Measure Noun Phrases in English: Usages in a Corpus and Textbooks*

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Jong-Bok Kim and Jooyoung Lim. 2011. Measure Noun Phrases in English: Usages in a Corpus and Textbooks. *Studies in Modern Grammar* 66, 47-69. Measure noun phrases (MP), canonically realized in the form of *X of Y*, display such grammatical complexities that they challenge both theoretical linguists as well as even advanced EFL learners. MPs individuate and give classificatory information about Y, but induces grammatical indeterminacy with respect to number concord, selectional restriction, and modification patterns. This paper investigates the uses of MPs in the English corpus COCA and secondary-level English textbooks in Korea to shed light on the direction of better understanding of their properties both in theoretical and EFL contexts.

Key words: measure noun phrase, usage-based, number concord, selectional restriction, modification, COCA

1. Introduction

Measure noun phrases (MP) typically express a specific portion of the mass or entity specified in the following PP as illustrated in the attested corpus examples from the COCA[1]:

* This work was initiated as an undergraduate project at Kyung Hee University and further developed as this one. Our thanks go to Eunjin Choi for the work in the first stage. We also thank anonymous reviewers of this journal for comments and suggestions.

(1) a. **A group of girls** are sitting on a porch trying to sing.
b. He was always drawn toward **that pestilent ribbon of water**.

Such MPs, realized in the form of '*X of Y*', display quite grammatical complexities and cause high level of learning difficulties to most of the EFL learners. In particular, MPs induce grammatical indeterminacy with respect to number concord, selectional restrictions, and modification patterns. For example, subject-verb agreement is determined either X or Y as shown in the attested corpus examples:

(2) a. ***A group*** **of police cruisers is** speeding across the bridge with light and sirens. (COCA)
b. **A group of *immigrants* move** in and, seemingly overnight, they're far more successful than native residents. (COCA)

In addition, the selectional restrictions of the verb can be also satisfied by either X or Y:

(3) a. Do you want to **grab *a cup* of coffee** and tell me about it, or would you rather stand here and implode? (COCA)
b. She sits at a table and **drinks a cup of *coffee*.** (COCA)

We can grab a cup (X) and drink coffee (Y), indicating either X or Y can be the target of the selectional restrictions imposed by the main verb. In a similar manner, we can observe that the adjectival expression

[1] The COCA (Corpus of Contemporary American English), freely-available online, is a balanced corpus of American English with 425 million words of text of spoken, fiction, magazines, newspapers, and academic texts. Some of the corpus data here are slightly modified to improve the readability.

in the pre-X position can modify either X or Y in the *of*-PP:

(4) a. I was holding **my *plastic cup* of 7-Up** aloft as if it were crystal. (COCA)
b. In twenty minutes, we can be in Assisi, have **a *delicious* cup of *espresso*.** (COCA)

Just like number concord or selectional restrictions, modification also tells us that either X or Y can serve as the head of the MP in question.

Such grammatical indeterminacy of the MPs with respect to number concord, selectional restrictions, and modification patterns has challenged both theoretical analyses and EFL learners. As an attempt to better understand such complexities of the MPs, we have performed an extensive corpus search using the online available corpora COCA (Corpus of Contemporary American English) and further checked their uses in secondary school textbooks in Korea.

2. Measure Noun Phrase and Partitive Constructions

English MPs often occur as either as a simple NP or binominal NP form, i.e. noun phrase followed by the *of*-phrase:

(5) a. I need a cord that is **ten feet** long.
b. I need **ten feet of cord**.

In this paper, we focus on binominal MPs like (5b) and refer the first noun as *X* while the second one as *Y*. The MPs are different from the so-called *partitive constructions*. Consider the following pairs of naturally

occurring data:

(6) a. The priest softened **a piece of bread** in a little wine. (COCA)
b. She wished she could reach out and grab **a piece of *the* bread** from other table. (COCA)

(7) a. I found **a box of vinyl records** yesterday. (COCA)
b. Eventually Tommy gave me **a box of *the* cards** he didn't want any more. (COCA)

