The real story about "quantifier float"

Thomas E. Payne

1. Introduction

In Chapter 10 of *Understanding English grammar*, the phenomenon of "quantifier float" is described as follows:

> One interesting property of *all* and *both* is that, when the DP' is a subject, these predeterminer quantifiers can "float" into the IP, either just before the Inflected verb, or between the first Aux (if there is one) and the verb. . . . This construction, often called QUANTIFIER FLOAT, does not occur for predeterminers other than *all* and *both*, and it does not occur when the DP' modified by the predeterminer is functioning in any role other than Subject of the sentence.

> The following examples from the BNC are then given:

(1)   These people *all* live in Edinburgh. (cf. *All* these people live in Edinburgh.)
The staff should *all* be working in the same direction. (cf. *All* the staff should be working in the same direction.)
The papers will *all* be identically punched. (cf. *All* the papers will be identically punched.)
The Shergolds must *both* be under a great deal of strain. (cf. *Both* the Shergolds must be under a great deal of strain.)
The prisoners will *both* profess their innocence. (cf. *Both* the prisoners will profess their innocence.)

While this very restricted definition of quantifier float is accurate, as far as it goes, it excludes several related phenomena in which *all* and *both* seem to float off of non-subjects, and situations where other special quantifier-like words, such as *each*, *either*, *also*, and *then* may also float from one position to another (see sections 4 and 5 below). In this extended discussion, I would like to show that:
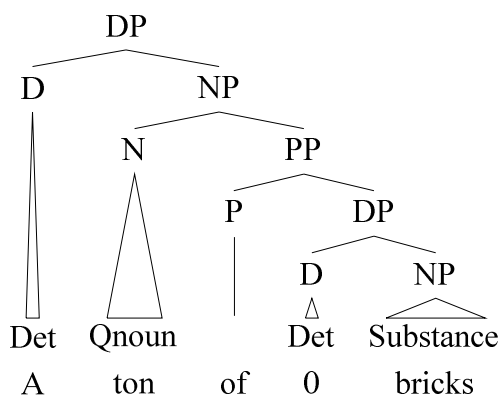
- PDQs (PreDeterminer Quantifiers) form a continuum, with *all* and *both* at one extreme ("canonical" PDQs), and quantity nouns followed by *of* at the other, e.g., *a truckload of*, *three tanks full of*, *two litres of*, etc.

Intermediate cases include *each of*, *many of*, *few of*, *a lot of*, *three of (N of)*, etc. Of course, *all of* and *both of* also occur, but *all* and *both* are the only floatable PDQs that may occur without a following *of*, cf.: *All my children*, *both doctors*, but not **each my children*, **either the doctors*. Fractions, such as *half* and *one-fourth*, may occur without
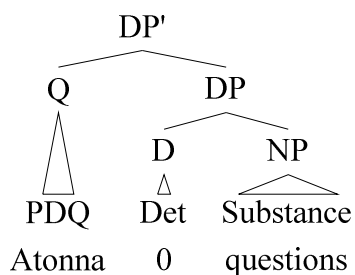
of, but they are not "floatable": *Half the children*, *one-fourth the population*, but not **the children will half arrive*, or **the population one-fourth reads Rowland*.

- This continuum can be understood as a consequence of the gradual unconscious reanalysis of quantified DPs, from a quantity noun (Qnoun) plus *of* to PDQ in a certain syntactic configuration. This reanalysis can be diagrammed using syntactic trees as follows:

(2)   Stage I: (Ex. *a ton of bricks*, *a lot of prime farmland*, *that busload of her supporters*)

```
                    DP
             _____|_____
            D              NP
            |         _____|_____
            |        N            PP
            |        |         ____|____
            |        |        P        DP
            |        |        |      ___|___
            |        |        |     D      NP
            |        |        |     Δ      /\
          Det     Qnoun      of   Det   Substance
           A       ton        of    0     bricks
```

(3)   Stage II: (Ex. *atonna questions*, *alotta the discussion*, *half the population*, *all my children*, *both the doctors*)

```
                DP'
          _____|_____
         Q              DP
         |          _____|_____
         /\        D         NP
        /  \       Δ         /\
      PDQ      Det      Substance
     Atonna     0        questions
```

According to this scenario, the Det+Qnoun+P of Stage I are reanalyzed (i.e., unconsciously thought of by English speakers) as a PDQ in Stage II, by analogy with preexisting PDQs. Consequently, the DP Complement of the preposition in Stage I, is reanalyzed as the head of a DP', adjoined by the newly reanalyzed PDQ.

