

An Analysis of Quantificational Phrases*

Ken'ichiro NOGAWA

1. Introduction

This paper is concerned with lexical properties of the so-called measure verbs in English. There are verb classes which lexically select a quantificational phrase (QP) (i.e., their thematic grids have a slot for a QP). We will refer to them, following Levin (1993), as measure verb classes. Levin lists five classes of measure verbs. They are the *register* class, the *cost* class, the *fit* class, the *price* class, and the *bill* class; each class is exemplified below, with the QPs underlined and some representatives in parentheses:

- (1) a. Register: The book weighs 3 lbs. (*measure, register, weigh, etc.*)
- b. Cost: That Mercedes will cost you 10 billion dollars. (*cost, take, carry, etc.*)
- c. Fit: This room sleeps five persons. (*fit, seat, sleep, etc.*)
- d. Price: The car dealer valued her old Honda at \$15,000. (*estimate, price, value, etc.*)
- e. Bill: The company billed John \$430. (*bill, charge, tip, etc.*)

All the underlined expressions in (1) denote some kind of amount or measurement of particular entities, and hence are referred to under the name of quantificational phrase. However, the analysis of the semantic status of the QPs is not determinate: The QPs are sometimes analyzed, in the literature, as objects (cf. Jespersen (1961)), quasi-arguments (cf. Chomsky (1981)), or adjuncts (cf. Quirk et al. (1985)).¹

In this paper, it will be shown that there are some syntactic and semantic differences among QPs of the five classes. We will argue that the differences are due to the variation among the QPs in their attributive property. Specifically, it will be suggested that QPs should be divided, at least, into two groups: those of an argumental nature, which refer to participants in the events described; and those of a non-argumental nature, denoting non-participants. This difference will explain the different grammatical behavior among the QPs.

2. Two Types of QPs

2.1. *Predicative QPs and Referential QPs*

As mentioned above, although the QPs in (1) all denote a certain amount or measurement of some entity, we will argue that they should be divided into two types in terms of their attributive nature. One type of QPs can be regarded as having a purely attributive nature, which describes the amount of some entity denoted by an NP in the sentence, either the subject NP or the object NP. In this sense, they can be regarded as predicative and we will refer to QPs of this type as "predicative QPs". We can see that QPs of the first four classes in (1) are predicative QPs: They describe the quantity of either the subject or the object NP. Among the four, QPs of the first three (the *register* class, the *cost* class, and the *fit* class) are subject-oriented ones. What is described by the QPs is the referent of the subject NP (but not of the object NP, even when the sentence has one). Since the subject-oriented QPs describe certain properties of the subject NPs, we obtain the following paraphrases, using the copula verb *be*.

(2) *Register* class verbs:^{2,3}

- a. The baby chimpanzee weighed 2.6 kg.
= The baby chimpanzee is 2.6 kg.
- b. The radius of the earth measures about 6,400 km.
= The radius of the earth is about 6,400 km.

(3) *Cost* class verbs:⁴

- a. The repair of the air conditioner cost (me) \$113.

= The charge for the repair of the air conditioner is \$113.

b. The homework takes (me) more than three hours.

= The length of time for the homework is more than three hours.

(4) *Fit* class verbs :⁵

a. This room sleeps five persons.

= The capacity of this room is five persons./

This room has the accommodation for five persons./

This room accommodates five persons.

b. Every seat in this train seats 7 persons.

= The capacity of every seat in this train is 7 persons.

QPs of the *price* class can also be considered to fall into this type ; but in this case, they are object-oriented QPs. Thus, unlike the above mentioned three cases, QPs of this class do not quantify the subject referent but the object referent.

(5) *Price* class verbs :

a. John valued the vase at about \$1,500.

≠ John is about \$1,500.

= The vase is about \$1,500.

b. The car dealer estimated the old car at \$800.

≠ The car dealer is \$800.

= The old car is \$800.

For example, the QP in (5a), 1,500 dollars, is not the value of the subject NP *John* : It is the value of the entity denoted by the object NP *the vase*.