Both the MPs in (a) and the partitive phrases in (b) are similar in syntactic structures. They both have binominal NP forms with the preposition *of*. They both allow mass nouns (e.g. *bread*) or countable nouns (e.g. *cards*) in the position of Y. The only syntactic difference between the two is the existence of the definite determiner *the* in the partitive. The two also induce a semantic difference: partitives denote a part of a whole while MPs individuate and give classificatory information about Y. That is, X provides the structure by which an unmeasured and internally undifferentiated Y is individuated (Quirk *et al*. 1985, Dodge and Wright 2002). For example, the MP *a box of vinyl records* in (7a) expresses a differentiated set of *vinyl records* while the partitive one *a box of the cards* in (7b) designates *a box* from the definite set *the cards he didn't want any more*.

Syntactic behaviors also differentiate the two. MPs can be pluralized by numerals or articles in most cases as in (8a) while not all partitives allow preceding numerals or articles as shown in (9) (Jackendoff 1968, Kim 2002):

(8) a. ***Two* groups of patients** were compared. (COCA)
b. ***Two* groups of *the* cells** sometimes merge together. (COCA)

(9) a. **Some of *the* men** took strips of colorful cloth from their pockets. (COCA)
b. ***The* some of *the* men** took strips of colorful cloth from their pockets. (COCA)
c. ***Three* some of *the* men** took strips of colorful cloth from their pockets. (COCA)

Modification patterns also tell the two apart. Modifiers can precede both partitives and MPs. However, as noted by Stickney (2007), in partitives, the preceding adjunct can modify only the X-element while in MPs, the adjunct can modify either X or Y. For example, the adjective *moldy* in the partitive example (10a) can modify only *box* but in the MP (10b), it can be linked to either *box* or *chocolates*:

(10) a. a **moldy** *box* of Aunt Margaret's chocolates
b. a **moldy** *box* of *chocolates*

The type of X expression also distinguishes MPs and partitives. Quantifiers such as *some, each, few, all,* and *both* require the following *of*-NP to be definite, but MPs combine with an *of*-phrase without the definite article:

(11) a. He has to belt trousers below it, as **some of *the* friends** must. (COCA)
b. So I thought just let him blow **both of *the* girls** out of the water. (COCA)
(12) a. *He has to belt trousers below it, as **some of friends** must.
b. *So I thought just let him blow **both of girls** out of the water.

We can summarize what we have seen as the differences between MPs and partitives as follow:

(13) Measure Noun Phrases and Partitives:

	Partitives	**Measure Noun Phrases**
Similarities	Surface Form - NP-*of*-NP	
Surface differences	definite Det for Y	no Det for Y
Function	denoting a part of a whole	individuating Y
Articles	Some partitives do not allow any preceding articles.	MPs can be pluralized and follow an article
Modification	Only X can be modified by a preceding modifier.	Either X or Y can be modified by a preceding modifier.

As summarized in the table, MPs behave differently from partitives though the two are superficially similar. In what follows, we will also see the idiosyncratic properties of MPs in English in more detail.

3. Types of Measure Noun Phrases

3.1 Definition

There exist several different definitions for measure NPs. For example, Quirk *et al.* (1985) takes MPs as a subgroup of the partitives, ascribing the noun X to denote quantities of length, volume, and area. Schwarzschild (2002) extends the notion, including not only NPs whose head is a term of measure such as *gallon* or *ounce*, but also phrases such as *much, too much, so many, a lot, a little* or *a truckload*. In a similar fashion, Brems (2003) defines MPs as measuring off well-established and specific portion of the entity specified in the *of*-phrase as given in (14a):

(14) a. a **kilo** of apples, **miles** of beach, a **meter** of cloth
b. a **lot** of people, a **truckload** of zebras, a **pile** of paper

Brems (2003) also extends the MPs to include nouns as in (14b) which do not designate a 'measure' but display a broader potential for quantification such as *bunch, heap* and *pile*. In this paper, we will examine measure nouns which not only refer to standard-like portion of entities but also are displayed in the broader sense.