It is important to emphasize that the creation of PDQs is a reanalysis *in process*. Some quantifiers (*eacha. manya, fewa, alotta, atonna, abuncha*, etc.) are further along in the process than others, and therefore have more of the properties of prototypical PDQs than others (*a carload of, a spoonful of*, etc.). However, only *all* and *both* have all the properties of PDQs, and are therefore the only PDQs that arguably have been fully reanalyzed into this relatively new, and still emerging syntactic category.

- Prototypical quantifier float, i.e., when a PDQ "floats" from a Subject DP into the I position in an IP, is motivated by the general attraction of Subjects, conjunctions and adverbial elements to that position.

Later in this discussion I will catalogue various quantifier float phenomena, and will show that there are intriguing asymmetries among the various PDQs regarding which ones float, and under what conditions. As quantifiers migrate out of noun phrases into larger structures (verb phrases and clauses), they tend to seek out positions where adverbial elements occur, thus creating additional paths for possible structural reanalysis.

2. Properties of PDQs

There are two syntactic properties that define a continuum from quantity noun to PDQ. These are:

Property 1: Optionality of a following preposition, *of*.

Property 2: Ability to "float" from a Subject DP into the I position on the verb (*all, both, each*)

Quantifiers that possess property 1 include *all*, *both* and certain fractions:

(4)   *All (of)* the papers will be punched.
         Both (of) my children live in Edinburgh.

         Half (of) the papers will be punched.
         Two thirds (of) the population are over 40.

Other quantifiers require *of* when occurring before a determined NP:

(5)   *Each of* my *children* live in Edinburgh.   **Each* my children . . .
         Three of the papers will be punched.   **Three* the papers . . .
         Few of my relatives are conservatives.   **Few* my relatives . . .
         Some of the shares can be sold.   **Some* the shares . . .
         Either of those will do.   **Either* those will do.
         None of my children live in Edinburgh.   **None* my children . . .
         Lots of these papers will be punched.   **Lots* these papers . . .
         Many of my relatives are conservatives.   **Many* my relatives . . .
         A tenth of the population have diabetes.   ??*A tenth* the population . . .

All, *both* and *each* may "float" from a Subject DP into the IP (i.e., they possess property 2). However, they may not be followed by *of* when floated:

(6)   My children *both* live in Edinburgh.   *My children *both of* live . . .
         My children *each* live in Edinburgh.   *My children *each of* live . . .
         The papers will *all* be punched.   *The papers will *all of* be punched.

Since *of* is not allowed following floated quantifiers, one might suspect that the set of quantifiers that possess property 1 (optionality of *of*) would be the same as those that possess property 2. However, this is not the case. *Each* possesses property 2, but not property 1, as illustrated in 5. Thus there are four logically possible combinations of properties 1 and 2: A quantifier may possess both properties 1 and 2, neither 1 nor 2, 1 but not 2, or 2 but not 1. This distribution is illustrated in Table 1.

Table 1: Syntactic properties of quantifier-like words		
	Property 1: Optionality of *of* (when in prenominal position)	Property 2: "Floatability"
All, both	+	+
each	-	+
some fractions	+	-
some, either, none, many, numbers . . . etc.	-	-

These properties, then, define a continuum from "canonical" PDQs (those that possess both properties), to plain Quantifiers (those that possess neither of the properties).

