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Stickney, Helen
Mafrica, Chelsea
Lippman, Jordan

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Author(s): Helen Stickney, Chelsea Mafrica, and Jordan Lippman
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Variation in the Syntax of the Partitive Structure

HELEN STICKNEY, CHELSEA MAFRICA, and JORDAN LIPPMAN
University of Pittsburgh

Introduction

This paper presents survey data suggesting that there is inter- and intra-speaker variation in the syntax of the partitive structure in English. We focus on bi-nominal partitives like (1) that contain two nouns. The first noun *box* (henceforth N1) in these partitives denotes a unit of measure. The second noun *chocolates* (henceforth N2) denotes a substance or group of items.

(1)   a box of those chocolates

Following Stickney 2009 we consider the partitive to be a bi-nominal structure consisting of two distinct DPs. As such, an adjective preceding the construction should only be able to modify N1 (Selkirk 1977). However, English speakers show variation in their ability to allow an adjective to modify N2. We propose that the grammaticalization of partitives in English (Rutkowski 2007) and its interaction with the language acquisition device account for the data. Our account is consistent with Roberts & Roussou's (2003) account of diachronic change.

This paper is organized as follows. In section 1, we will discuss the syntax of the partitive in contrast to the pseudopartitive, a related construction. In section 2 we will discuss previous literature that investigates the processing of the partitive and the pseudopartitive and literature that analyzes the pseudopartitive as the grammaticalized version of the partitive. Section 3 presents the survey experiment and its results. In section 4 we will argue that the results are indicative of both grammaticalization of particular partitive phrases and a more global change in the syntax of the partitive in English.

1   Partitive and Pseudopartitive Syntax

The syntactic and semantic literature suggests that partitive (2) and pseudoparti-
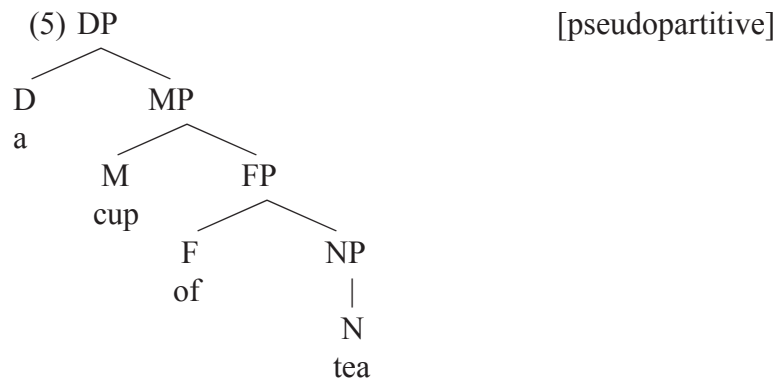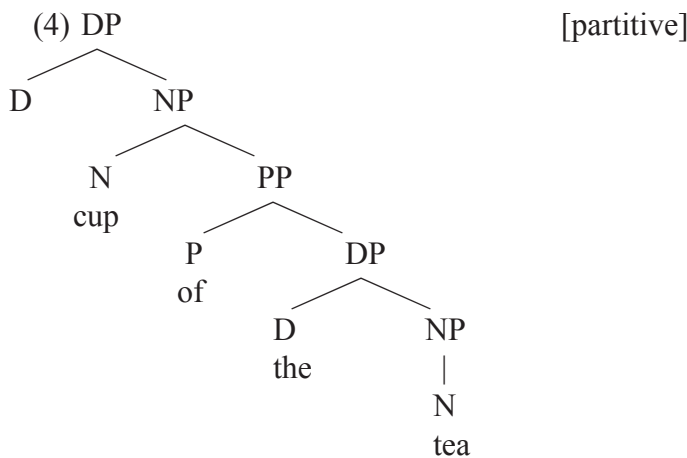
tive (3) are distinct constructions (Selkirk 1977, Alexiadou, Haegeman & Stavrou 2007, Stickney 2009, interalia).