3.2 Types of Measure Noun Phrases Investigated

MPs can be classified into several groups, depending on the restrictions on Y, types of noun on X, or the semantic relation between X and Y. Following Dodge and Wright (2002) replying on the basis of the properties of X and Y, for this paper we classify MPs into five different subgroups as given in the following:

(15) Types of Measure Noun Phrases:

Types	**Property of X and Examples**
container-measures	Y: mass, multiplex He handed her **a glass of red wine.**
standard-measures	Y: mass, multiplex **7,000 gallons of oil** have spilled into the Gulf.
dimensional-boundaries	Y: mass **Ribbons of fine snow** lay across it.
configuration type	Y: multiplex **The stack of papers** drops onto the desk.
collection-of-members	Y: multiplex **A group of volunteers** come to Philadelphia.

This classification hinges on the property of X as well as of Y, whether

it is a mass or multiplex (plural countable) noun. Examples of the 'container'-type MP include *glass of tea, cup of coffee, cupful of wine*, etc. X-element contains substance Y and Y must be physically contained to be measured. Both mass nouns and multiplex nouns can occur in the Y position. The 'standard'-type MP designates a precise and standardized amount of Y. The Y-element can be either a mass or multiplex noun as in *a yard of cloth, two gallons of milk,* and so forth. As for 'dimensional'-type MP, the X expression provides relative size information of Y and describes shape, dimensionality and rigidity of Y. Examples like *a stick of butter, a sheet of paper,* and *a ribbon of sand* belong to this type. The Y expression here is internally cohesive and thus can be only a mass noun, not a multiplex noun. In the 'configuration'-type MP, individuals are arranged in a particular configuration and thus Y must be a multiplex noun. X offers information about the configuration's shape and orientation. Examples of this type include *a line of trees, a stack of papers, a heap of stones,* etc. Finally, in the 'collection-of-members'-type MP, X provides social or functional relationships between the individuals involved. In this type, Y requires a multiplex noun as in *a herd of zebras, a team of soccer players, a group of people,* and the like.

3.3 On the Headedness of the Measure Noun Phrases

MPs interact with other elements in the clause in unique ways. In particular, as noted by Dodge and Wright (2002) and others, they display three unique grammatical phenomena with respect to number concord, selectional restrictions, and modification patterns.

Let us consider number concord with the following corpus examples:

(16) a. **A group of *girls* are** sitting on a porch trying to sing. (COCA)
b. They assembled **a group of *50 people*** and paid **them** to taste and rate 12 different waters. (COCA)

(17) a. **A *group* of police cruisers is** speeding across the bridge with light and sirens. (COCA)
b. ***A group* of U.S. missionaries arrives** from San Francisco to spread the Christian gospel among the perceived heathens. (COCA)

All the MPs here have the singular determiner *a*, but we observe different number concord. In (16a), the verb is in the plural form and in (16b), the pronoun referring to the MP is plural. This indicates that it is Y that determines the number value of the MP. However, in (17) we have a different situation: the main verb is singular even though Y is plural. On top of this mismatch in agreement, we have cases where the number value can be flexible as pointed out by Dodge and Wright (2002):

(18) a. *The herd of zebras is/are* grazing. (Dodge & Wright 2002)
b. **The group of warehouses** I control **is** close by the Great Southern Highway (COCA)
c. **The group of secondary victims** of domestic violence **were** receiving psychological treatment at the time. (COCA)

What these examples indicate is that the context may determine the number value of the MP. We thus cannot designate the head of the MP in a rigid way.

Selectional restrictions also show the flexibility of headedness in MPs. Observe the following:

(19) a. I can't **hold *a glass* of water or tea** long. (COCA)
b. I was **sipping a glass of *water*.** (COCA)

In these two examples, selectional restrictions occur differently. In (19a), what one can hold is not *water* (Y) but *glass* (X). Meanwhile in the example (19b), we have the opposite situation. We sip *water* (Y), not *glass* (X). In addition, we can find examples in which selectional restrictions seem to work for both X and Y:

(20) a. The nurse ***brought* a glass of tea.** (COCA)
b. ***Producing* a pound of beef** requires 4.8 pounds of grain. (COCA)

The *nurse* can bring either *a glass* or *tea*, and we can produce *a pound* or *beef*. Once again, we see that the headedness is determined by other external factors in the MP.