3. How to create a new PDQ

According to "classic" GRAMMATICALIZATION THEORY (see, e.g., Traugott and Heine 1991), grammaticalization involves a source, a path and a target. The source is an element (usually a lexical item) that undergoes reanalysis, the target is an existing category that serves as the model for reanalysis, and the path is a plausible "story" by which the source may be reconstrued as a member of the target category. In the case of PDQs, we have seen that certain Quantity nouns (*lot*, *ton*, *bunch*, etc.) are sources, with the category of PDQs as the target. Thus, *a lot of X* becomes *alotta X* by analogy with structures like *all of X*, *many of X, few of X,* etc. This path may also be drawing other structures, such as *a ton of X*, and *a bunch of X* into the PDQ+X pattern. This reanalysis entails that the head of a noun phrase is reconstrued as a PDQ, with the erstwhile Complement of a prepositional phrase functioning as the new head, as displayed in the tree structures in 2 and 3 above.

The "story" that explains this tendency resides in the nature of the particular Qnouns that undergo this reanalysis. They are, first of all, very low in semantic content themselves. Secondly, they are very frequent. For example, a *lot* (for most modern English speakers) is a very vague quantity. A *spoonful*, on the other hand, is much more specific. We can count and quantify spoonfuls just like any other countable noun. A *lot*, on the other hand (unless we are using this word in the sense of a parcel of property) is not so easily quantified and counted. We're not quite sure how much a *lot* of something is. Ten words may be a *lot* for the title of a book, while 100,000 words may not be a *lot* for the content of a book. A lot is essentially, well . . . *a lot*! It is semantically very

similar to quantifiers like *many*, *much* or *few*. This property of referring to a relative, rather than absolute, quantity makes this word quite useful as a general quantifier, and results in its being very frequent in discourse (114 examples of *spoonful* in the BNC, and 24,953 examples of *lot*).

Something similar seems to be happening for Qnouns like *bunch* and *ton* in contemporary English. Although *ton* has a technical definition (2000 pounds in the American system), in contemporary expressions like *a ton of people* or *tons of questions* speakers are certainly not using this word in the technical sense. It is losing its specific semantic content, and becoming semantically more like a quantifier similar in meaning to *many*. Similarly, *bunch* may have something like a technical definition when referring to flowers or grapes, but when referring to people, or songs (*a bunch of chamber songs*) it hardly expresses a technical meaning. We can count and quantify bunches only when used in the technical sense. Other Qnouns with very specific semantic content, like *spoonful*, *liter*, or *plate* (*a plate of cherries*) are not likely ever to become PDQs (though one can never predict with certainty the course of language change). Thus the tendency for the semantics of certain Qnouns to "bleach out" (become vague), goes hand in hand with their increasing functionality as general quantifiers. At some point speakers start unconsciously thinking of them as ordinary quantifiers like *many*, *all* and *both*, and their reanalysis as PDQs is complete. Thus, meaning drives syntactic reanalysis.

4. How to create a floatable PDQ

The question we want to ask in this section is, how does a PDQ become a "floatable" PDQ? Most of the Qnouns that are potential or actual sources for reanalysis as PDQs do not float (they do not have property 2 of PDQs outlined in section 2). What is different about *all*, *both*, and *each* such that they can "float" into the Inflection position, whereas other PDQs cannot?
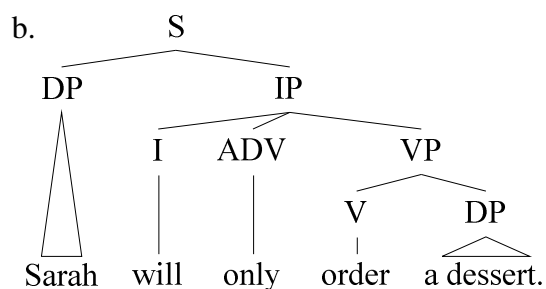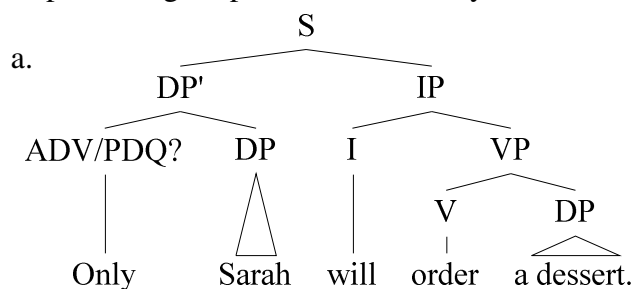
The first property of the floatable PDQs is that they apparently were never Qnouns. There is no lexical noun source that I can determine for the words *all, both* and *each*. They may very well have lexical sources, but if so, they are so deeply buried in history that from the perspective of present day English it is impossible to determine what the sources are. However, many other quantifiers, such as *many*, *few* and *much* also do not have discernible lexical sources, yet these do not float (see examples in 5). So not having a Qnoun source does not alone distinguish floatable from non-floatable PDQs.