The other type of QPs has, within the sentence, no antecedent to be linked with, and thus they cannot be regarded as predicative. In contrast with the four classes above, QPs of the *bill* class belong to this latter type : They are neither subject-linked nor object-linked QPs. Consider the following examples :

(6) *Bill* class verbs :

a. The company billed/charged John \$302.

≠ The company is \$302.

≠ John is \$302.

- (= (The amount of) the bill/the charge is \$302.)
- b. The gentleman tipped the clerk only a penny.
- ≠ The gentleman is only a penny.
- ≠ The clerk is only a penny.
- (= (The amount of) the tip is only a penny.)

In (6a) for example, the amount of money \$302 is not the 'cost' of the company denoted by the subject NP or of the recipient *John* in the object position. Thus, the QP is attributed neither to the subject nor to the object; it is attributed to an entity which is not syntactically realized.⁶ In fact, we can say that QPs of *bill* class verbs denote some substantial referent with a certain quantificational property. In other words, the QP itself refers to a participant in the event. In (6a), the referent is arguably a theme object moving from the company to John. Then, although QPs of the *bill* class also refer to a particular amount (of money), we may say, at least, that they can be regarded as having a referential status. Thus, they will be referred to in the following as "referential QPs".

In sum, among the five classes of measure verbs in (1), the first four classes take predicative QPs, describing the measurement of either the subject or the object NP. On the other hand, QPs of the last one is considered not to be 'purely' attributive, but to be referential in that they function as participants by themselves.

2.2. *Passivization and Wh-island Extraction of QPs*

In this subsection we will examine the relationship between the two types of QPs and the argument vs. non-argument distinction. It will be shown that the referential and predicative types of QPs correspond to arguments and non-arguments in nature, respectively.

It is considered in the literature that one diagnostics of the distinction between arguments and non-arguments (e.g., adjuncts) can be found in realization of the relevant constituents in *wh*-interrogatives: Arguments and non-arguments are realized in different *wh*-forms (cf. Quirk et al. (1985: 10.13)). In general, non-arguments like adjuncts are considered to be realized in adverbial forms (e.g., taking the form of *how* (or other periphrastic forms *how much*, *how long*, etc.); argumental *wh*-phrases, on

the other hand, are realized in the pronominal form *what* but not in adverbial forms (*how*-forms).⁷ If the distinction between the QPs of the first four classes and those of the last one is the distinction between non-argument and argument in nature, we expect that QPs of each type should be realized in *how*-forms and in *what*-form, respectively.

However, we should notice that lexical realization of QPs in *wh*-interrogatives is not unquestionable. In fact, some QPs are realized both in *what*-and *how*-forms. Consider the following examples :

- (7) QPs of *register* class verbs :
 - a. What/How does the thermometer register in the shade?
 - b. What/How (much/heavy) does the baby weigh?
- (8) QPs of *cost* class verbs :
 - a. What/How much would the computer cost?
 - b. What/How long will the homework take?
- (9) QPs of *fit* class verbs :
 - a. What/How many people does this room sleep?
 - b. What/How many people does this bench seat?
- (10) QPs of *price* class verbs :
 - a. At what price/How did the dealer value the vase?
 - b. At what price/How do you estimate the tapestry?
- (11) QPs of *bill* class verbs :
 - a. What/How much did the company bill/charge you?
 - b. What/How much should I tip him?

Thus, the pronominal-adverbial distinction in realization of *wh*-QPs cannot determine whether or not they function as arguments in the sentence. The indeterminacy may be due to the fact that QPs have the dual nature (irrespective of type of QPs) : On the one hand, QPs have the form of NP (i.e., one of the typical instances of the syntactic realization of arguments) and, on the other hand, they can describe some measurement of other arguments (implying the non-argumental (adverbial or predicative) status of QPs). Then, *wh*-realization of QPs seems to be dependent on which aspect of QPs are focused.⁸ In order to decide whether or not a QP is an argument, then, we need to seek some diagnostics other than *wh*-realization

of QPs.

