

## Semantics Qualifying Paper (QP2)

### Semantics of measure phrases, measure phrase split, and *-ssik* in Korean

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#### 1. Introduction

This paper investigates Korean measure phrases (MP, numeral+classifier) in four constructions:

- (1) MP constructions
  - a. Non-split MP construction: boy-3-CL-CASE
  - b. Split MP construction: boy-CASE ... 3-CL
  - c. Non-split MP construction with *-ssik*: boy-3-CL-ssik-CASE
  - d. Split MP construction with *-ssik*: boy-NOM ... 3-CL-ssik

The goal of the paper is to identify what the semantic contributions of the MP, of split, and of *-ssik* are. The literature on Korean and on languages that exhibit similar constructions has discussed the individual elements, but not in combination – either because the authors chose to focus on a limited set of data (in Korean and Japanese), or because the languages they discussed did not obviously have all the above elements (German, Telugu, and Hungarian). Therefore, one of the questions this paper asks is how tenable their results are, in themselves, and when all four possibilities are taken into account.

Nakanishi (2007) discusses Japanese non-split and split MPs, but not the Japanese equivalent of *-ssik* (i.e., *zutsu*), neither in non-split nor in split. Nakanishi observes that sentences with non-split MPs allow either distributive or collective readings, whereas those with split MPs only allow distributive readings. Nakanishi proposes to account for distributivity in split MP constructions with reference to a monotonicity constraint necessitated by measuring. Nakanishi supplements Schwarzschild's (2002) definition of monotonicity with an “at least two” property to achieve this result.

Oh (2001) discusses Korean non-split MPs with *-ssik*, building on Choe (1987) and Gil (1990), but not split MPs, neither with nor without *-ssik*. Oh observes that MP+*ssik* must occur within the scope of a D(istributive) operator, whose sorting key is either a nominal plurality or an event plurality. (Oh dubs *-ssik* a “distributive polarity item” for this reason.) The D-operator then associates with each element of that plurality something “MP-ful” (e.g., in the case of ‘3-boy-NOM monkey-two-CL-*ssik*-ACC saw’, two monkeys with each individual boy, or two monkeys with each subevent), so that altogether at least two “MP-fuls” are used.

Zimmermann (2002) and Balusu (2005) discuss similar constructions in English and German (binominal *each* in English; *jeweils* in German) and Telugu (numeral reduplication), respectively, and give analyses that are similar though not identical to Oh's. In particular, Balusu observes that not only plurals but also distributive universals support numeral reduplication, and proposes that, semantically speaking, the sorting key of the distributive operator is always a plurality of events, although individuals and subevents may be in a one-to-one relation, giving the illusion of individual-key readings. Szabolcsi (2010: section 8.4) suggests that Balusu's analysis of Telugu can be extended to English binominal *each* and Hungarian numeral reduplication. Similarly to Oh, Zimmermann and Balusu do not examine these linguistic devices in combination with MP-split.<sup>1</sup>

In sum, Nakanishi investigated the effect of split, whereas Oh (Zimmermann and Balusu) investigated the effect of *-ssik* (*each/jeweils* and numeral reduplication, respectively). The present paper investigates them in combination. The preliminary generalizations are as follows:

- (2) The preliminary generalizations about MPs, MP-split, and *-ssik*
  - a. In the absence of *-ssik*, an MP gives the total number of atomic units. For example, sentences like 'boy-3-CL-NOM danced' or 'boy-NOM ... 3-CL danced' both describe situations in which the total number of boys is 3.
  - b. In the presence of *-ssik*, MP gives the size of the units. For example, sentences like 'boy-3-CL-*-ssik*-NOM danced' or 'boy-NOM ... 3-CL-*-ssik* danced' both describe situations in which triplets of boys danced.
  - c. Sentences with non-split MPs describe either distributive or collective events, whereas sentences with split MPs describe distributive events.
  - d. In line with (2)b, what size units act either separately or collectively depends on the presence or absence of *-ssik*. If *-ssik* is attached to the MP, the numeral in the MP gives the size of the unit.

On the one hand, these observations indicate that Nakanishi's insight regarding the role of split is basically correct, although this paper will propose a different technical implementation. On the other hand, *-ssik* may not be the exact equivalent of Telugu numeral reduplication, for example. Formally, Telugu (5) resembles Korean (3) – non-split MPs with *-ssik* –, but its range of readings matches that of Korean (4) – split MP with *-ssik*.

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<sup>1</sup> German and Telugu may or may not exhibit MP-split, and if they do, it may or may not have the same semantics as in Japanese and Korean. For example, Hungarian MP-split does not allow all the readings that Japanese MP-split does according to Nakanishi (A. Szabolcsi, p.c.).

- (3) boy-3-CL-ssik-NOM made a chair.  
 √ ‘In each subevent, a triplet of boys made a chair’ (distributes to triplets)  
 √ ‘In one event, triplets of boys joined forces to make a table’ (a collective of triplets)
- (4) boy-NOM ... 3-CL-ssik made a chair.  
 √ ‘In each subevent, a triplet of boys made a chair’ (distributes to triplets)  
 # ‘In one event, triplets of boys joined forces to make a chair’ (a collective of triplets)
- (5) Telugu example, as inferred from Balusu’s (2005) discussion (to be checked)  
 3-3 boys made a chair.  
 √ ‘In each subevent, a triplet of boys made a chair’ (distributes to triplets)  
 # ‘In one event, triplets of boys joined forces to make a chair’ (a collective of triplets)

In this way, Korean will help identify the semantic elements out of which the cross-linguistically attested readings are composed. Moreover, if the judgment in (3) is correct, *-ssik* cannot be described, formally or informally, as a “distributive polarity item,” insofar as that would entail that the “collective of triplets” reading is not possible. By itself, just *-ssik* serves to indicate that the MP defines the size of units, not total amount of units.

Nakanishi (2007) uses a modified version of Schwarzschild’s (2002) monotonicity condition on measurement to derive the distributivity of MP-split. Nakanishi argues that split MPs are adverbial, hence they measure events by measuring “individuals mapped from events.” Non-split MPs require monotonicity of the measure function only in the nominal domain, split ones both in the nominal and in the verbal domains. Her definition of monotonicity, however, requires that there are at least two individuals in the domain. This requirement might exclude a collective reading which are forced by a single collective event, it is not mathematically necessary to ensure monotonicity. In other words, Nakanishi does not really derive distributivity from the concept of measurement. As a result, her definition of monotonicity predicts that the sentence in (6) is true in the given situation. This is not the case in Korean, however. In addition, the ‘at least two’ requirement exclude a measure phrase whose numeral is one.

- (6) boy-NOM ... 3-CL made a chair.  
 √ ‘In each subevent, three boys each made a chair’ (distributes to triplets)  
 # ‘In one event, three boys joined forces to make a chair’ (a collective of triplets)  
 Situation: We have three boys; boy<sub>1</sub> made a chair; boy<sub>2</sub> and boy<sub>3</sub> joined forces to make a chair.

Champollion (2010, 2011) proposes a theory in which sentences with measure phrases such as ‘run for two hours’ presuppose that the events have stratified (i.e. distributive, divisive) reference with a particular granularity with respect to run-time and assert that the total run-time is two hours. His proposal seems to capture the same intuition as Nakanishi’s (2007) treatment of split MPs in Japanese, but it seems more successful (A. Szabolcsi, p.c.). It will not run into trouble with either the numeral “one” or with the situation as in (6), if the granularity of a split MP construction without *-ssik* is guaranteed to be atomic individuals. Probably, the classifier

could ensure that. Furthermore, Champollion’s theory offers a natural place for specifying granularity. MPs with *-ssik* require just that. The numeral in the MP specifies the size of units. Therefore, Champollion’s theory promises to be a good framework for capturing the contributions of both MP-split and *-ssik*. This paper will suggest how Champollion’s theory applies to Korean data, but it will not implement this suggestion technically.

The paper is organized as follows. Section 2 provides data beginning with simple ones, and gives generalizations from the perspective of the role of each component of MPs. Section 3 discusses the previous literature and shows that each proposal would fit for a limited set of data and readings. Section 4 provides a unified explanation of MPs, MP-split, and *-ssik* by adopting Champollion’s stratified reference theory. Section 5 concludes the paper.

## 2. Data and generalizations

This section presents examples that support the correctness of the descriptive generalizations above. In section 2.1, the effects of split and *-ssik* are presented separately. The interaction of split and *-ssik* follows in section 2.2. Then, section 2.3 illustrates the range of readings in examples that contain two MP expressions.

### 2.1. Simple data

#### 2.1.1. Terms: measure phrases (MPs) and MP-split

For the description of Korean data, I adopt some of the terms used by Nakanishi (2007) for Japanese data because, as for the data in this paper, Korean expressions are parallel to Japanese ones. A measure phrase (MP) composes of two parts: a numeral and a classifier (e.g., *sey-myeng* ‘3-classifier’). An MP expresses the amount of the adjacent NP. The following are examples of an NP followed by an MP.