One key to answering the question of "how does a PDQ become floatable" is to ask "what other elements float into the Inflection position"? This might provide an analogical "target" by which PDQs might acquire the property of floatability. It turns out that certain other words, usually considered to be adverbs or conjunctions, seem to "float" from a pre-determiner position to the Inflection position. These never occur with *of*, and often have different interpretations depending on where they show up:

(7)   a. *Only* Sarah ordered a dessert.   Subject scope
         b. Sarah *only* ordered a dessert.   Predicate scope
         c. Sarah will *only* order a dessert.   Predicate scope

The word *only* can appear either before the subject (7a), or in the Inflection position (7b and c), but it has different SCOPE in each of these positions. Scope refers to the syntactic span over which the modifier in question has an effect. Example 7a can only mean that of all the people in the party, Sarah was the only one who ordered a dessert, therefore the scope of *only* is the Subject -- *Sarah*. Examples 7b and c, on the other hand, mean something quite different. These examples mean that of all the things Sarah could have ordered, she decided to order a dessert, and nothing else. Therefore the scope of *only* in these cases is the Predicate -- *ordered a dessert*. This scope distinction is usually represented in tree diagrams by including *only* either within the Subject DP or the IP, as follows:

(8)   Representing scope distinctions in syntactic trees:

a.

```
                        S
              _____|_____
            DP'                      IP
        _____|_____              ____|____
   ADV/PDQ?       DP         I           VP
      |            |         |        ___|___
      |           /\         |       V       DP
    Only       Sarah       will    order   a dessert.
```

b.

```
            S
       _____|_____
     DP          IP
     /\      _____|_____
    |       I    ADV    VP
    |       |     |    __|__
    |       |     |   V     DP
  Sarah   will  only order a dessert.
```

Only seems to have scope over the Subject when in predeterminer position, but when "floated," it has scope over the Predicate.

Some adverbial conjunctions, such as *then* and *yet*, are ambiguous in predeterminer position. In example 9a, *then* may have scope over the Subject alone, i.e., a number of people ordered dessert, and then Sarah did, or it may have scope over the Predicate, i.e., Sarah ordered a number of things, and then ordered a dessert. In 9b and c, only Predicate scope is reasonable:

(9)   a. *Then* Sarah ordered a dessert.   Subject or Predicate scope
        b. Sarah *then* ordered a dessert.   Predicate scope
        c. Sarah will *then* order a dessert.   Predicate scope

        d. And *yet* Sarah may order a dessert.   Subject or Predicate scope
        e. And Sarah may *yet* order a dessert.   Predicate scope.

It is interesting that the floatable quantifier *both* exhibits some of the scope effects of these adverbial elements:

(10)   *Both* my children like carrots and dislike onions.   Subject scope
        My children *both* like carrots and dislike onions.   Subject or Predicate scope
        Sarah *both* likes carrots and dislikes onions.   Predicate scope

It seems that the other floatable quantifiers do not exhibit these scope effects:

(11)   *Each of* my children likes carrots and dislikes onions.   Subject scope
        My children *each* like carrots and dislike onions.   Subject scope
        *Sarah *each* likes carrots and dislikes onions.