    (2) a cup of the tea

    (3) a cup of tea

    The partitive is bi-phrasal, consisting of two NPs (Jackendoff 1977, Selkirk 1977, Hoeksema 1996, Stickney 2009). Semantically the partitive represents a measured proportion of a discourse-relevant set. The pseudopartitive, in contrast, is a single nominal projection that represents a single entity (Alexiadou, Haegeman & Stavrou 2007, Stickney 2009). What is the first NP and the PP in the partitive are Measure Phrase (MP) and FP in the pseudopartitive, respectively (see Stickney 2009 or Alexiadou, Haegeman & Stavrou for more discussion of these nodes).

    The partitive is headed by N1 while the pseudopartitive is headed by N2. Thus the partitive *a cup of the tea* (4) is headed by *cup* while the pseudopartitive *a cup of tea* (5) is headed by *tea*.

(4) DP   [partitive]

```
(4)      DP                          [partitive]
        /  \
       D    NP
           /  \
          N    PP
         cup  /  \
             P    DP
             of  /  \
                D    NP
               the    |
                      N
                     tea
```

(5) DP   [pseudopartitive]

```
(5)    DP                            [pseudopartitive]
      /  \
     D    MP
     a   /  \
        M    FP
       cup  /  \
           F    NP
           of    |
                 N
                tea
```

The structures in (4) and (5) account for differences in syntactic patterns related to, among others, extraposition (Section 1.1), adjectival modification (Section 1.2), fronting and stranding, and recursion. See Stickney 2009 discussion of fronting and stranding, recursion, and further differences between these two constructions.

1.1   Extraposition

Pseudopartitives allow low-attached modifiers to extrapose (6-7). The partitive (8-9) does not (Stickney 2009:54).

(6) <u>A number of questions concerning electromagnetism</u> were asked.

(7) <u>A number of questions</u> were asked <u>concerning electromagnetism</u>.

(8) <u>A number of the questions concerning electromagnetism</u> were asked.

(9) *<u>A number of the questions</u> were asked <u>concerning electromagnetism</u>.

Conversely, the "of-phrase" cannot be extracted from the pseudopartitive (10-11), but can from the partitive (12-13). The following examples are from Selkirk (1977:304).

(10)   <u>A lot of leftover turkey</u> has been eaten.

(11)   *<u>A lot</u> has been eaten <u>of leftover turkey</u>.

(12)   <u>A lot of the leftover turkey</u> has been eaten.

(13)   <u>A lot</u> has been eaten <u>of the leftover turkey</u>.

Stickney accounts for the differences in modifier extraposition by treating the determiner in the partitive as marking a phase boundary, DP. Because this DP layer doesn't exist in the pseudopartitive movement of the modifier is licit. In the case of movement of the "of-phrase," Stickney implies that the FP *of* does not form a constituent with the material that it dominates in the pseudopartitive. The PP in the partitive, however, is free to move.

1.2   Adjectival Modification

Partitive and pseudopartitive differ in terms of how they interact with adjectives. Stickney 2009 shows that an adjective preceding N1 in the partitive structure

should only modify the first noun and should not be able to modify the second noun. Stickney assumes that an adjective adjacent to N1 that is modifying N2 has moved to that position from a position in N2's projection. Following Bošković 2008, she claims that this movement is blocked by the phase boundary created by the DP layer between these two nouns. An alternative analysis may be to say that English restricts adjectives to modifying only the closest noun (and that the pseudopartitive contains only one noun).

In a pseudopartitive structure there is no intervening DP and an adjective adjacent to N1 is able to modify N2. The following phrases are from Stickney (2009:72-73)

(18) A spiky pot of the beetles   [partitive]

(19) A spiky pot of beetles   [pseudopartitive]

According to Stickney, the phrase in (19) is compatible with a scenario in which the beetles are spiky. Whereas, the phrase in (18) only has the reading in which the pot is spiky. However, experimentally, Stickney finds some ambiguity with respect to adjectival modification and these two constructions. The rest of this paper is concerned with accounting for this ambiguity.

2   Processing of the Partitive and the Pseudopartitive

2.1   Difference Between Partitive and Pseudopartitive

Selkirk 1977 first illustrated that partitive and pseudopartitive have different syntactic structures, pointing out restrictions on various syntactic behaviors. However, as a final thought in the paper, Selkirk notes ambiguity in the behavior of each structure, especially with respect to verb agreement and s-selection[1] (20-21), which ultimately led her to suggest two structures for each based on headedness –i.e. both the partitive and the pseudopartitive have an N1-headed and an N2-headed version.