#### (7) Examples of an NP followed by an MP

- a. [sonyen]<sub>NP</sub>-[sey-myeng]<sub>MP</sub>  
boy-3-CL  
‘three boys’
- b. [mwul]<sub>NP</sub>-[kwu-lithe]<sub>MP</sub>  
water-9-CL  
‘nine liters of water’
- c. [kapang]<sub>NP</sub> -[yel-kay]<sub>MP</sub>  
suitcase-10-CL  
‘ten suitcases’

Also, I use the term “host NP” to indicate the NP whose amount is expressed by the adjacent MP, following Nakanishi’s terminology. In all the examples in (7), the NPs are immediately adjacent to the MPs. NPs and MPs are not always immediately adjacent, however, as compared in (8). The two examples are distinguished by looking at the location of a case marker for the host NP. First, a case marker can be attached after a classifier, as in (8)a. In this example, the nominative case marker *-i* follows the classifier *-myeng*. Following Nakanishi (2007), I call this type of

measure phrases ‘non-split measure phrases (**non-split MPs**)’. Second, a case marker can be attached after a noun, as in (8)b. In this example, the same case marker *-i* follows the noun *sonyen* ‘boy’. I also follow Nakanishi’s term ‘split measure phrases (**split MPs**)’ to refer this kind of measure phrases. Note that an adverbial phrase like *ecey* ‘yesterday’ may intervene between the noun and the split MP. I use the term a non-split MP construction to refer to a sentence with a non-split MP and the term a split MP construction to refer a sentence with a split MP, following Nakanishi.

(8) Two types of MPs

- Non-split
- a. [sonyen      sey-myeng]-i      ecey      wus-essta  
 [boy      three-CL]-NOM      yesterday      smile-PAST  
 ‘Three boys smiled yesterday.’  
 [소년 세 명이 어제 웃었다] (Korean orthography)
- Split
- b. [sonyen]-i      ecey      [sey-mali]      wus-essta  
 [boy]-NOM      yesterday      [three-CL]      smile-PAST  
 ‘Three boys smiled yesterday.’  
 [소년이 어제 세 명 웃었다]

The two sentences in (8) have the same meaning. Both sentences describe the following situation: there are two boys and both boys smiled. No other situation can be described. For example, it is not the case that two boys collectively made a single smiling face. When a predicate like *wus-* ‘smile’ applies to a non-atomic (plural) individual, it always distributes to its atoms, as per its lexical meaning (world knowledge).<sup>2</sup>

**2.1.2. The effect of split**

Distinction between the two types of MPs can be seen when a different type of predicate applies to a non-atomic (plural) individual. In order to provide rather familiar example, I take an English example first. The sentence ‘three boys made a chair’ is ambiguous, whereas ‘three boys smile’ is not. On the one hand, according to the interpretation in (9)a, ‘made a chair’ equally applies to the three atomic individuals that compose of the non-atomic (plural) individual ‘three boys’. On the other hand, according the interpretation in (9)b, ‘made a chair’ applies to ‘three boys’ in a

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<sup>2</sup> I use the term “Atom” by the following definition, which is adopted from Champollion (2010: 16). I believe it is generally accepted in the literature.

- (i) **Definition: Atom**  
 $Atom(x) =_{def} \neg \exists y[y < x]$   
 (An atom is something which has no proper parts.)

different way. A possible context would be that the first boy cut wood, the second one put glue on the pieces of wood, and the third one put the pieces together. I call the construals as in (9)a **distributive readings**, since the predicate ‘made a chair’ seems to be evenly distributed to each of a non-atomic (plural) individual. In addition, I call the construals as in (9)b **non-distributive readings**, since the same predicate does not seem to be evenly distributed to each atomic individual of a non-atomic (plural) individual.

- (9) Three boys made a chair. (English)
- a. ‘Three boys each made a chair.’ √ *distributive*
  - b. ‘Three boys joined forces to make a chair.’ √ *non-distributive*

In Korean, non-split MP constructions can be ambiguous depending on the predicate of the construction. The sentence in (10)a is such an example. It is ambiguous unlike the example in (8)a, which describes only one situation. On the one hand, the sentence (10)a can be read with either a distributive reading or a non-distributive reading. On the other hand, the split MP construction in (10)b is not ambiguous. It allows only a distributive reading, not a non-distributive reading.

(10) (Im)possibility of non-distributive readings in non-split and split MPs

- a. [sonyen        sey-myeng]-i ecey            uyca-lul        mantul-essta  
    [boy            three-CL]-NOM yesterday        chair-ACC        make-PAST  
    √ *distributive*            ‘Three boys each made a chair yesterday.’  
    √ *non-distributive*        ‘Three boys joined forces to make a chair.’  
    [소년 세명이 어제 의자를 만들었다.]
  
- b. **sonyen-i**        ecey            **sey-myeng**    uyca-lul        mantul-essta  
    boy-NOM        yesterday        three-CL        chair-ACC        make- PAST  
    √ *distributive*            ‘Three boys each made a chair yesterday.’  
    \* *non-distributive*        ‘Three boys joined forces to make a chair.’  
    [소년이 어제 세명 의자를 만들었다.]

This is the main distinction between non-split and split MPs reported by Nakanishi, and the distinction can apply to Korean. In the case of non-split MP constructions, atomic individuals act either separately (on *distributive* readings) or non-separately (on *non-distributive* readings). Nakanishi also provides MP constructions with single-occurrence verbs like ‘to kill’. They can also test and support the classification Nakanishi made, because they do not distribute to the atoms, as per lexical meaning (world knowledge). I do not provide examples with a predicate like ‘kill’ here. Below is the table which summarizes the effect of split.

(11) The effect of split (in the absence of *-ssik*)

Readings	Non-split MP	Split-MP
distributive	√	√
non-distributive	√	*

### 2.1.3. Distribution of *-ssik*

The so-called distributivity marker *-ssik* has been explained in terms of how *-ssik* contributes to the distributive readings, event-key readings, and so on (Gil 1990, Oh 2001). In this study, I begin with examining simple sentences with *-ssik* and comparing them with those without *-ssik* in order to pinpoint the effect of *-ssik*, which might be mixed with the effects of other expressions.

*-ssik* always follows a classifier in the MP. This fact does not change even if the MP is split. The following are examples of MPs with *-ssik* in non-split and split forms. Non-split examples are made by adding *-ssik* to the MPs in (7). I do not provide the translation of MPs at this moment, because their meanings would be clear in the sentence, but not by themselves without context.

(12) Examples of *-ssik* in MPs

<u><i>-ssik</i> in non-split MPs</u>	<u><i>-ssik</i> in split MPs</u>
a. [sonyen-sey-myeng- <b>ssik</b> ]-i boy-3-CL-SSIK-NOM	a'. [sonyen]-i [sey-myeng- <b>ssik</b> ] boy-NOM 3-CL-SSIK
b. [mwul-kwu-lithe- <b>ssik</b> ]-i water-9-CL-SSIK-NOM	b'. [mwul]-i [kwu-lithe- <b>ssik</b> ] water-NOM 9-CL-SSIK
c. [kapang-yel-kay- <b>ssik</b> ]-i suitcase-10-CL-SSIK-NOM	c'. [kapang]-i [yel-kay- <b>ssik</b> ] suitcase-NOM 10-CL-SSIK

### 2.1.4. The effect of *-ssik*: specifying the size of unit

The two sentences in (13) below show a comparison between a non-split MP construction without *-ssik* and its counterpart with *-ssik*. The sentence in (13)a is repeated here from the sentence in (8)a. Note that, in both MP constructions, the predicate *wus-* ‘smile’ is used and it is a strictly distributive predicate, as per its lexical meaning. Therefore, the sentences in (13)a and (13)b are a good minimal pair that may show the minimal effect of *-ssik*, excluding non-distributive readings at the outset. The meaning of (13)a is obvious: ‘We have three boys; each of them smiled yesterday’. For providing rather explicit interpretation of MPs, I introduce the term “unit” to refer to a set of individual that has the properties presented in (14).