(12)   *All* the students like carrots and dislike onions.   Subject scope
        The students *all* like carrots and dislike onions.   Subject scope
        *Sarah *all* likes carrots and dislikes onions.

Finally, for ordinary manner adverbs such as *immediately*, predicate scope is the only possibility, regardless of their position in the clause:

(13)   a. *Immediately* Sarah ordered a dessert.   Predicate scope
        b. Sarah *immediately* ordered a dessert.   Predicate scope
        c. Sarah will *immediately* order a dessert.   Predicate scope

Since adverbs are "floatable", and some adverbs (in particular, *only*) exhibit scope effects, we see a potential target structure for PDQs. A quantifier like *both* can be considered a kind of "adverb" in the sense that it may have scope over a Predicate or a Subject (the examples in 10). This template provides a plausible historical explanation for "quantifier float" in Modern English. "Pure adverbs", such as *immediately*, *quickly*, etc., tend to be fairly "free" in their syntactic distribution -- where a speaker chooses to place a pure adverb depends on considerations of information structure (emphasis, contrastiveness, etc.), though, they tend to "land" at fairly high level syntactic junctures, such as the beginning or end of a clause, or in the Inflection position.

The word *only* may be the missing link (or the "camel's nose in the tent", depending on one's preferred metaphor) between quantifiers and adverbs. It seems like an adverb both because it can have scope over a predicate (see 7 above), and it carries the syllable *-ly*. However, its source as a quantifier is clear; it comes from the numeral *one* plus the adverbial suffix -- "one-ly". So *only* is a kind of hybrid between adverb and quantifier. By analogy with *only*, other quantifiers may be drawn into the same template. The next step in this process are "floatable" quantifiers like *both* and *all*. Their ability to appear in the Inflection position may be by analogy with *only*. And, it seems, at least *both* has scope effects. It is a little more difficult to discern scope effects with *all*, however it is possible. Consider the following examples:

(14)   *All* the boys were tired out.   Subject scope
        The boys were *all* tired out.   Subject or Predicate scope
        Malcolm was *all* tired out.   Predicate scope

When *all* has Predicate scope, it may be construed as an adverb roughly equivalent to *completely*.

5. Non-canonical quantifier float

The definition of "quantifier float" given in Chapter 10 of *Understanding English Grammar* (cited at the beginning of this paper) defines "canonical" quantifier float, i.e., the most central, or prototypical kind of quantifier float. There are, in fact, several related phenomena that are appropriately left out of that definition. In this section, I will catalogue some of these, but will not necessarily relate them directly to canonical Q-float. Though it is tempting to assert that these phenomena are analogical extensions of canonical Q-float, there are enough complications to cast any facile comparison into doubt.

        Both and *all* may float off of pronominalized Direct Objects and Obliques, as illustrated in these examples from the BNC:

(15)   I adored them *both*. (cf. I adored *both of* them.)
        I'd I got the contract from them *both*. (cf. I'd I got the contract from *both of* them.)
        It can come upon us *all*. (cf. It can come upon *all of* us.)
        That shocked us *both.* (cf. That shocked *both of* us.)

The examples in 16 illustrate that this type of quantifier float does not occur with other quantifiers, whether they are PDQs or not:

(16)   *I adored them *each*. (cf. I adored *each of* them/the boys)
        *I'd I got the contract from the clients *many*. (cf. I'd I got the contract from *many of* them/the clients.)
        *It can come upon people *few*. (cf. It can come upon *few of* us/the people.)
        *That shocked the boys *half.* (cf. That shocked *half of* them/the boys.)

        However, all "floatable" PDQs can be launched by non-pronominal objects when they are followed by something else in the same clause. For example, non-pronominal Primary Objects can launch floating quantifiers when a secondary object follows (17a), when an embedded clause follows (17b, c, d), or when a prepositional phrase follows (17e):

(17)   a. We gave the boys *each/all/both* a shilling. (cf. We gave *each of/all/both* the boys a shilling.)
        b. We saw the boys *each/all/both* getting onto the train.
        c. We made the boys *each/all/both* apologize for their behaviour.
        d. I taught the girls *each/all/both* to play the piano.
        e. It shocked the boys *each/all/both* to the core.