One possible test is passivization of QPs (Quirk et al. (1985)). In general, arguments can stand in the subject position in the passive construction but non-arguments (e.g., adverbial phrases) cannot.⁹ Now, consider the following examples :

- (12) QPs of *register* class :
*Ten pounds was weighed by the package.
- (13) QPs of *cost* class verbs :¹⁰
*Ten dollars are cost by the book.
- (14) QPs of *fit* class verbs :
*Five people are slept in each room.
- (15) QPs of *price* class verbs :¹¹
*213 dollars were valued by this bone china.

These examples show that the QPs of the first four classes in (1) cannot be passivized, suggesting that they have the non-argumental status in nature. On the other hand, the following example shows that the QPs of the *bill* class have the argumental status, where the QPs of the verbs *bill* and *charge* (both being of the *bill* class) are moved to the subject position.¹²

- (16) QPs of *bill* class verbs :
420 dollars were billed/charged to me by the car dealer.

Another test to decide whether QPs are arguments or not can be found in island extraction phenomena : Arguments show a weak island effect when extracted out of *wh*-islands whereas adjuncts (i.e., non-arguments) show a strong effect. The contrast between them is exemplified in (17):

- (17) a. ?What_i does John wonder whether Mary bought *t_i*?
b. *How_i does John wonder whether Mary fixed the car *t_i*?

The difference in grammaticality above is attributed to the argument-non-argument asymmetry between the moved constituents. A brief review of the explanation in Rizzi (1990) is in order.

Rizzi redefines the difference between arguments and non-arguments (i.e., quasi-arguments and adjuncts) in terms of the 'referentiality' of their theta roles : Arguments have referential theta roles and non-arguments

According to Rizzi, even lexically selected constituents may show a strong island violation if they are not assigned a referential theta role (i.e., not referring to participants, but just qualifying the events). This is demonstrated by the following examples, where lexically selected adverbials (manner adverbials) ((18b)) and idiom chunks ((19c)) are *wh*-moved out of *wh*-islands :

- (18) a . Jean se comporte *(bien) avec les amis.
 ‘Jean behaves (well) with friends.’
 b . *Comment ne sais-tu pas [avec qui [PRO te comporter *t* t]]?
 ‘How don’t you know with whom to behave?’
 cf. ?Avec qui ne sais-tu pas [comment [PRO te comporter *t* t]]?
 ‘With whom don’t you know how to behave?’
(Rizzi (1990 : 77))
- (19) a . What headway do you think [*t* [you can make *t* on this project]]?
 b . What project do you think [*t* [you can make headway on
 t]]?
 c . *What headway do you wonder [how [PRO to make *t* on this
 project]]?
 d . ?What project do you wonder [how [PRO to make headway

on *t*]]?

(Rizzi (1990 : 79))

Both the manner adverbial *bien* in (18) and the idiom chunk *headway* in (19) are selected by the verbs and hence should be mentioned in the theta grid of the verbs, on a par with the patient object in (17a). However, the results of island extraction in (18b) and (19c) are as bad as the one in (17b). Rizzi's analysis gives a clear account of this : Although the manner adverbial and the idiom chunk in these examples are selected by the verbs (thus receiving a theta role), neither of them are participants in the described events and are thus assigned a non-referential theta role. Hence, not having a referential theta role, they cannot be extracted out of islands.^{14,15}

In addition to idiom chunks and lexically selected adverbials, adjectival predicates can also be regarded as non-participants, which receive no referential theta role.

- (20) a. He became *angry*.
b. Bill considers Pete *stupid*.

(Note here that adjectival predicates and the first four classes of quantificational phrases have, at least, one property in common : Both of them describe certain properties of a NP in the sentence.) Not surprisingly, adjectival predicates cannot undergo *wh*-movement out of islands. Rizzi provides the following examples, which are cited from Baltin (1989) and Roberts (1988) :

- (21) a. How angry do you think that he became *t* ?
b. *How angry do you wonder whether he became *t* ?
c. How stupid do you think (that) Bill considers Pete *t* ?
d. *How stupid do you wonder whether Bill considers Pete *t* ?

(Rizzi (1990 : 130))

Since the *wh*-constituents in (21) are not participants, they are not assigned a referential theta role. Thus, they cannot be extracted out of *wh*-islands as in (21b) and (21d).