(13) Examples without and with *-ssik* (Non-split; with a distributive predicate)

Without *-ssik*

- a. [sonyen sey-myeng]-i ecey wus-essta = (8)a  
[boy three-CL]-NOM yesterday smile-PAST  
'Three boys smiled yesterday.'  
= 'Three one-boy units smiled yesterday'  
[소년 세명이 어제 웃었다]

With *-ssik*

- b. [sonyen sey-myeng-**ssik**]-i ecey wus-essta  
[boy three-CL-**SSIK**]-NOM yesterday smile-PAST  
'We have multiple three-boy units; each of them smiled yesterday.'  
= 'More than one three-boy unit smiled yesterday.'<sup>3</sup>  
[소년 세명씩이 어제 웃었다]

(14) Properties of a "unit"

- a. Every unit has its own size, and the size of each unit is the cardinality of its members. Therefore, the size of a unit can be expressed by numerals. (e.g., the size of 'a three-boy unit' = 3; the size of 'a ten-monkey unit' = 10; etc.)
- b. A unit whose size equals one is Atom. (i.e., the size of Atom = 1)
- c. When we have a unit whose size is greater than one, the **members** within a unit may act either *separately* or *collectively*.  
(e.g., (i) When we have a single three-boy unit and the unit smiled, then each member of the three-boy unit smiled and they acted *separately*.  
(ii) When we have a single three-boy unit and the members of each unit joined forces to make a single chair, then each member of the three-boy unit acted *collectively*.)
- d. When we have multiple units, the **units** may act either *separately* or *non-separately*.  
(e.g., (i) When we have multiple units and each unit made a single chair, then each unit acted *separately*.  
(ii) When we have multiple units and the units joined forces to make a single chair, then the units acted *non-separately*.)

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<sup>3</sup> This interpretation is similar to what Balusu (2005) calls event-key readings in terms of their truth condition. This fact is discussed later when I provide an example with *-ssik* in the object position. See footnote 4.

- e. When we have multiple units, the members of the different units should be disjoint, or if they overlap, the members should participate in (not necessarily atomic) distinct events. [See the discussion of the distinctness of units right below after (15).]

Using the term “unit” that has the properties in (14), the translation of (13)a and (13)b can be paraphrased by referring to the unit size and how many units are related (i.e., the number of units). In the absence of *-ssik*, for instance, (13)a, the size of the units is ‘one’, and the numeral in the MP ‘three’ indicates the number of units. In the presence of *-ssik*, the size of the units equals the numeral in the MP ‘three’, and the number of units should be more than one. Comparing (13)a and (13)b, what is changed by adding *-ssik* is the unit size (from *one* to *three*) and the number of units (from *three* to *more-than-one*). This is summarized in table (15).

- (15) Comparison between MPs without and with *-ssik*; with distributive predicates, like “smile”

	(13)a	(13)b
Split	--	--
<i>-ssik</i>	--	<i>-ssik</i>
Example	boy-3-CL-CASE smiled	boy-3-CL- <b>ssik</b> -CASE smiled
Unit Size	Atom (= 1)	3
Number of Units	3	n > 1

What units qualify as distinct is crucial for counting units when *-ssik* is attached to MPs. This is related to how to formalize the properties of “unit” in (14)e, which is repeated below:

- (14)e When we have multiple units, the members of the different units should be disjoint, or if they overlap, the members should participate in (not necessarily atomic) distinct events.

With this property of “units” in mind, let us consider what kind of situations the following sentence rules out. The sentence is repeated from (13)b.

- (13)b [sonyen sey-myeng-**ssik**]-i ecey wus-essta  
 [boy three-CL-SSIK]-NOM yesterday smile-PAST  
 ‘We have multiple three-boy units; each of them smiled yesterday.’  
 = ‘More than one three-boy unit smiled yesterday.’  
 [소년 세명씩이 어제 웃었다]

With *-ssik* attached to the MP, the sentence in (13)b expresses that there are multiple three-boy units, whose members smiled yesterday.

First, suppose a situation in which the members of the different units are disjoint. For example, suppose that there are six boys, b1, b2, ..., b5 and b6, and the six boys smiled. In this case, we may divide the six boys into two units, such as, unit A which is composed of b1, b3 and b5, and unit B which is composed of b2, b4 and b6. Then, we may say that the members of unit

A participated in smiling-event e1, and the members of unit B participated in smiling-event e2, if the two events e1 and e2 are distinct in some pragmatically and contextually justified manner. An example of such manner is that the event e1 occurred at time t1 and the event e2 occurred at time t2, which is five minutes after t1. The two units can be distinguished by expressing each unit as <event, participant(s)> pairs:

unit A = <e1, {b1, b3, b5}>  
 unit B = <e2, {b2, b4, b6}>  
 Then, <e1, {b1, b3, b5}> ≠ <e2, {b2, b4, b6}> (i.e., unit A ≠ unit B)

Second, suppose a situation in which the members of the different units overlap. For example, suppose that there are four boys, b1, b2, b3 and b4. In this case, if there are two three-boy units whose members are from the four boys, the members of the two units always overlap either partially or totally. Even though the members of multiple units overlap, those units can be distinguished if we count the units based on the <event, participant(s)> pair. For example, there are three contextually distinct times, t1, t2 and t3. Suppose the following situation: The event e1 is an event where b1, b2 and b3 smiled at t1. The event e2 is an event where b2, b3 and b4 smiled at t2. The event e3 is an event where b1, b2 and b3 smiled at t3. Then, the participants of the event e1 and e2 partially overlap; b2 and b3 participate in both e1 and e2. Also, the participants of the event e1 and e3 totally overlap; b1, b2 and b3 participate in both e1 and e3. We can still find three distinct units from the supposed situation.

unit A = <e1, {b1, b2, b3}>  
 unit B = <e2, {b2, b3, b4}>  
 unit C = <e3, {b1, b2, b3}>  
 Then, <e1, {b1, b2, b3}> ≠ <e2, {b2, b3, b4}> (i.e., unit A ≠ unit B)  
 <e2, {b2, b3, b4}> ≠ <e3, {b1, b2, b3}> (i.e., unit B ≠ unit C)  
 <e1, {b1, b2, b3}> ≠ <e3, {b1, b2, b3}> (i.e., unit A ≠ unit C)

The sentence in (13)b does NOT describe the following situation, however. Suppose that there are four boys, b1, b2, b3 and b4, and the four boys smiled in the event e1. The smiling event is evenly distributed over time or space, so there is no pragmatically or contextually justified manner to define distinct more than one event. In this case, <e1, {b1, b2, b3, b4}> is the only <event, participant(s)> pair that we can obtain from the situation. Therefore, the sentence in (13)b cannot describe this situation.

## 2.2. The interaction of the effects of split and -ssik

We have already observed the effects of two components of MPs: the effect of split and that of -ssik. They are summarized in table (11) and (15), respectively. Note that I show the effects of them in the limited contexts. First, in the **absence of -ssik**, non-split MP constructions allow both distributive and non-distributive readings, whereas split MP constructions allow only distributive readings. Second, in the **absence of split** (i.e., in **non-split MPs**) and with the distributive predicate “smile”, adding -ssik to the MP changes both the size of the units and the number of



- b. [sonyen sey-myeng-**ssik**]-i ecey uyca-lul mantul-essta  
 [boy three-CL-**SSIK**]-NOM yesterday chair-ACC make-PAST  
 √ *distributive* ‘We have multiple three-boy units; each of the units made a chair yesterday.’  
 √ *non-distributive* ‘We have multiple three-boy units; all the units joined forces to make a single chair.’  
 [소년 세명씩이 어제 의자를 만들었다.]

- c. sonyen-i ecey sey-myeng-**ssik** uyca-lul mantul-essta  
 boy-NOM yesterday three-CL-**SSIK** chair-ACC make-PAST  
 √ *distributive* ‘We have multiple three-boy units; each of the units made a chair yesterday.’  
 \* *non-distributive* ‘We have multiple three-boy units; all the units joined forces to make a single chair.’  
 [소년이 어제 세명씩 의자를 만들었다.]

The table in (17) summarizes the effect of split in the two conditions, without and with *-ssik*. The table also summarizes the effect of *-ssik* in the two conditions, non-split and split MPs. In (18), I also provide the summary of the generalizations regarding MPs, MP-split, and *-ssik*.

(17) Summary of the effects of split and *-ssik*; with predicates like “make a chair”

Split	--		Split	
	--	<i>-ssik</i>	--	<i>-ssik</i>
Example	(10)a = (16)a	(16)b	(10)b	(16)c
Scheme	boy-3-CL-CASE	boy-3-CL- <i>ssik</i> -CASE	boy-CASE...3-CL	boy-CASE...3-CL- <i>ssik</i>
distributive	√	√	√	√
non-distributive	√	√	*	*
Unit size	1	3	1	3
Number of Units	3	n > 1	3	n > 1

(18) Summary of the generalizations regarding MPs, MP-split, and *-ssik*

- a. (i) In non-split MPs, units can act either distributively or non-distributively.  
(ii) In split MPs, units can act only distributively.
- b. (i) In the absence of *-ssik*,  
the unit size is ONE, which is the size of an atomic individual,  
and the number of units equals the numeral in the MP.  
(ii) In the presence of *-ssik*,  
the unit size equals the numeral in the MP,  
and the number of units is not specified but it should be more than one.