(20)   Bill smashed a bottle of the wine.

(21)   Bill drank a bottle of the wine.

The purely syntactic contrasts between partitive and pseudopartitive, such as extraposition, are not shown to be ambiguous, leading Stickney 2009 to assume only one structure for each: the partitive as bi-nominal and headed by N1, and the pseudopartitive as one noun headed by N2 (as seen in (4) & (5) above). Stickney

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[1] Deevy 1999 confirms this ambiguity experimentally for the pseudopartitive.

investigates English-speaking children's acquisition of the difference between these two constructions.

Using adjectival modification (Section 1.2) as a diagnostic, Stickney presented children with a picture choice task containing both partitives and pseudopartitives. After listening to a short story, subjects were presented with either a partitive or a pseudopartitive with an adjective immediately preceding N1. They were then required to choose the picture that best represented the phrase, choosing between a picture that depicted N1 modified, one that depicted N2 modified and one in which neither noun was modified. Children in this experiment treated partitive and pseudopartitive the same, allowing N2 to be modified equally as often in each construction. Only the children in the oldest age group (5-6 year olds) restricted N2 modification in some partitives. The adult controls in this study distinguished significantly between partitive and pseudopartitive, but a surprising proportion of the adult data (~25%) showed N2 modification to being accepted with a partitive prompt. How are these data to be interpreted –especially in light of Selkirk's original suggestion that the partitive is ambiguous between two different syntactic structures? We suggest that partitives of the sort investigated in this paper are in the process of grammaticalizing, and that this grammaticalization is affecting the interpretation, structure, and the acquisition of the partitive structure in English.

2.2   Pseudopartitive as Grammaticalized Partitive

The idea that the pseudopartitive construction is the outcome of a process of syntactic grammaticalization originates with Koptjevaskaja-Tamm 2001, who reviews a range of languages (from a variety of language families) to show that pseudopartitives derive from partitives diachronically. This process is formalized by Rutkowski 2007 who analyzes pseudopartitives as being grammaticalized partitives following Roberts & Roussou's (1999) account of grammaticalization. Roberts & Roussou (1999, 2003) treat grammaticalization as a diachronic process brought about by systematic reanalysis of existing functional material or reanalysis of lexical material as functional. This is viewed as a process of simplification of structure and/or features. Rutkowski suggests that the pseudopartitive evolves in languages to accommodate partitives that are not referential and thereby do not necessitate the more complicated (and costly) bi-nominal structure. In these partitives, the N1 is systematically reinterpreted as a measure phrase and other material is deleted or reinterpreted, creating the pseudopartitives structure (22).

(22)   [$_{DP}$ a [$_{MP}$ bowl$_j$ [$_{FP}$ of$_k$ [$_{NP}$ ~~e$_j$~~ [$_{PP}$ ~~e$_k$~~ [$_{DP}$ ~~her~~ [$_{MP}$ [$_{NP}$ soup]]]]]]]]]

Rutkowski suggests that during the transitional period from partitive to pseudopartitive there may be ambiguity in the language, giving rise to partitives that

may either be parsed with a partitive or a pseudopartitive structure. This ambiguity creates the ideal environment for broader language change. In Roberts & Roussou's account, ambiguity in a language may trigger the language learner's parameter setting device to set the parameter to the simpler/default option (based on the premise that the "language acquisition device is deterministic only to the extent that all parameters have to be set" (Roberts & Roussou 2003:12) – this does not imply that the learner necessarily sets all the same parameters extant in the target language). If the L1 English learner hears both partitives that contain two NPs and partitives that are part of single nominal projection but contain two noun-like elements (as in the pseudopartitive), the ambiguity may be enough to trigger the parameter setting in his I-language to treat all partitives as single nominal projections, despite the fact that the majority of English speakers may not have this parameter setting. We do not claim to know exactly what this parameter setting is, but we predict it would manifests a preference for parsing partitives as pseudopartitives in non-referential contexts.

Given the above analyses, there are two possible changes that may be happening in English: partitives may get parameterized as pseudopartitive in general or individual partitives may over time in the language become pseudopartitives.

