this paper has clarified that the contrast between a container reading and a containee reading of a container measure construction is neither the contrast in syntactic structures, nor an issue of the lexical semantics of any word in the construction. I have claimed that the two readings come from two different routes of s-feature projection. Mere s-selection differences do not correlate with different syntactic structures. I have also reported my observation that s-feature projection from an element that is not the syntactic head is impossible for theta-role assignment relations. I have proposed that the optionality in the two ways of s-feature projection correlates with the parallelism of other formal properties of the two nominals of the construction. Theoretically, I have shown how the two possible ways of projection reveal more about feature projection, and how s-feature projection is different from syntactic feature projection: they may be projected from different elements.

The facts discussed in this paper lead us to see two sides of s-feature projection. On the one hand, it is restricted by syntactic structures: only sisters in certain syntactic relation, i.e., non-thematic relation, may project their s-features from either one. On the other hand, such projection exhibits a freedom not found in syntactic computations: both sisters may project their features. The study of this paper is an endeavor to explore possible mismatches between syntax and semantics.

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