In section 4, I provide an explanation that may unify the above generalizations and the effects of MP-split and *-ssik*.

### 2.3. The range of possible readings: examples containing two MPs

This subsection illustrates the range of readings in examples that contain two MP expressions. The purpose of this section is not to provide the possible readings exhaustively, but to show that there are more readings, which are not given sufficient attention in earlier literature.

First, I compare two MP constructions in which the host NP of each MP is the object in the sentence. As given in the following examples, there seems to be no effect of split when the thematic role of the host NP is not an agent.

(19) No effect of split when the host NP is not an agent (In the **absence** of *-ssik*)

- a. con-i            [uyca-sey-kay]-lul    ecey            mantul-essta  
John-NOM        chair-three-CL-ACC    yesterday        make-PAST  
'John made three chairs yesterday.'  
[존이 의자 세개를 어제 만들었다.]
- b. con-i            uyca-lul            ecey            sey-kay            mantul-essta  
John-NOM        chair-ACC            yesterday        three-CL            make-PAST  
'John made three chairs yesterday.'  
[존이 의자를 어제 세개 만들었다.]

Likewise, even in the presence of *-ssik*, there seems to be no effect of split when the thematic role of the host NP is not an agent. In addition, in the presence of *-ssik*, MP constructions obtain so-called event-key readings. In the event-key readings below, there are multiple occasions of 'made-something' by John, and a three-chair unit is distributed to each of the plural occasions.<sup>4</sup>

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<sup>4</sup> Note that I do not provide the translation of the MP constructions in this way, when the thematic role of host NP is an agent. For example, the translation of the sentence in (i), repeated from (13)b, does not refer occasions.

Event-key readings are available in both non-split and split MPs. Since the two comparisons in (19) and (20) show that there is no distinction between non-split and split MPs in the object, I provide only non-split MPs from now on if the host NP of the MP is in the object. These examples also show that, in the presence of *-ssik* in the object, we can obtain two different readings from a sentence containing two (non-split or split) MPs.

- (20) No effect of split when the host NP is not an agent;  
 (2 possible readings in the presence of *-ssik* in the object)
- a. con-i            [uyca-sey-kay-**ssik**]-lul        ecey            mantul-essta  
 John-NOM        chair-three-CL-SSIK-ACC        yesterday        make-PAST  
 ‘John made multiple three-chair units’  
 ‘We have multiple occasions; John made a three-chair unit in each occasion’  
 [존이 의자 세개씩을 어제 만들었다.]
- b. con-i            uyca-lul        ecey            sey-kay-**ssik**    mantul-essta  
 John-NOM        chair-ACC        yesterday        three-CL-SSIK    make-PAST  
 ‘John made multiple three-chair units’  
 ‘We have multiple occasions; John made a three-chair unit in each occasion’  
 [존이 의자를 어제 세개씩 만들었다.]

Second I provide the possible readings of a sentence that contain two MP constructions in (21). In this case, the two host NPs of two MPs are in the subject and in the object, respectively, and we can obtain an additional non-distributive reading as described in (21)c. On the one hand, the non-distributive reading in (21)b corresponds to the non-distributive reading we observed in (10)a, where there is no MP in the object. I use ‘collective readings’ to refer to this type of readings. On the other hand, the second non-distributive reading can be called a ‘cumulative’

- 
- (i) [sonyen            sey-myeng-**ssik**]-i        ecey            wus-essta  
 [boy            three-CL-**ssik**]-NOM        yesterday        smile-PAST  
 ‘We have multiple three-boy units; each of them smiled yesterday.’  
 = ‘More than one three-boy unit smiled yesterday.’  
 ≈ ‘We have multiple occasions; a three-boy unit smile in each occasion’  
 [소년 세명씩이 어제 웃었다]

This is because there is no change in its truth condition even though the same sentence is described referring occasions. I think that the sentence in (i) has more than one English translation; these however have the same meaning because of the property of ‘unit’ in (14)e. It says “[w]hen we have multiple units, the members of the different units should be disjoint, or if they overlap, the members should participate in (not necessarily atomic) distinct events.” When the host NP is indefinite as in (i), it is easy to think of a case where multiple three-boy units are disjoint. If they overlap, the overlapped members should participate in distinct events. When we have multiple occasions, it is technically possible to distinguish the same individual participating in one event, if we assume that two <event, participant(s)> pairs are distinct iff either the events  $e_1$  and  $e_2$  are distinct in some pragmatically and contextually justified manner, or the participant(s)<sub>1</sub> and participant(s)<sub>2</sub> are disjoint.

reading because the numeral ten is the number cumulated by adding the number of chairs made by each of three boys. I use ‘cumulative readings’ to refer to this type of readings. This example shows that, in the absence of *-ssik*, three different readings are possible from a sentence containing two (non-split) MPs.

(21) A sentence containing two MPs (I) (3 possible readings)

- |                    |                  |              |
|--------------------|------------------|--------------|
| sonyen-sey-myeng-i | uyca-yel-kay-lul | mantul-essta |
| boy-three-CL-NOM   | chair-ten-CL-ACC | make-PAST    |
- a.  $\surd$  *distributive* ‘Three boys each made ten chairs’
- b.  $\surd$  *non-distributive 1* ‘Three boys joined forces to make ten chairs’  
     = *collective* (e.g., The first boy cut wood, the second one held pieces of wood, and the third one nailed; in this way, three boys together made ten chairs)
- c.  $\surd$  *non-distributive 2* ‘Three boys each made at least one chair; in sum, they made ten chairs’  
     = *cumulative* (e.g., The first boy made two chairs by himself, the second one made five chairs by himself, and the third one made three chairs by himself; in this way, three boys together made ten chairs.)

[소년 세명이 의자 열개를 만들었다.]

Third, when *-ssik* is added only to the MP in the subject of the sentence in (21), the following readings are obtained. This example shows that, from a sentence containing two (non-split) MPs, in the presence of *-ssik* in the subject, three different readings are still possible.

(22) A sentence containing two MPs (II) (3 possible readings)

- |                         |                  |              |
|-------------------------|------------------|--------------|
| sonyen-sey-myeng-ssik-i | uyca-yel-kay-lul | mantul-essta |
| boy-three-CL-SSIK-NOM   | chair-ten-CL-ACC | make-PAST    |
- a.  $\surd$  *distributive* ‘We have multiple three-boy units; each of them made ten chairs’  
     Each three-boy unit made ten chairs cumulatively or collectively.  
     For example, there is a three-boy unit composed of boy1, boy2 and boy3; either each boy made at least one chair and in sum they made ten chairs (i.e., cumulatively), or the three boys in the unit joined forces to make ten chairs (i.e., collectively).
- b.  $\surd$  *collective* ‘We have multiple three-boy units; all the units joined forces to make ten chairs’
- c.  $\surd$  *cumulative* ‘We have multiple three-boy units; each unit made at least one chair; in sum, they made ten chairs’

[소년 세명씩이 의자 열개를 만들었다.]

Fourth, when *-ssik* is added only to the MP in the object of the sentence in (21), the following readings as in (23) are obtained. Note that we can obtain six different readings. Since there are two MPs in a sentence, we may expect that there are three possible readings:

distributive, collective, and cumulative readings. Since *-ssik* is added to the MP in the object, we may expect that there are two possible readings: event-key and non-event-key readings. By multiplying the number of possibilities,  $3*2$ , we can obtain 6 possible readings.

- (23) sonyen-sey-myeng-i                      uyca-yel-kay-ssik-ul    mantul-essta  
 boy-three-CL-NOM                              chair-ten-CL-SSIK-ACC make-PAST
- a. *distributive; non-event-key*    ‘Three boys each made ten chairs (*or* a ten-chair unit)’  
 b. *distributive; event-key*            ‘We have multiple occasions; (the same) three boys each made a ten-chair unit in each occasion’  
 c. *collective; non-event-key*        ‘Three boys joined forces to make multiple ten-chair units’  
 d. *collective; event-key*              ‘We have multiple occasions; three boys joined forces to make a ten-chair unit in each occasion’  
 e. *cumulative; non-event-key*        ‘Each of three boys made at least one chair; in sum, they made multiple ten-chair units’  
 f. *cumulative; non-event-key*        ‘We have multiple occasions; each of three boys made at least one chair and they in sum made a ten-chair unit in each occasion’

[소년 세명이 의자열개씩을 만들었다.]