Let us now consider *wh*-island extraction of QPs. If there is any difference in referentiality (in the sense of Rizzi) among the QPs in (1), it is

expected that we should obtain the same contrast with respect to the *wh*-island effect, between referential and non-referential QPs: Those which have a non-referential theta role (i.e., purely attributive QPs in our terms) should show the strong island effect whereas those which have a referential theta role (i.e., referential (participant) QPs) should not.

This is indeed the case. Let us start with island extraction of QPs of *register* class verbs, which Rizzi discusses in his analysis. Consider the sentence in (22):

- (22) What₁ did John weigh t_1 ?
 1. John weighed apples.
 2. John weighed 200 lbs.

The *wh*-phrase in (22) allows two interpretations, namely the theme (patient) interpretation and the interpretation as a QP. Accordingly, the two replies in (22) are possible. However, Rizzi claims that the *wh*-phrase *what* in (23) cannot be interpreted as the weight of John.

- (23) QPs of *register* class verbs :
 ?What₁ did John wonder how₂ to weigh $t_1 t_2$?

(Rizzi (1990 : 78))

In other words, the *wh*-phrase *what* crossing the *wh*-island does not allow QP-interpretation. The only possible interpretation of the *wh*-phrase is of the theme (patient) object of the verb *weigh* (though the judgment is marginal as indicated). This means that QPs of the *register* class cannot be extracted out of *wh*-islands. Given this, we expect that in a context where the patient interpretation is not allowed for the extracted *wh*-phrase, the sentence will be completely ruled out. Consider the following sentences :

- (24) QPs of *register* class verbs :
 a. *What₁ did John wonder whether the baby weighed t_1 ?
 b. *What₁ did John wonder whether the diameter measured t_1 ?

As expected, the examples above are ruled out. This is a result of the thematic grid forced on the verbs in (24). The embedded subject in each sentence (i.e., *the baby and the diameter*) cannot be properly interpreted as an agent but serves only the theme interpretation. As a result, the *wh*-

phrase originating from the postverbal position is obligatorily understood as the amount of the theme subject (i.e., as a subject-oriented QP). Hence, *wh*-extraction of the QPs is blocked and the sentences in (24) are ruled out.

Let us examine island-extraction of the other QPs. We start with QPs of the *cost* class and the *price* class. We have assumed that QPs of these classes are purely attributive (non-argumental) in nature, denoting some amount or measurement of the referent of a NP in the subject or the object position. If this is the case, the QPs of these classes are also expected to yield the severe island effect. Consider the following examples :

(25) QPs of *cost* class verbs :

- a. * {What_i/How much_i} did John wonder whether that Mercedes cost t_1 ?
- b. * {What_i/How long_i} does John wonder whether the homework takes t_1 ?

(26) QPs of *price* class verbs :

- a. *What_i did John wonder whether the car dealer priced his old car at t_1 ?
- a' *How much did John wonder whether the car dealer priced his old car t_1 ?
- b. *What_i did John wonder whether the editor valued his novel at t_1 ?
- b' *How much did John wonder whether the editor valued his novel t_1 ?

The examples above show the same island effect as is found in (17b), forming a clear contrast to the marginality in (17a). This proves that these classes as well as the *register* class take their QPs as non-argument.¹⁶

Now consider the last measure verb class in (1), the *bill* class. If the QP of the verb class is argumental, as we have assumed, we predict that they should be extractable from *wh*-islands. This prediction is also correctly borne out, as shown by the following example :

(27) QPs of *bill* class verbs :

??What_i did John wonder whether the company billed/charged
 t_i to him?

Since the *wh*-QP in (27) serves a participant role in the sentence, it can be moved out of a *wh*-island on a par with the patient *wh*-phrase in (17a).¹⁷ Thus, QPs selected by the *bill* class of measure verbs are referential and are concluded as having the status of argument.¹⁸

3. Concluding Remarks

In this paper, we have seen that quantificational phrases which are selected by measure verbs fall into two groups: referential QPs, which are argumental, referring to participants in the described events and predicative (i.e., purely attributive) QPs, which are non-argumental in nature, describing the amount or measurement of other NPs in the sentence. The former type involves QPs of the *bill* class alone and QPs of the other classes fall into the latter type.