One of these possibilities may account for the adult data seen in Stickney 2009. The 25% of adult responses that allowed N2 to be modified in the partitive may be indicative of particular partitives grammaticalizing (although Stickney shows that no particular partitive was more likely to allow N2 modification than any other) or may indicate that particular speakers have a different I-language that treats all bi-nominal partitives as pseudopartitives.

The following experiment was designed to investigate whether there exists a group of English speaking adults who might have a different I-language. If partitives are grammaticalizing on an item-by-item basis, then we should see particular partitives that behave more like pseudopartitives. If what we are seeing is a change in parameter setting, then we should see a split in English speakers – those who treat all partitives as if they were pseudopartitives (consistent with a new parameter setting) and those who do not.

Stickney 2009 suggests that it is the definite determiner that is, in fact, being reanalyzed in the grammars of the speakers that treat partitive as if it were pseudopartitive. However, she does not provide data that shows that the definite determiner is more likely to cause partitives to grammaticalize than partitives with other determiners (e.g. demonstratives or possessives). The survey experiment below seeks to investigate this issue as well.

3   Survey Experiment

In order to replicate and further investigate the adult data from Stickney 2009, we designed a survey experiment primarily intended to identify whether there was an

identifiable class of adult English speakers who treated partitive as pseudopartitive and to see if particular determiners are more like than others to influence interpretation of adjectival modification of partitive phrases. In the experimental design phase, no attempt was made to identify particular partitives in the process of grammaticalizing, however, a post-hoc analysis was done to address this question (see Section 3.3).

3.1   Methods

Ninety-seven undergraduate students from the University of Pittsburgh completed a survey. The subjects were native English speakers with an average age of 21.

Each survey contained forty-eight partitive phrases that participants were instructed to read and rate for "naturalness" on a scale of 1 (unnatural) to 5 (natural). The basic structure of partitive phrases was as follows:

(23)   a [adjective] [noun] of [determiner] [noun]

This experiment implemented a 2X4 within subjects design. The partitive phrases were created by manipulating whether the adjective was semantically compatible with N1 or N2 (referred to as N1-item and N2-item respectively) and the determiner (definite determiner, demonstrative, possessive pronoun, possessive phrase). Examples of the possible types of phrases follow:

(24)   Eight possible phrases derived from 'a [adj] box of [det] chocolates'

Det. type	N1-item	N2-item
definite determiner	(a) a cardboard box of the chocolates	(b) a semi-sweet box of the chocolates
demonstrative	(c) a cardboard box of those chocolates	(d) a semi-sweet box of those chocolates
possessive pronoun	(e) a cardboard box of his chocolates	(f) a semi-sweet box of his chocolates
possessive phrase	(g) a cardboard box of the man's chocolates	(h) a semi-sweet box of the man's chocolates

If a subject perceives the partitive to be a single nominal projection, like the pseudopartitive (5), then we predict that an adjective anywhere in this projection should be able to modify N2. If the subject perceives the partitive to be bi-

nominal, then an adjective adjacent to N1 should only be able to modify the higher noun phrase, N1. Thus, by manipulating whether an adjective was compatible with N1 or N2 we anticipated that subjects would rate as less natural any phrase containing an adjective-noun combination that was infelicitous. For example, if the subject's grammar could only allow an adjective preceding N1 to modify N1 and not N2, then we would expect him to rate (24b) as less natural than (24a).

There were eight counterbalanced versions of the survey. Each subject rated twenty-four N1-items and twenty-four N2-items. Each subject saw twelve of each determiner type, six as N1-items and six as N2-items.

3.2 Predictions

Given the literature reviewed in Section 2.2, we generate four predictions (Sections 3.2.1-3.2.4). These predictions will be evaluated in the discussion in Section 4.

3.2.1 P1: Subjects Will Prefer N1-items to N2-items

Stickney 2009 treats partitive and pseudopartitive as distinct syntactic constructions (4-5). If a subject's grammar treats the partitive and the pseudopartitive as distinct, then he will prefer N1-items to N2-items, giving them higher naturalness ratings. This is because an adjective in the higher noun phrase should not be able to modify a noun in the lower noun phrase in English (Section 1.2).

3.2.2 P3: Some Subjects Will Not Prefer N1

However, if language change is occurring by the changing of a parameter setting in the grammars of some English speakers, such that the structure of bi-nominal partitives grammaticalizes to become a single nominal projection like the pseudopartitive, then we expect that subjects who have this parameter setting will treat partitives as if they were pseudopartitives. This predicts the existence of subjects who do not distinguish between N1 and N2 or even prefer N2-items outright.