In all of the readings in (23), a single three-boy unit made chairs either once or multiple times. When *-ssik* is not attached to an MP and the host NP of the MP is the subject of a sentence, the same single unit becomes a participant of events. The ordering between the subject and the object seems to affect the interpretation. As a default ordering in Korean, a subject precedes an object. The sentence in (23) follows this ordering. When the subject follows the object, however, the sentence is more likely to have a reading that a possibly different three-boy unit made ten chairs on each of multiple occasions. Likewise, when *-ssik* is not attached to an object and the object precedes the subject, a similar effect can be seen. For example, in the distributive readings of (21), three boys mad ten chairs each, so in sum thirty chairs were made. If the object precedes the subject, however, it becomes hard to obtain the distributive reading, because the same ten chairs are likely to be made by the three boys.

Last, when *-ssik* is added to both MPs of the sentence in (21), the following readings are possible, as shown in (24). These six readings are parallel to the six readings in (23).

- (24) sonyen-sey-myeng-ssik-i              uyca-yel-kay-ssik-ul              mantul-essta  
 boy-three-CL-SSIK-NOM                      chair-ten-CL-SSIK-ACC              make-PAST
- a. *distributive; non-event-key*    ‘We have multiple three-boy units; each of them made a ten-chair unit’  
 b. *distributive; event-key*            ‘We have multiple three-boy units and multiple occasions; each of them made a ten-chair unit in each occasion’  
 c. *collective; non-event-key*        ‘We have multiple three-boy units; all the units joined forces to make multiple ten-chair units’

- d. *collective; event-key* ‘We have multiple three-boy units and multiple occasions; all the units joined forces to make a ten-chair unit in each occasion’
- e. *cumulative; non-event-key* ‘We have multiple three-boy units; each of them made at least one chair; in sum, they made multiple ten-chair units’
- f. *cumulative; non-event-key* ‘We have multiple three-boy units and multiple occasions; each of them made at least one chair and they in sum made a ten-chair unit in each occasion’

[소년 세명씩이 의자 열개씩을 만들었다.]

This subsection illustrates the range of readings in sentences that contain two MP expressions. They include cases either without or with *-ssik*. With two MP expressions in a sentence, three readings are possible. By adding *-ssik* to the MP in the object, we get two possible readings. The combination of two conditions, in which two MP expressions exist in a sentence and the MP in the object with *-ssik*, we could observe six possible readings. In the next section, I review previous literature and argue that previous works focus on a limited set of data or a limited set of readings for the data.

### 3. Discussion of previous literature

This section discusses previous literature. Among them, I discuss the main data and proposal of three papers, which motivate the present work. Each paper focuses on a limited set of data and provides an analysis for the limited set. Section 3.1 discusses Nakanishi (2007)’s proposal, which pertains to split of measure phrases. Section 3.2 discusses two papers, which pertain to *-ssik*. Section 3.2.1 provides a piece of data from Gil (1990). Gil reports that diverse readings of MP construction are possible. Especially, I focus on the non-distributive and collective readings of MPs with *-ssik*. Section 3.2.2 discusses Oh (2001)’s proposal, which pertains to *-ssik*. I summarize what the essence of each proposal is, and discuss whether their prediction is correct in terms of the data given in this paper and other works.

#### 3.1. On MP-split in Japanese (and Korean): Nakanishi (2007)

The observations of the asymmetry between non-split and split MPs of Korean should be credited to Nakanishi (2007). While Japanese shows the same asymmetry and it also has the equivalent of *-ssik* (i.e., *-zutsu*), Nakanishi does not provide data with *-zutsu*. In section 2.2, I presented the data showing that the effect of split holds true in the presence of *-ssik*. Then, it is worth testing whether her analysis might apply to the data with *-ssik*. In this subsection, I summarize her proposal, and then, show that the predictions that her proposal makes are partially incorrect.

The following Japanese examples are repeated and slightly modified from Nakanishi (2007). The sentences in (25) are parallel to the Korean ones in (10). Similar to Korean, non-split MPs allow both distributive and non-distributive readings as shown in (25)a, whereas split MPs

permit only distributive reading as shown in (25)b. Nakanishi also provides two more tests which support the asymmetry between non-split and split MPs, but I do not discuss them here.

(25) (Im)possibility of collective reading in non-split and split MPs in Japanese

- a. [**otokonoko san-nin**]-ga kinoo isu-o tukut-ta (koto)  
 [boy three-CL]-NOM yesterday chair-ACC make-PAST  
 √ *distributive* ‘Three boys each made a chair yesterday.’  
 √ *non-distributive* ‘Three boys joined forces to make a chair.’
- b. **otokonoko**-ga kinoo **san-nin** isu-o tukut-ta (koto)  
 boy-NOM yesterday three-CL chair-ACC make-PAST  
 √ *distributive* ‘Three boys each made a chair yesterday.’  
 \* *non-distributive* ‘Three boys joined forces to make a chair.’

In order to capture the asymmetry, Nakanishi begins with an independent phenomenon that is generally found in both types of MPs. The phenomenon is that some dimensions of nouns **cannot** be expressed by neither non-split MPs nor split ones. The key examples are repeated below from Nakanishi (2007). As shown in (26), MPs are able to express *volume* of water. In contrast, MPs are unable to express *degree* (of temperature) of water, as shown in (27).

(26) The dimension *volume* can be expressed by MPs

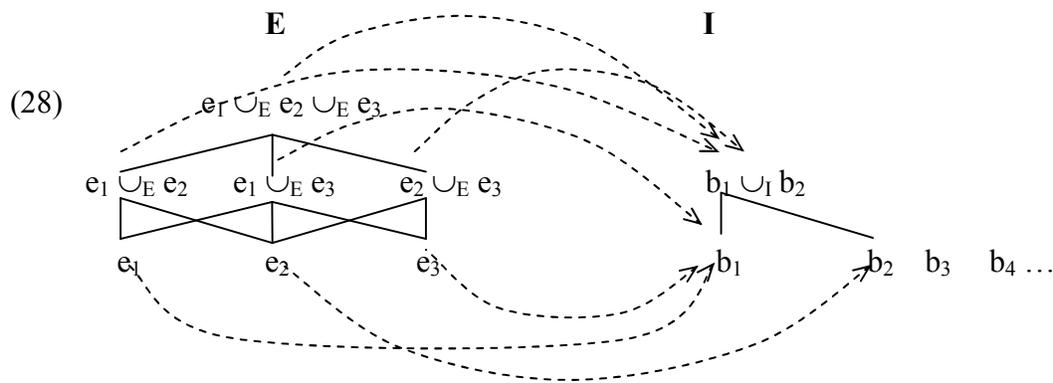
- a. [**mizu san-rittoru**]-ga tukue-nouede kobore-ta (koto)  
 [water three-liter]-NOM table-on spill-PAST  
 ‘Three liters of water spilled on the table.’
- b. **mizu**-ga tukue-nouede **san-rittoru** kobore-ta (koto)  
 water-NOM table-on three-liter spill-PAST  
 ‘Three liters of water spilled on the table.’

(27) The dimension *degree* (temperature) cannot be expressed by MPs

- a. \*[**mizu san-do**]-ga tukue-nouede kobore-ta (koto)  
 [water three-degree]-NOM table-on spill-PAST  
 ‘Water whose temperature is three degrees spilled on the table’
- b. \***mizu**-ga tukue-nouede **san-do** kobore-ta (koto)  
 water-NOM table-on three-degree spill-PAST  
 ‘Water whose temperature is three degrees spilled on the table’

Nakanishi uses a modified version of Schwarzschild’s (2002) monotonicity condition on measurement to derive the distributivity of split MPs. Nakanishi argues that split MPs are adverbial, hence they measure events, although they do that by measuring “individuals mapped from events.” The elements of the event-lattice are mapped homomorphically to those of an individual (agent, patient, etc.) lattice. For example, suppose a situation in which there are three separate boy-coughing events. Boy<sub>1</sub> coughed in the first event e<sub>1</sub>, and next boy<sub>2</sub> coughed in the

second event. Last, boy<sub>1</sub> again coughed in the third event e<sub>3</sub>. In sum, total two boys coughed: one coughed twice and the other coughed once. Then, the event-lattice of the three events can be drawn as the left lattice in (28), whereas the agent-lattice can be drawn as the right part in (28). The mappings from events to individuals are represented by dashed lines with an arrow. Although there are three atomic events as shown in the lattice left side, the number of boys that are mapped from the events is **two**, not three or four (only boy<sub>1</sub> and boy<sub>2</sub> are counted; boy<sub>3</sub> and boy<sub>4</sub> are not counted.). In this situation, we would say that ‘boy-NOM yesterday two-CL coughed’, and the numeral in the split MP is the same with the number of boys mapped from events. In this way, split MPs measure individuals mapped from events.