Modification patterns also tell us the flexibility of the headedness. Observe the following corpus examples:

(21) a. He says over **a *short stack* of pancakes** at the Sourdough Cafe here. (COCA)
b. His private secretary came into the room bringing **his *usual* stack of *phone messages.*** (COCA)

In (21a), the adjective *short* modifies X (*stack*), not Y (*pancakes*). This pattern is different from (21b) in which the adjective *usual* modifies not X (*stack)* but Y (*phone messages*). This modification pattern thus also shows us the context determines its head: the modifier can be linked to either X or Y.

As we have seen so far, number concord, selectional restrictions, and

modification patterns all indicate that the headedness in MPs is indeterminated. Their external factors in a sense determine the headedness.

4. Corpus Findings

4.1 Overall Frequencies

As a way of checking the authentic uses of the MPs, we performed a comprehensive corpus search, using the balanced corpus COCA (Corpus of Contemporary American English), freely-available online. As a first step, we selected total 20 high-frequent MPs, four measure nouns from each of the five groups we defined in the previous section (cf. Biber *et al.* 1999). We have identified the frequency of each one, totaling 33,241 tokens. Of these, as summarized in the following table, in terms of the group frequency, the collection-of-members type yields the highest frequency (53.98%) followed by dimensional (21.55%), standard-measure (10.74%), configuration (6.30%), and container-measures (7.42%):

(22) Frequency of Measure Noun Phrases:

Container-measures	Standard-measures	Dimensional-boundaries	Configuration type	Collection-of-members
cup barrel pack basket	foot pound inch gallon	piece sheet square stick	pile stack heap wedge	group set series bunch
7.42%	10.74%	21.55%	6.30%	53.98%
- Words in each type are listed according to the frequency order. - The frequencies of listed words are summed for the percentage of each type.				

The topmost four frequent words of the 20 measure words we identified

are all the collection-type: *group, set, series,* and *bunch*. In addition, the most frequent words in the four remaining groups are *cup, foot, piece,* and *pile*, respectively. Of these 33,241 instances, we have extracted 100 examples for each measure word and checked how they behave with respect to the three main properties we discussed in the previous section: number concord, selectional restrictions, and modification patterns.

4.2 Number Concord

As noted in the previous section, each type of the five MPs displays slightly different properties of Y. Our corpus search shows that the noun property of Y is in a close relation to the specific entity on the position X. For example, even though *gallon* and *pound* both belong to the 'standard'-type MP, the MP *gallon* takes only a mass noun in Y while *pound* combines with a multiplex noun or a mass noun, as illustrated in the following:

(23) a. So far, three million **gallons** of **oil** have leaked out. (COCA)
b. The tax on **a gallon** of **80-proof liquor**, which is 40% alcohol, would equal $5.42. (COCA)

(24) a. One **pound** of **fat** equals 3,500 calories. (COCA)
b. Seventy **pounds** of **steel plates** were substituted for batteries on the power chair. (COCA)

Unlike the collection-of-members type, the other four types of MP show a consistent behavior with respect to number agreement. That is, for example, in the standard-measure or configuration type, it is Y that determines the number value:

(25) a. **Four pounds of salt pork is** $ 1.13. (COCA)
b. In front of him **are a pile of cottonmouth snakes.** (COCA)

The collection-of-members type displays frequent number mismatches in subject-verb and pronoun-antecedent agreement. Consider the following corpus examples:

(26) a. **A group of *girls are*** sitting on a porch trying to sing. (COCA)
b. When you put **a group of *people*** together that are oppressed, **they** will destroy one another. (COCA)
(27) a. **A set of *circular profiles are*** projected onto the spheres from the projectors. (COCA)
b. You're looking at **a set of *questions*** on a poll and you're making too much of ***them***. (COCA)

In these collection-of-members type examples, the verb or the pronoun agrees not with the singular X but with the plural Y. Of course, we have examples where the verb agrees with X:

(28) If **a group** of **contras *breaks*** into your home, ties you up and takes out your eye before cutting your throat. (COCA)

Interestingly, we also find examples like (29) in which an MP can be either refer to singular or plural:

(29) In Baghdad, there**'s another group of diplomats**. What is **their** status at the moment? (COCA)

In the first sentence here, the MP *another group of diplomats* agrees

with the singular verb, while in the second sentence the MP refers to the plural pronoun. This implies that the context can pick up the index value of X or Y, depending on the context.