3.2.3 P2: Some Partitives Will More Readily Allow N2 Reading

If, as Rutkowski implies, over time particular partitives grammaticalize if they are frequently used in non-referential contexts, then evidence that particular N2-items are more likely to be rated as "natural" than others is predicted.

3.2.4   P4: The Type of Determiner Will Affect Acceptance of N2

Lastly, Stickney hypothesizes that a grammaticalized definite determiner is what allows N2 to be modified by an adjective adjacent to N1 in the partitives structure. This predicts an interaction between determiner type and high naturalness ratings for N2-items.

3.3   Results

We took two distinct approaches to the analyses of the rating data. First, we examined effects of item type (N1-items vs. N2-items) and determiner type within the entirety of the data (Section 3.3.1). Second, we identified individuals who tended to prefer N1-items to N2-items and those who did not and looked at each group to see if these types of individuals produced different ratings (Section 3.3.2).

3.3.1   Analyses at the Level of the All Ratings

The 2X4 ANOVA conducted on ratings revealed a main effect of item type (N1 vs. N2), $F(1,96) = 58.921$, $p = .00$, but no main effect of determiner and no interaction of item type and determiner on participant's ratings. The main effect of item type was due to participants rating N1-items as more natural than N2-items (25).

(25)   Average ratings for N1 vs. N2-items by determiner type

Item type	Overall	*the*	Demonstrative	*his*	*the man's*
N1	**3.474**	3.488	3.533	3.429	3.448
N2	**2.951**	2.948	3.060	2.969	2.826

When looking at whether particular partitives might be more likely to accept an N2 rating, we noticed that those phrases that might have common pseudopartitive counter-parts in English were getting higher ratings. For instance, the N2-item *a delicious plate of the food* was rated much more highly overall than then N2-item *a counterfeit suitcase of the cash*. A post hoc analysis of the effect of frequency and its interaction with item type on ratings was conducted. We used The Corpus of Contemporary American English (Davies 2008-) to determine frequency. Bi-nominal partitives in general are very infrequent in this corpus, however we found ample pseudopartitives. Thus we searched the pseudopartitive versions of these phrases. Instead of *box of the chocolates*, we searched *box of chocolates* and recorded the number of instances of each pseudopartitive counter-part to the partitive phrases in our data (forty-eight phrases in all). We divided the partitives in our survey into high and low frequency items via median split of the frequencies of their pseudopartitive counterparts.

A 2 (N1-items versus N2-items) X 2 (high versus low frequency) within subjects ANOVA was conducted on participants' ratings. This analysis identified a main effect of item type, $F(1,96) = 65.278$, $p < .01$, a main effect of frequency, $F(1,96) = 82.00$ $p < .01$, and an interaction of item type and frequency, $F(1,96) = 47.847$, $p < .01$.

An examination of ratings provided for N1-items and N2-items for high versus low frequency phrases shows there were larger differences between ratings provided for N1-items and N2-items for low frequency than high frequency phrases:

(26)   Ratings by frequency and item type
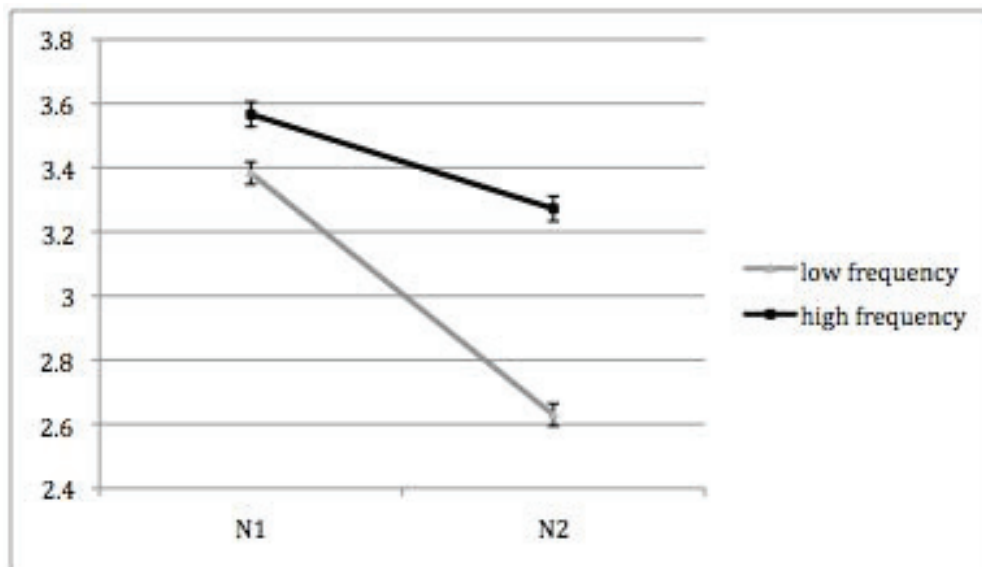
In other words, whether a subject liked or disliked an N1-item was not strongly affected by frequency. However, the frequency of the pseudopartitive version of the phrase significantly affected the rating of N2-items. If a partitive was in the high frequency group, the corresponding N2-item would be given a higher naturalness rating, but this was not true of its corresponding N1-item.