According to her proposal, non-split MPs require monotonicity of the measure function only in the nominal domain, split ones in both the nominal and in the verbal domains. Her definition is as follows (Nakanishi 2007: 239, ex. 4):

- (29) A measure function  $\mu$  is monotonic relative to domain  $\mathbf{I}$ [ndividual] iff:
- a. there are two individuals  $x, y$  in  $\mathbf{I}$  such that  $x$  is a proper subpart of  $y$ , and
  - b.  $\mu(x) < \mu(y)$

The definition says, the measure function [ $\mu$ : volume] is monotonic because, when there are three liters of water ( $y$ ) and two liters of water ( $x$ ) that is a proper subpart of  $y$ , [ $\mu$ : volume]( $x$ ) equals 2 and [ $\mu$ : volume]( $y$ ) equals 3, so it is true that [ $\mu$ : volume]( $x$ ) is less than [ $\mu$ : volume]( $y$ ). On the contrary, the measure function [ $\mu$ : temperature] is NOT monotonic because, when there are three liters of water ( $y$ ) whose temperature is sixty and two liters of water ( $x$ ) that is a proper subpart of  $y$  and whose temperature is also sixty, [ $\mu$ : temperature]( $x$ ) and [ $\mu$ : temperature]( $y$ ) have the same value. Her definition of monotonicity seems to be appropriate for monotonicity in substance like water (if the term “individuals” is changed to “substances”). It is not the case for individual level, however.

Notice that the definition does not only require that if there are  $x$  and  $y$  as in (29)a then  $\mu(x)$  and  $\mu(y)$  must be as in(29)b; it explicitly requires the existence of such  $x$  and  $y$  (a suggestion

that her footnote 6 credits to a reviewer). This requirement is linguistically necessary in order to exclude a single non-distributive event, which split MPs do not describe, but not mathematically necessary to ensure monotonicity. In other words, Nakanishi does not really derive distributivity from the concept of measurement. Instead, Nakanishi derives distributivity with the help of requiring at least two individuals. Consequently, this addition runs into trouble with split as well as non-split MPs whose numeral is “one” (as Nakanishi herself notes at footnote 8). It also runs into trouble with a situation as in (30) (Nakanishi does not notice this).

(30) Situation: “One boy made a chair on his own; two boys made a chair together.”

- (31) **sonyen-i** ecey **sey-myeng** uyca-lul mantul-essta (= (10)b)  
 boy-NOM yesterday three-CL chair-ACC make- PAST  
 a.  $\surd$  *distributive* ‘Three boys each made a chair yesterday.’  
 b. \* *non-distributive* ‘Three boys joined forces to make a chair.’  
 c. \* *non-distributive* ‘One boy made a chair; two boys joined forces to make a chair.’

It seems that the “at least two” condition only prevents all the individuals from forming a single collective. In the situation that is described in (30), the composite agent of the composite event in which two chairs are made has two proper parts, and  $\mu(\text{ag1})=1$ ,  $\mu(\text{ag2})=2$ , and  $\mu(\text{ag1}+\text{ag2})=3$ . The Korean sentence in (31), which is repeated from (10)b, is not true in this situation, however.

In this subsection, I summarized how Nakanishi captures the obligatory distributive reading in the split MP. The formalization Nakanishi proposes does not make a correct prediction, since the constraint Nakanishi argues for only blocks situations where there is a single event and a single (collective) agent. Therefore, it is clear that we need a different technical implementation to formalize the effect of split. In section 4, I will adopt that of Champollion (2010, 2011), which ensures the distributivity we find through the split MP data.

### 3.2. Regarding *-ssik*

#### 3.2.1. Gil (1990): data showing non-distributive/collective readings

Before discussing Oh (2001)’s proposal, this section provides an argument for the non-distributive (and collective) readings that are available in non-split MPs with *-ssik*. I provide supporting data from Gil (1990). This is because, in the next section, 3.2.2, I will emphasize the fact that even MPs with *-ssik* have non-distributive or collective readings as well as distributive ones. This fact is important because it implies that the so-called distributivity marker *-ssik* itself would not be responsible for the distributivity in non-split MP constructions.

Non-distributive and collective readings that I present through various examples should be credited to Gil (1990). Gil provides possible readings of MP constructions with *-ssik* in a very systematic way, although Gil does not propose a formal implementation. I repeat an example from which we can obtain non-distributive readings, from Gil (1990). In this example, *-ssik* is attached to the MP ‘man-two-CL’. Among the three readings Gil observes, two readings are related to the distributivity. In the reading in (32)a, ‘man-two-CL’ is distributed over three suitcases each. In the reading in (32)b, ‘man-two-CL’ is distributed over multiple events in which ‘suitcases-three-CL’ are carried. In the case of the reading in (32)c, however, we cannot find any

distribution of ‘man-two-CL’ over either individuals or events. It denotes that three suitcases are carried by the joined forces of sets of two men. Gil explains the reading in (32)c as follow: “in this case the men number two *per unit set*, or  $2n$ , where the value of  $n$  is again determined by context”.

- (32) salam-twu-myeng-ssik-i            kapang-sey-kay-lul            wunpanha-yessta  
       man-two-CL-SSIK-NOM            suitcase-three-CL-ACC            carry-PAST
- a.  $\sqrt{\text{distributive}}$             ‘Three suitcases were carried by two men each’  
 b.  $\sqrt{\text{event-key}}$             ‘Two men carried three suitcases at each occasion’  
 c.  $\sqrt{\text{non-distributive}}$             ‘Sets of two men carried three suitcases’

### 3.2.2. Oh (2001): -ssik within the scope of a D(istributive) operator

In this section, I discuss Oh’s proposal (2001), which pertains to *-ssik* located in non-split MPs. Because Oh provides an analysis very explicitly and compositionally, it is clear what her analysis may or may not explain. I summarize her proposal, and argue that Oh uses a limited set of data and does not include the full range of readings than can be obtained from MP constructions. Oh does not consider the collective readings that I present in section 2.3 and Gil (1990) also reports. Her proposal crucially excludes such a construal, so it does not cover the full range of readings regarding MPs with *-ssik*.

Oh (2001) mainly discusses how to derive the meaning of non-split MP constructions with *-ssik*, in terms of distributivity which can be attested when *-ssik* is attached to the MP. Oh provides a compositional derivation, based on the distributive readings that *-ssik* would induce. In order to see what her proposal predicts, the main data and readings in her paper should be known first. Basically, Oh makes generalizations on MP construction with *-ssik* through the following examples in (33). Three examples are repeated from Oh (2001). The three examples in (33)a, b, c correspond to the examples in (22), (23), and (24), respectively. They contain two MPs in a sentence with *-ssik* either in one of the two MPs or in both MPs. Oh does not deal with split MP constructions, neither with nor without *-ssik*. Two MPs in all examples in (33) are the same: ‘man-2-CL’ in the subject and ‘suitcases-3-CL’ in the object. *-ssik* is attached to one of the two MPs; to ‘man-2-CL’ in (33)a and to ‘suitcase-3-CL’ in (33)b, or to both MPs in (33)c.

#### (33) Examples from Oh (2001)

- a. saram-twu-myeng-ssik-i            kabang-sey-kay-lul            wunpanha-essta  
       man-two-CL-SSIK-NOM            suitcase-three-CL-ACC            carry-PAST
- b. saram-twu-myeng-i            kabang-sey-kay-ssik-ul            wunpanha-essta  
       man-two-CL-NOM            suitcase-three-CL-SSIK-ACC            carry-PAST
- c. saram-twu-myeng-ssik-i            kapang-sey-kay-ssik-ul            wunpanha-essta  
       man-two-CL-SSIK-NOM            suitcase-three-CL-SSIK-ACC            carry-PAST

Oh provides three construals that can be obtained from the three constructions. According to her observation, a sentence that contains two MPs has two readings if *-ssik* is attached to one of the two MPs, like (33)a and (33)b. The sentence in (33)a can be read as either (34)a or (34)c; the sentence in (33)b can be read as either (34)b or (34)c. On the other hand, if *-ssik* is attached to both MPs like (33)c, such an example has only one reading, like (34)c.