4.3 Selectional Restrictions

In the previous section, we have observed that selectional restrictions can be sensitive to either X or Y. Corpus data also show us similar behavior. Consider the following corpus examples for each of the five groups:

(30) a. Daniel **handed** her **a cup of tea.** (COCA)
b. They **found 750 pounds of market-ready marijuana.** (COCA)
c. If you **take a piece of paper** and fold it in half, the result is a stack of paper. (COCA)
d. Three waiters **brought two piles of freshly sliced fruit.** (COCA)
e. We **have a group of soldiers** that we're going to be following. (COCA)

In each of these examples, the verb can be linked to either X or Y in terms of selectional restrictions. Of course, our corpus search yields examples where the verb restricts only Y as in (31) or only X as in (32), even though the restriction to Y is more often than the one to X:

(31) a. He waited for the mail bus and **drank** a cup of **coffee** in the cafe across the street. (COCA)
b. I'd **eat** a whole pound of **beef** in one sitting. (COCA)
c. When it **devoured** the pile of **oats** I set on the table before it. (COCA)
(32) a. The **pile** of agent rejections **grew** painfully high. (COCA)
b. How can you **broaden** the **group** of people we select from to be

in leadership positions? (COCA)

However, the container-measure type places more frequent selectional restrictions on X rather than the other four types do:

(33) a. He **grabbed** a **cup** of coffee. (COCA)
b. My **glass** of Dr. Pepper fell on the brick floor and **smashed**. (COCA)

4.4 Modification Patterns

Not different from the literature (e.g., Stickney 2004, Dodge and Wright 2002), we have also found that an adjunct in the pre-X position can modify either the following X or the remote Y:

(34) a. How can you pass this **huge piece** of legislation? (COCA)
b. So, get out a **blank** piece of **paper**. (COCA)
(35) a. She looked like the cat who had eaten an **entire gallon** of cream. (COCA)
b. We'll be able to produce a million **fresh** gallons of **water** per day. (COCA)

Theoretically either X or Y can be modified by an adjunct in the pre-X position, but most of the corpus data modifies X. This is what we expect from a processing point of view, such as the preference for being linked to a closer element.

4.5 Summary

So far, we have described the usages of the five different types of MPs

we found from the corpus COCA with respect to the three main phenomena: number concord, selectional restrictions, and modification pattern. This can be summarized as following:

(36) Number concord:
  a. The type of noun in Y varies depending on the type of X.
  b. The number value of an MP is in most cases determined by X.
  c. The collection-of-members type shows more frequent flexibility in number concord.

(37) Selectional restrictions:
  a. Restrictions apply for both X and Y, regardless of the MP types.
  b. Y is in most cases the target for selectional restrictions.
  c. The container-measures type places frequent selectional restrictions on X.

(38) Modification patterns
  a. The pre-X adjective can modify either X or Y.
  b. In most cases, X is the target for the modification by a pre-X adjective.

5. Usages in Secondary School Textbooks

As we mentioned in the beginning of the paper, the complexity and flexibility of MPs challenge ESL learners. We have searched total 29 middle and 20 high school textbooks used for 7th to 12th grade students in Korea to check how the MPs are used in ESL environments (of 289,776 words, we have identified 87 measure noun tokens). The search tool we used is MonoConc after collecting the raw texts of each textbook.