3.3.2   Analyses at the Level of Participants

In order to investigate whether an individual subject differentiated between N1-items and N2-items, we subtracted his average N2-item score from his average N1-item score. Subjects were classed via median split as those who clearly preferred N1-items (N1-item minus N2-item score: 0.58 to 2.58) and those who preferred N2-items or who did not distinguish between N1-items and N2-items (N1-item minus N2-item score: -1.33 to 0.54).

A 2 (N1-item preference versus no preference) X2 (high versus low frequency

phrases) mixed-subjects ANOVA of acceptability ratings indicated a between-subjects main effect of preference group, $F(1,4654)=13.043$, $p < .00$, a within-subjects effect of frequency (described above), and no significant interaction of preference group and frequency.

The main effect of preference group indicates that participants who prefer N1-items have a larger discrepancy between N1-item and N2-item ratings than the other group of participants. Although there was an interaction between the frequency of phrases and the acceptance of N2-items, there was no interaction between subject group and frequency.

In sum, subjects overall prefer N1-items to N2-items, but a closer look shows that there is a split in subjects into those prefer N1-items to N2-items and those who don't differentiate between the two. A frequent pseudopartitive counterpart to the partitive makes it more likely that subjects will accept an N2-item, but does not affect the likelihood of accepting an N1-item. Whether a subject differentiates between an N1-item and an N2-item does not affect whether he/she is affected by the frequency of an item.

4   Discussion

First and foremost, the results of this survey experiment support the ambiguity in the syntax of the partitive identified by Selkirk 1977. There is often not a clear distinction between partitive and pseudopartitive in English. Although in general adult English speakers prefer N1-items to N2-items, two distinct groups of speakers can be described: those who treat N1-items as preferable to N2-items and those who do not. In addition, there is an affect of frequency on whether subjects like N2-items. However, there is no interaction between the preference group to which a subject belongs and the affect of frequency on N2-items. This suggests that two separate (but related) events are happening with bi-nominal partitives in English.

The data support three of our four predictions (Section 3.2). We discuss P1, P2 & P3 here and address P4 toward the end of this section. P1 is supported by the overall trend in the data of subjects rating N1-items as more natural than N2-items (25). This overall preference for N1-items is consistent with the syntactic structure in (4). An adjective preceding N1 in this partitive structure cannot modify N2, thus an adjective that is semantically compatible with N1 is more felicitous in these items than an adjective that is compatible with N2.

However, the data is also consistent with P2, which predicts the existence of speakers who treat partitives as if they were pseudopartitives if, following Roberts & Roussou 2003, language change is brought about by the triggering of a parameter setting that is different from the language of the environment. The N1-item minus N2-item score gives us two statistically significant groups of subjects, consistent with a conflicting parameter setting of this sort. The subjects with the

lower N1-item minus N2-item score allow an adjective adjacent to N1 to modify N2, suggesting that for these speakers, the bi-nominal partitive is a single nominal projection, like the pseudopartitive.

The data is also consistent with P3. Although the experiment design did not incorporate frequency, we were able to split the partitives based on the frequency of their pseudopartitive counterpart. This is a reliable predictor for a higher naturalness rating for N2-items. It had no effect, however, on the acceptance of N1-items. This seems to be preliminary evidence that certain (high-frequency, non-referential) partitives have grammaticalized in English.