(34) Possible readings of the examples in (33) given by Oh (2001)

- a. For (33)a only:  
 ‘Men in pairs carried each of a set of three suitcases’  
 $\exists X[X \text{ is a set of three suitcases} \wedge \forall x \in X: \exists Y[Y \text{ is a group of two men} \wedge \exists e.Y \text{ carried } x \text{ in } e]$   
 → Distribute *ssik*-attached ‘three boys’ over an atom of ‘ten chairs’
- b. For (33)b only:  
 ‘Two men each carried three suitcases’  
 $\exists Y[Y \text{ is a group of two men} \wedge \forall y \in Y: \exists X[X \text{ is a set of three suitcases} \wedge \exists e.y \text{ carried } X \text{ in } e]$   
 → Distribute *ssik*-attached ‘ten chairs’ over atom of ‘three boys’
- c. For (33)a, b, c:  
 ‘Two men together carried three suitcases (where happened more than one instance of this, simultaneously or one after another)’  
 $\exists e. \forall e' \in e: \exists Y[Y \text{ is a group of two men} \wedge \exists X[X \text{ is a set of three suitcases} \wedge Y \text{ carried } X \text{ in } e']$  ( $|e| > 1$ )  
 → Distribute an event regarding *ssik*-attached ‘three boys’ and ‘ten chairs’ over multiple events

The generalization Oh made based on these examples and construals is that “an argument containing *ssik*” is distributed over either “the other argument not containing *ssik*” or plural events. Her proposal reflecting this generalization is that “*ssik* is a distributive polarity item (DPI) which must remain within the scope of the D(istributivity)-operator (Link 1983)”. Oh assumes that there are events in the LF and MPs without *-ssik* or events may undergo Quantifier Raising (QR) over the D operator. In the case where one of the two MPs does not contain *-ssik*, an argument without *-ssik* undergoes QR and the other argument with *-ssik* is distributed over the raised argument. The readings in (34)a and (34)b are obtained in this way. Also, events in the LF may be raised over the D-operator, so the reading in (34)c can be obtained. This is how a construction containing two MPs, one with *-ssik* and the other without *-ssik* can have two readings. In the case where both MPs contain *-ssik*, however, the readings like (34)a and (34)b cannot be obtained because none of the MPs can be raised, because they should be under the scope of the D-operator. The only possibility for this construction is to raise events over the D-operator. This is why a construction containing two MPs with *-ssik* can have only the reading like (34)c.

As summarized above, Oh explains the distributive regarding *-ssik* by controlling the relation between the D-operator and the argument(s) containing *-ssik*. A prediction of her proposal comes from a presupposition that, “in *ssik*-construction, the D-operator is present at

LF”. As long as the D-operator is at LF, MPs with *-ssik* should be always distributed over something, and there is no way for the MPs with *-ssik* to act either non-distributively or collectively. In other words, her proposal implies that there is an inherent link between *-ssik* and distributivity, so the proposal predicts that non-distributive or collective readings of MPs with *-ssik* are impossible from the beginning. This is not the case, however, as I provide the example with such readings in (16)b and (22). Note that the split MP construction forces distributive readings, whereas both distributive and non-distributive readings are allowed in non-split MP constructions regardless of *-ssik* (see the summary table in (17)). Now, it is clear that *-ssik* itself is not the source of distributivity in non-split MP construction.

This section discussed Oh’s proposal pertaining to non-split MPs with *-ssik*. Her analysis works for distributive readings of MPs with *-ssik*, but it crucially excludes non-distributive or collective readings, which are actually attested. This implies that distributivity in non-split MPs with *-ssik* comes from other than *-ssik*. On the contrary, split MP constructions consistently forces distributive readings whether or not *-ssik* is attached to the MP. That is, the data indicate that MP-split is crucially related with distributivity in a certain way. In section 4.3, I argue for the direct link between MP-split and distributivity and propose that MP-split introduces stratified reference (Champollion 2010, 2011), which ensures this kind of distribution.

#### **4. Proposal: unified explanation of MPs, MP-split, and -ssik**

This section discusses how to give a unified explanation of measure phrases, measure phrases split, and *-ssik*. Section 4.1 recapitulates the generalizations from data regarding MPs, MP-split, and *-ssik* and discusses how the data in section 2 motivate modifications. Section 4.2 provides a summary analysis of English *for*-adverbials by Champollion (2010, 2011). Champollion explains the atelic/telic opposition in terms of how the relevant event can be distributed over the interval introduced by *for*-adverbials. *for*-adverbials, such as *John talked for ten minutes*, are allowed if John’s talking events can be distributed over very small amounts of time intervals which are parts of ten-minute run-time. Champollion proposes that *for*-adverbials introduces stratified (i.e., distributive, divisive) reference with a particular granularity and how long the total run-time is. Section 4.3 presents how his analysis can apply to my data especially for non-split MP constructions. In short, I argue that MP-split introduces stratified reference such that the granularity is specified as the size of units and the range of distributivity is specified as the product of the number of units and the size of units. Section 4.4 briefly presents how to derive both distributive and non-distributive readings in non-split MP constructions.

##### **4.1. What we know about MPs, MP-split, and -ssik**

This section recapitulates the generalizations and findings from data regarding MPs, MP-split, and *-ssik*, and discusses whether the previous proposals are enough to explain the findings of this paper.

In section 2, I present data and give their meanings using the term “units”. By introducing the concept of *units*, the meaning of MP constructions can be expressed systematically and coherently, without respect to whether an MP construction is split/non-split or with/without *-ssik*. The generalizations in (35) are repeated from (18).

(35) Summary of the generalizations regarding MPs, MP-split, and *-ssik* (= (18))

- a. (i) In non-split MPs, units can act either distributively or non-distributively.
- (ii) In split MPs, units can act only distributively.
  
- b. (i) In the absence of *-ssik*,  
         the unit size is ONE, which is the size of an atomic individual,  
         and the number of units equals the numeral in the MP.
- (ii) In the presence of *-ssik*,  
         the unit size equals the numeral in the MP,  
         and the number of units is not specified but it should be more than one.

The generalizations are divided into two parts. One regards the role of MP-split ((35)a); it says that split MPs allows only distributive readings. The other regards the interaction of MPs and *-ssik* ((35)b); it says that the role of each component of MPs may vary depending on the presence/absence of *-ssik*. I present the generalizations in (35)b in the perspective of the role of each component, assuming that a classifier is responsible for the size of units.<sup>5</sup>

(36) The variable role of each component of MPs

	MP without <i>-ssik</i>	MP with <i>-ssik</i>
Example	(boy)-3-CL	(boy)-3-CL-SSIK
Components	a numeral; a classifier	a numeral; a classifier; <i>-ssik</i>
Numeral	the number of units	the size of units
Classifier	the size of units = 1 (Specified)	No role
<i>-ssik</i>	--	the number of units > 1

As discussed in section 3, Nakanishi (2007)'s and Oh (2001)'s proposals independently deal with MP-split and *-ssik*, respectively. As for Nakanishi, her intuition on MP-split can apply to MP constructions containing *-ssik*, but the technical implementation Oh proposes would make some wrong predictions. As for Oh, her analysis of MPs with *-ssik* works for, at least, the readings Oh takes into account, but her proposal does not consider collective readings of MPs with *-ssik*. The collective readings, however, are reported by Gil (1990), and I myself, as a native Korean speaker, also agree to the readings in Gil's examples.

I present a coherent picture of data regarding MP-split, *-ssik*, and their interactions. I also discuss that the previous literature has an explanation for each of MP-split and *-ssik*, but they are partially incorrect or they do not cover the wide range of data con. These facts motivate the

<sup>5</sup> I believe the role of a classifier can be divided into two parts. One would be a numeral that is related to the lexical meaning of a classifier, and the numeral does not have to be the numeral *one* (= |Atom|). The other would specify the size of units as *one* (= |Atom|).

modifications of analysis and my proposal is presented in section 4.3. The proposal is based on an analysis of English *for*-adverbials made by Champollion (2010, 2011). The next section 4.2 summarizes Champollion’s account on English *for*-adverbials before moving on to Korean MP constructions.

#### 4.2. Stratified Reference by Champollion (2010, 2011)

In this section, I introduce Champollion’s (2010, 2011) account of English *for*-adverbials before I apply his account to my data. What actually Champollion does in his dissertation is extracting common properties that regulate three distinct domains, which have been analyzed independently. The three domains are distributivity, aspect, and measurement. As a result, Champollion proposes “a higher-order property [that Champollion calls] stratified reference”. The summary and examples in this section are adopted from Champollion (2011), a summary of his dissertation (Champollion 2010).

His account of English *for*-adverbials regards the domain of aspect. Champollion contrasts the following sentences containing *for*-adverbial expressions. The sentence in (37)a is compatible with *for*-adverbials, and the predicate ‘talked’ is atelic. On the other hand, the sentence in (37)b is not compatible with *for*-adverbials, and the predicate ‘finish talking’ is telic.