To examine the usages of MPs in these textbooks precisely, we first

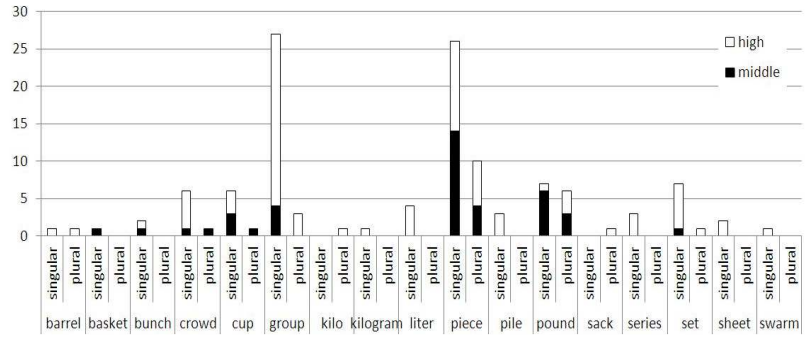
distinguished singular measure nouns and plural measure nouns. Some of the typical singular MP examples we found from the textbooks are given in the following:

(39) a. Congress is **the group of men and women** who make the laws for the United States. (Hanseo Middle 2)
b. He gave the old man **a piece of bread** and **a glass of cold milk**. (Chunjae (H) Middle 3)

(40) a. In 1823, **a group of boys** were playing soccer at a school called Rugby in central England. (Chunjae (Kim) High 2)
b. Then chip of **a little piece of ice** and hold it on your finger. (Chunjae (Kim) High 3)

The middle school textbooks use the MP *piece* most frequently, followed by *group*. Meanwhile, in the high school textbooks, the MP *group* is the most frequently used one, followed by *piece*. The frequency of other measure nouns, together with these two, is given in the following:

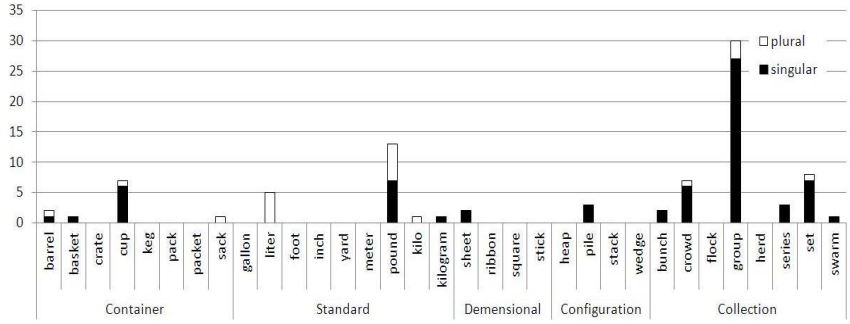
(41) Frequency of MPs in Middle and High School Textbooks:



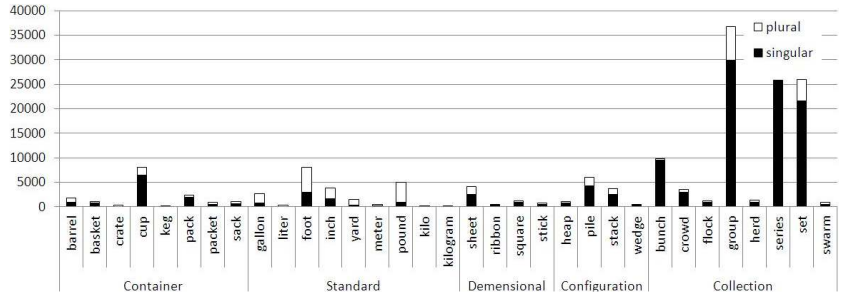
As shown in the table, the frequency of measure nouns in textbooks is rather skewed, overusing two measure nouns *piece* and *group*. This is

rather different from the COCA. Let us compare the usages of the five group in high school textbooks with those in the COCA:

(42) Measure Noun Phrases in Textbooks:



(43) Measure Noun Phrases in the COCA:



These two table charts show us the frequencies of the five types of MPs. What we first can observe is that the COCA includes more variety usages of measure nouns. For example, measure nouns like *series* and *set* are frequently used in real data, but are much less found in Korean textbooks.

6. Discussion and Conclusion

We have illustrated the complexities of MPs and their usages in the corpus as well as in the English textbooks in Korea. MPs are presented

with *X of Y* form in general, sharing some properties with partitive constructions. According to the properties of X and Y, MPs can be classified into five subgroups. On top of those characteristics, MPs have indeterminant properties with respect to phenomena such as number concord, selectional restrictions, and modification patterns. MPs behave differently in these three depending on the context.