Notes

*I would like to thank Minoru Nakau and Yukio Hirose for reading an earlier version of this paper. Needless to say, any remaining inadequacies are my own.

¹We should note that the three views of QPs are all concerned with (and based on the analyses of) the verb class which is referred to as the *register* class in this paper.

²Since the verbs in (2) do not take any object NPs, the QPs can only be linked to the subject NPs. Note also that verbs of the *register* class may take an agent subject and a theme object, instead of a theme subject and a QP.

- (i) a. The curator weighed the baby chimpanzee.
- b. Eratosthenes measured the circumference of the earth.

Interestingly, however, we cannot add an object-oriented QP in this case.

- (ii) a. *The curator weighed the baby chimpanzee 3.12 kg.
- b. *Eratosthenes measured the circumference of the earth about 40,000 km.

We leave this complementary distribution of the agent subject and the QP for future research.

³Note that as for the verb *register* of the *register* class, its QP does not describe the amount of the referent of the subject NP. The subject NP refers to

the scale or recording instrument on which the measurement is shown.

⁴Verbs of the *cost* class may optionally take an object NP. However, the QP may not be attributed to this optional object. Thus in (3a), for example, the amount of money \$113 is not the cost of 'me'.

⁵As is the case with the *register* class, *fit* class verbs in (4) do not take any object NPs. Thus, their QPs have no object antecedent to be linked with and may only be linked with subject NPs. Note also that even in another use of the verbs of this class, QPs may not be added to the sentences.

- (i) a. *The baby sitter usually sleeps children 3 at once.
cf. The baby sitter usually sleeps 3 children at once.
- b. *The owner of the small hotel sleeps his guests 5 in each room.
cf. The owner of the small hotel sleeps 5 guests in each room.

In this paper, we do not discuss this fact either.

⁶The implicit entity is lexically specified by the verb itself. Thus, \$400 in (6a) is the amount of the 'bill' or the 'charge' and *only a penny* in (6b) is the amount of the 'tip'.

⁷As for the *wh*-realization of nominal predicates in *what* form, see Yasui (1988).

⁸With respect to QPs of the *register* class of verbs, Jespersen (1961) also makes the same kind of observation, stating that the verb *weigh* may take either *what* or *how much* in interrogative sentences. Granting this indeterminacy, however, he considers that the QP of *weigh* should be most naturally analyzed as an object (not as an adjunct). See also Konishi (1980).

⁹Needless to say, the argumenthood of the moved constituent is not the sufficient condition for the operation of passivization.

¹⁰Sentences with the verb *cost* can be passivized if the verb means "to calculate how much money is needed to do or make it" (*COBUILD*).

- (i) a. The project has been costed.
- b. The job was costed by the builder at about £150.

(In this case, the verb may be classified into the fourth class (i.e., the *price* class).) However, we should note that what is moved into the subject position here is not the QP but the theme NP (and this is the case with verbs of the *price* class in general). See also note 11.

¹¹Although we cannot make passive sentences with a QP subject as in (15), passive sentences are acceptable if the derived subject is the theme NP. Thus, we obtain the following results:

- (i) This bone china was valued at \$213.

The difference between (15) and (i) clarifies the contrast between theme object NPs and QPs of the *price* class.

¹²Somehow, the sentence with the verb *tip* (a member of the *bill* class) cannot be passivized:

- (i) *Only a penny was tipped (to) the waiter by the gentleman.

¹³Lexically non-selected adjuncts are assigned no theta role whereas lexically selected constituents (even adverbials) are assigned a non-referential theta role. Thus, quasi-arguments and lexically selected adverbials (see (18) and (19)) are analyzed as having a non-referential theta role.

¹⁴I have pointed out in Nogawa (1995) that (true) cognate objects, which are lexically selected by the verbs, also show a strong island violation when they are extracted from islands. I only present some relevant examples below:

- (i) a. *What sort of smile_i do you wonder [whether [Hitler smiled t_i in front of Chamberlain]]?

- b. *What sort of smile_i didn't Hitler smile t_i in front of Chamberlain?