We are not suggesting that the existence of pseudopartitives in English is new. Clearly pseudopartitives have been emerging from common bi-nominal partitive constructions for quite some time (some pseudopartitives have been in the language for hundreds of years). The influence of frequency in our data may be an example of individual partitives grammaticalizing (like *keg of the beer* to *keg of beer*), but may also be indicative of semantic (and syntactic?) blocking. Perhaps because the pseudopartitive *cup of tea* is highly frequent in English, the partitive version is somehow inaccessible to the hearer in non-referential contexts – although we are not sure how this should be formalized.

What we find most striking in these results is the fact that there does seem to be a segment of English speakers who allow an adjective adjacent to N1 to modify N2. We take the data to be affirmation that these speakers exist, although more research needs to be done to investigate this phenomenon. It does not seem to be a dialectal preference, however, as our subjects were relatively homogenous in their speech community (mostly from the Pittsburgh area) and Stickney's (2009) data came from students mostly from Western Massachusetts. Instead of a dialectal difference we suggest that this is evidence of the process of language change suggested by Roberts & Roussou. There is enough ambiguity in the language, given the tendency for bi-nominal partitives to be treated as pseudopartitives, to trigger a simpler parameter setting in some learners –resulting in a different I-language from their peers relevant to these constructions. We claim that the data is evidence of the process of a change in English.

Nevertheless, the data leaves many questions unanswered. If English is shifting toward treating a partitive like 'a cup of the tea' as if it were structurally 'a cup of tea,' what does this signify about the intermediary determiner? The structure in (5) does not leave room for a DP. This is one of the issues that leads Stickney to suggest that what is actually grammaticalizing is the determiner rather than the partitive construction. She hypothesizes a reanalysis of the features in the definite determiner that allows it to be treated as some other functional item that would fit into a lower node in the nominal domain. This leads us to the prediction in P4. However, this prediction was not borne out in our data. There is no difference in the rating of an N2-item given determiner type. We are left with no clear picture of what is happening to the determiner in these constructions. Rutkowski

suggests deletion in the process of grammaticalization, but deletion in the context of an experiment where subjects were reading partitive phrases does not seem quite plausible to us. But if not deleted, then where is the determiner located within these structures? Stickney 2009 also suggests an alternative hypothesis that these partitives may actually remain bi-nominal and that what changes is the features of DP that prevent adjectives from modifying lower in the structure. If this were the case it would mean that all the types of determiners used in our experiment are grammaticalizing. It is unclear what this would mean in the broader context of English syntax. Further research into the processing of determiners in bi-nominal partitives is needed.

This is the first study to look at synchronic data on the partitive and ask whether grammaticalization is in process. The data suggests that it is. However, if we are to assert that a particular parameter is being set that causes these partitives to be treated like pseudopartitives, a clear definition of that parameter is needed. According to Roberts & Roussou, grammaticalization is lexically driven. Is a particular functional projection like MP or DP the cause of the shift or can entire strings of words be parameterized?

We would also like to see the issue of referentiality addressed. Rutkowski claims that non-referential bi-nominal partitives are what undergo this process of grammaticalization into pseudopartitives. Clearly, referential partitives should be tested to see if an adjective adjacent to N1 can modify N2.

We are currently conducting a follow-up survey in which all partitive items have equal frequency. A survey with carefully measured high and low frequency items is also in order. We are also currently designing a series of online experiments to see if the ambiguity in the partitive structure shows up in real time judgments. In these online experiments we will be investigating a range of aspects of partitive syntax. We assume that the ambiguity present in the data is structural, thus we should expect to see the same ambiguity with extraposition, fronting, stranding, etc..

We are excited to provide data that adds to the literature on syntactic variation and the literature on the partitive structure. Our data is consistent with a generative approach to language change that suggests that parameter setting may be affected by ambiguity in the language. The next step is to identify the exact nature of the ambiguity that is triggering a new parameter setting for bi-nominal partitives in English.

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University of Pittsburgh
Department of Linguistics
2816 Cathedral of Learning
Pittsburgh, PA 15260

helen.stickney@gmail.com