As noted in the previous section, compared to the COCA, there are much less MPs used in the English textbooks. In addition, the frequency order is rather different. In the textbooks in Korea, the frequency is rather skewed, overusing *piece* and *group*. This indicates that EFL learners at junior and high school levels may not be exposed enough to experience the complexity as well as diversity of MPs. As we have seen in the literature as well as in the corpus, the grammatical properties of MPs are rather complex and flexible. In terms of syntax, it appears that X plays an important role in many cases. However, in terms of semantics, it seems to be the case that Y functions as the semantic head. Such flexibility is also found in our corpus findings. For example, with respect to number concord, in most of the MP types, the verb or pronoun number value concords with X not with Y. However, the collection-of-members type frequently displays mismatches in subject-verb or pronoun-antecedent agreement. In those cases, Y seems to function as the semantic head, largely due to the properties of collection nouns.

Selectional restrictions also tell us a similar point. Consider the fact that the container-measures type shows more frequent verb restrictions to X. The other four types generally have intangible entities in the position X. For the collection-of-members type, it is hard to distinguish X from Y since Y is a member of X and X further consists of Y. Consider the

examples in (44). Here, the expression *yellow ribbon* doesn't mean a long, narrow piece of cloth which has yellow color. It refers to *hasty patriotism* metaphorically. In (44b), what is *in Baghdad* is *a group* and the *group* consists of *diplomats*.

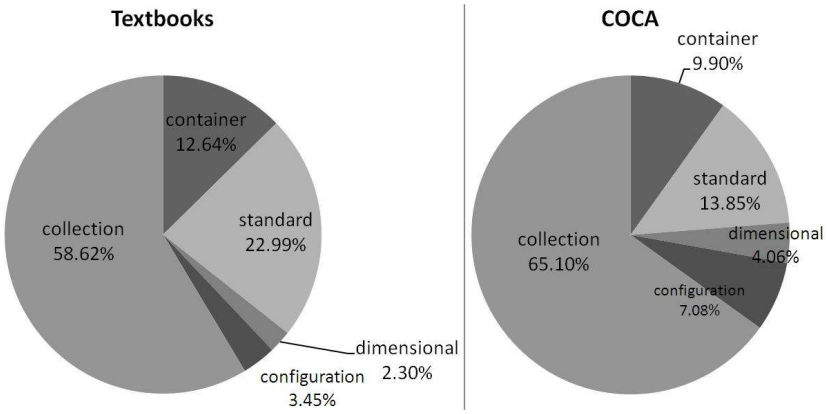
(44) a. Yellow **ribbons of hasty patriotism** blossom on every streetlight. (COCA)
b. In Baghdad, there's another **group of diplomats.** (COCA)

Since it is not easy to divide X and Y clearly, those types place frequent verb restrictions on X and Y both. However, X and Y normally refer to different entities in the container-measures type.

In addition, EFL learners need to experience that in terms of modifications, X is more often the target of modification even Y can function as the modified. In terms of comprehension, it appears that number concord would not be obstacles. Number concord does not give any confusion to speakers in understanding the meaning of sentences in question. Modification patterns and selectional restriction can draw confusion slightly since there are a lot of instances that display ambiguities. In terms of production, however, it is predicted that the toughest part is number concord. This is mainly due to the fact that unlike English, Korean has no number accord phenomena.

MP usages in the English textbooks also tell us something about learning MPs. In terms of frequency, unlike the COCA or other authentic corpora, the school textbooks has less balanced distribution of the five types as observed from the following charts.

(45) Percent of each type:



In both the COCA and the textbooks, the collection-of-members type includes more than half uses but the textbooks have much less instances for the dimensional and configuration types. This suggests that EFL learners using these textbooks may have less chances to experience the diversity of the MP types.

Considering school textbooks are the main learning sources for most EFL learners, balanced data for a given phenomenal are important for them to be exposed to its proper usages. When the textbooks are not satisfactory enough to provide enough authentic data for active learners, English corpora can be viable resources to be used as supplementary resources. In particular, EFL learners need to meet unique properties of each of the MP types so that they can have a better understanding of the MP syntax and semantics.

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Received: October 5, 2011
Revised version: December 3, 2011
Accepted: December 10, 2011