¹⁵The following examples (cited from Rizzi (1990: 89 f.)) also strongly supports the idea that the distinction between participant and non-participant is crucial to island-extractability. These sentences are semantically very close to each other, and they both involve a constituent which denotes a reason associated to the events. The only difference is the linguistic conceptualization of the events and the relation of the reasons to them. The sentence in (ia) involves a reason as a non-participant; on the other hand, (ib) takes a reason as a participant.

- (i) a. Non so se potremo dire che Gianni è stato licenziato per questa ragione.

'I don't know if we could say that Gianni was fired for this reason.'

- b. Non so se potremo dare questa ragione per il licenziamento di Gianni?

'I don't know if we could give this reason for Gianni's firing.'

When the constituents in question are *wh*-moved out of islands, only the former shows the severe island effect.

- (ii) a. *Per che ragione non sai se possiamo dire che Gianni è stato licenziato?

'For what reason don't you know if we can say that Gianni was fired?'

- b. ?Che ragione non sai se possiamo dare per il licenziamento di Gianni?

'What reason don't you know if we can give for Gianni's firing?'

¹⁶As for the *fit* class, QPs can, though marginally, be extracted out of *wh*-islands, and the result is not as bad as the other three classes.

- (i) a. ??[What number of people_i/How many_i people] does John wonder whether the room sleeps t_i ?

- b. ??[What number of people_i/How many_i people] does John wonder whether the wagon seats t_i ?

This is an unexpected result, but we reluctantly leave this point for further research.

¹⁷We must admit that the *wh*-extraction in (27) is somehow a little worse than when extracting a patient object NP (cf. (17a)).

¹⁸We expect that this distinction might also be reflected in the distribution of *it*-cleft constructions: Referential QPs, but not predicative QPs, could be the focus of a cleft sentence (cf. Quirk et al. (1985: 18.27), Yasui (1988)). However, we do not have enough definite results of the distribution and I leave the matter open. I thank Minoru Nakau (personal communication) for bringing my attention to the cleft construction.

References

- Baltin (1989) "Comments on Cinque's paper "The Respective Scope of Long and Successive Cyclic Movement,"" Paper presented at Second Princeton Workshop on Comparative Grammar, 1989.
- Chomsky, N. (1981) *Lectures on Government and Binding*. Foris, Dordrecht.
- Cinque, G. (1990) *Types of A'-Dependencies*. MIT Press, Cambridge, Massachusetts.
- COBUILD: Collins COBUILD on CD-ROM. Harper Collins.
- Huang, C.-T. J. (1982) *Logical Relations in Chinese and the Theory of Grammar*. Doctoral dissertation, MIT.
- Kegl, J. and C. Fellbaum (1988) "Non-Canonical Argument Identification," WCCFL 7, 187-202.
- Kenkyusha Shinpen Ei-wa Katsuyo Dai-jiten (*The Kenkyusha Dictionary of English Collocations*) on CD-ROM. Kenkyusha, Tokyo.
- Jespersen, O. (1961) *A Modern English Grammar on Historical Principles* II, III. George Allen and Unwin, London: Ejnar Munksgaard, Copenhagen.
- Konishi, T. (1980) *Eigo Kihon-Doshi Jiten (A Dictionary of English Word Grammar on Verbs)*. Kenkyusha, Tokyo.
- Levin, B. (1993) *English Verb Classes and Alternations*. University of Chicago Press, Chicago.
- Nogawa, K. (1995) "Cognate Objects and Island Effects," *Tsukuba English Studies* 14, 111-140.
- OED²: *The Oxford English Dictionary 2nd Edition on Compact Disc*. Oxford University Press.
- Palmer, F. R. (1974) *The English Verb*. Longman, London.
- Quirk, R., S. Greenbaum, Geoffrey Leech, and J. Svartvik (1985) *A Comprehensive Grammar of the English Language*. Longman, London.
- Rizzi, L. (1990) *Relativized Minimality*. MIT Press, Cambridge, Massachusetts.

- Roberts, I. (1988) "Thematic Mininality," *Rivista di grammatica generativa* 13, 111-137.
- Yasui, Minoru (1978) *Atarasii Kikite-no Bunpoo*. Taishukan, Tokyo.

準研究員 (Research Associate)