        The examples in 18 illustrate that this type of quantifier float does not occur non-pronominal Direct Objects when they occur at the end of a clause:

(18)   *I adored the boys *both*. (cf. I adored *both* the boys.)
        *We saw the boys *each/all/both*.
        *I taught the girls *each/all/both*.

Similarly non-pronominal Oblique participants may launch floating quantifiers only when another element follows:

(19)   a. I'd I got the contract from the clients *both* with great enthusiasm.
           *I'd I got the contract from the clients *both*.
        b. It can come upon people *all* for the wrong reasons.
           *It can come upon people *all*.
        c. Water companies came out of the study well, with the ten privatised companies *all* on the top 24 profit-makers' list.
           *Water companies came out of the study well, with the ten privatised companies *all*.

        Finally, the quantifier *each* may float off of subjects to the end of the Predicate. This does not seem to occur with *both*, *all* or the fractions:

(20)   a. Gaza's seven groups have 8–10 members *each*.   (cf. *Each of* Gaza's seven groups have 8-10 members, or Gaza's seven groups *each* have 8-10 members.)

        b. Denie and Diane will take another one *each*.   (cf. Denie and Diane will *each* take another one, but not, oddly, *Each of* Denie and Diane will take another one).

        c. They would average about 2,000 full-time students *each* (cf. *They would average about 2,000 full-time students *all/both*.)

        d. The female proposers of motions are married with four children *each*. (cf. *The female proposers of motions are married with four children *all/both*.)

6. Conclusion

Table 2 summarizes the entire continuum from Qnoun to PDQ in terms of the four syntactic properties that have been the focus of this paper. The canonical PDQs, *all* and *both* possess all of these properties, while ordinary Qnouns, such as *spoonful* and *litre* possess none of them. Thus we see a potential path whereby Qnouns can become PDQs, and perhaps even canonical PDQs, by gradually acquiring these properties by analogy with the category of items immediately above them in the table.

Table 2: Quantifier properties				
	Occurance in Predeterminer position without *of*	Float from Subject to I position	Float from pronominalized Direct Object, with no other element in the clause.	Float from any Object when another element follows
both, *all*	+	+	+	+
each	-	+	-	+/-
fractions (*half*, *one-third*, etc.)	+	-	-	-
Grammaticalized quantity nouns (*alotta*, *atonna*, etc.)	+	-	-	-
Numerals and other "plain" quantifiers and quantity nouns	-	-	-	-

Qnouns that potentially refer to semantically bleached quantities (such as *lot*, *bunch* or *ton*) tend to be particularly useful as gradable quantifiers, and therefore are more likely to follow this path than those that inherently refer to very specific quantities. Of course the directionality of this cause-effect relationship is not self-evident -- one could say that Qnouns start to become semantically bleached *as a consequence of* following the grammaticalization path described above. However, a general principle of grammaticalization is that semantic shift ("bleaching") precedes structural reanalysis. Therefore, the best "story" regarding this particular change is that Qnouns begin to bleach, and then start to be reanalyzed as PDQs. This phenomenon is yet another example of how gradience in grammatical categorization is explainable in terms of the fact that the

complex set of habitualized behavioral patterns we call grammar is constantly changing in response to usefulness and consequent frequency of particular configurations of units.

References and further reading

Traugott, Elizabeth Closs and Bernd Heine (eds). 1991. *Approaches to grammaticalization*: *volume I. Theoretical and methodological issues.* Amsterdam and Philadelphia: John Benjamins.

Traugott, Elizabeth Closs and Bernd Heine (eds). 1991b. *Approaches to grammaticalization*: *volume II. Types of grammatical markers.* Amsterdam and Philadelphia: John Benjamins.