- (37) The telic/atelic opposition (repeated from Champollion’s (2011) example (8))
- a. √ John **talked** for five minutes. *atelic*
  - b. \* John **finished talking** for five minutes. *telic*

His insight comes from a classical answer for the distinction. The classical answer attributes the property of atelicity to the “subinterval property”. It says that a property *P* is atelic in terms of an interval if and only if the property *P* holds true at every single subinterval of the interval. For example, the predicate ‘talk’ can be atelic in terms of five minutes if and only if the ‘talking’ event holds true at every single subinterval of five minutes. This implies that, if there is a single moment that the ‘talking’ event is stopped, such as for a few seconds during the five minutes, then the predicate ‘talk’ cannot be atelic. The classical account is “too strong” in this way. Champollion suggests a slight modification from the classical account. Champollion keeps a part of the classical account which argues that *for*-adverbials introduce a kind of presupposition that a property *P* should hold true at some points. What Champollion modifies is the degree of how much a property *P* should hold. Champollion argues that *for*-adverbials introduces stratified reference with two parameters, dimension that is measured by *for*-adverbials and the size of subintervals in which the property *P* should hold true. Therefore, stratified reference is a kind of presupposition that provides two parameters. The following is the presupposition that is introduced by the expression *for an hour*. And the star operator in the expression has the meaning in (39)

- (38) Stratified reference introduced by *for an hour*  
(repeated from Champollion’s (2011) example (47))  
 $\forall e[\text{VP}(e) \rightarrow e \in * \lambda e'(\text{VP}(e') \wedge \varepsilon(\lambda t[\text{hours}(t) = 1])(\tau(e')))$   
(Every VPing event consists of one or more VPing events whose runtimes are very short compared to an hour.)
- (39)  $x \in *(\lambda y.B(y))$  means:  $x$  consists of one or more parts of which  $B$  holds  
(repeated from Champollion’s (2011) definition on page 6)

In this example, a VP “has stratified reference (SR) with respect to the dimension  $\tau$  (“runtime”) and the granularity  $\varepsilon(\lambda t[\text{hours}(t) = 1])$  (“very short time interval”)”. Champollion manages to weaken the too strong requirement about subinterval by stipulating a value for the granularity parameter.

Two points about stratified reference should be said in order to link Champollion’s work to Korean data. First, stratified reference regards distributivity. In order to satisfy the formal expression of *for an hour*, a VP must hold true in every event whose runtime is very short. In other words, a property expressed by VP is distributed over every subevent, not over the sum of more than one subevent. This is related to the role of MP-split in my data. Note that split-MP constructions do not allow collective readings. Collective readings correspond to distribution over a sum of units. Second, stratified reference provides the granularity parameter that can be specified. This is related to the role of numerals in the case of MPs with *-ssik*, and the role of classifiers in the case of MPs without *-ssik*. Note that, in my data, either numerals or classifiers indicate the size of units depending on the presence or absence of *-ssik*, as summarized in table (36). With these two points in mind, I provide a unified explanation of MPs, MP-split, and *-ssik* in section 4.3.

### 4.3. A unified explanation of MPs, MP-split, and *-ssik*

This section presents how stratified reference applies to the split MP construction either with or without *-ssik*. I show how each component of stratified reference corresponds to the role of MP-split, numerals, classifiers, and *-ssik*. Then, I provide a preliminary version of stratified reference introduced by split MPs. I do not show the compositional derivation for the entire MP construction in a formal way, however.

My proposal is that MP-split introduces stratified reference. Similar to the stratified reference introduced by English *for*-adverbials, it presupposes the properties of every VPing event in terms of the dimension parameter and the granularity parameter. In the case of MP-split, cardinality is the dimension that is measured by measure phrases.

First, in the absence of *-ssik*, the granularity parameter is assigned its value from a classifier of the MP, i.e., the numeral *one* (= |Atom|). The granularity is expressed by the cardinality of the agent of the subevent  $e'$  (i.e., |agent( $e'$ )|). In addition to the dimension and granularity parameters, I add the information about the number of units into the presupposition. The number of units is assigned from the numeral in MPs in the absence of *-ssik*. The number of units is expressed by the cardinality of event  $e$  (i.e., |agent( $e$ )|). A preliminary version of stratified reference introduced by split-MP without *-ssik* is presented below:

(40) Stratified reference introduced by the split MP without *-ssik*,

Example: ‘boy-NOM ... three-CL VP’

$\forall e[\text{VP}(e) \rightarrow e \in * \lambda e'(\text{VP}(e') \wedge \underline{|\text{agent}(e')|=1} \wedge |\text{agent}(e)|=3 \wedge \text{boys}(\text{agent}(e)))]$

(Every VPing event consists of one or more VPing events in which the cardinality of the agents of every subevent is one, the cardinality of the agents of the event is three, and the agents of the event are boys; the underlined part (the cardinality of the agents of every proper subevent is 1) is a presupposition.)<sup>6</sup>

Second, in the presence of *-ssik*, the granularity parameter is assigned its value from the numeral of the MP. Likewise, the granularity is expressed by the cardinality of the agent of the subevent  $e'$  (i.e.,  $|\text{agent}(e')|$ ). The number of units is assigned as a numeral  $n$  that is more than one, in the presence of *-ssik*. The number of units is indirectly expressed by the cardinality of event  $e$  (i.e.,  $|\text{agent}(e)|$ ), whose value is the product of the number of units ‘ $n$ ’ and the granularity value (i.e.,  $n*3$ ). A preliminary version of stratified reference introduced by split-MP with *-ssik* is presented below:

(41) Stratified reference introduced by the split MP with *-ssik*,

Example: ‘boy-NOM ... three-CL-SSIK’

$\forall e[\text{VP}(e) \rightarrow e \in * \lambda e'(\text{VP}(e') \wedge \underline{|\text{agent}(e')|=3} \wedge |\text{agent}(e)|=3n \wedge (n > 1 \wedge \text{boys}(\text{agent}(e)))]$

(Every VPing event consists of one or more VPing events in which the cardinality of the agents of every subevent is three, the cardinality of the agents of the event is  $3n$ ,  $n$  is more than one, and the agents of the event are boys; the underlined part (the cardinality of the agents of every proper subevent is 3) is a presupposition.)

It is worth mentioning that the two problems that Nakanishi’s proposal has are resolved in my proposal. First, the case where the numeral in MPs is *one* cannot be explained with Nakanishi’s proposal. That is because her monotonicity constraint presupposes the existence of, at least, two individuals in the domain. In the case of stratified reference, however, distributivity is achieved by presupposing that a property should hold at every single subevent. Therefore, distributivity is vacuously obtained when the single agent of a single subevent is the only agent of the (big) event (i.e., This is the case where the relevant part of the stratified reference would be “ $|\text{agent}(e')|=1 \wedge |\text{agent}(e)|=1$ ”). Second, stratified reference excludes collective readings at the outset, by specifying the granularity parameter as one ( $=|\text{Atom}|$ ) when *-ssik* is not attached.

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<sup>6</sup> Balusu (2005) hints that the main assertion and the presupposition or implicature of multiplicity are connected by E-type event anaphora, which Schein (1993) expresses using the phrase *therein*. I make the presupposition part of the formula and indicate its status by underlining in order to avoid introducing the formal apparatus that is needed to account for this anaphoric relation.

Therefore, stratified reference introduced by MP-split predicts that the situation described in (30) and repeated below is NOT true.

(42) Situation: “One boy made a chair on his own; two boys made a chair together.” (= (30))

This section showed how Champollion’s stratified reference applies to split MPs with or without *-ssik*. Although I do not present a formal derivation from each component of MPs to the entire MP constructions, I explicitly provide an example of stratified reference presupposed by MP-split. Providing the meaning of MP construction would be one of the future projects.

#### 4.4. In the case of non-split MPs

This section provides an explanation of non-split MPs, which may have collective readings as well as distributive ones. I show that a predicate has two meanings and the distributive and collective readings result from the ambiguity of the predicate.

As I present in section 2, both distributive and collective readings are available in non-split MP constructions, without respect to the presence or absence of *-ssik*. Therefore, *-ssik* should not be responsible for distributive readings in the case of non-split MP constructions. Instead, I argue that predicates are ambiguous. The following are two possible meanings of the predicate ‘made a chair’. The meaning in (43)a is responsible for distributive readings. In this case, ‘made a chair’ applies to every  $y$  that is smaller than  $x$ . The meaning in (43)b is responsible for collective readings. Whatever the predicate receives as an input, the group formation operator  $\uparrow$  would make the input into a group, so the collective reading would be obtained.

(43) The ambiguity of the predicate ‘made a chair’

- a.  $\lambda x_e \forall y[y < x][y \text{ made a chair}]$
- b.  $\lambda x_e [\uparrow(x) \text{ made a chair}]$

The point of this section is that, in non-split construction, distributive readings are not obligatory, and *-ssik* does not seem to contribute to the distributivity at all. This is not a problem of non-split MP constructions, as I suggested that the predicate can be ambiguous.

#### 4.5. Discussion

This section discusses how *-ssik* and MP-split in Korean can be related with similar expressions in other languages. Among them, numeral reduplication in Telugu (Balusu 2005) will be focused on.

Numeral reduplication in Telugu is similar to MP-split with *-ssik* in Korean in that the expression induces event key readings. The following example shows the form of numeral reduplication and the interpretations from the expression.

(44) Numeral reduplication in Telugu (Balusu 2005)

renDu	renDu	kootu-lu	egir-i-niyyi
2	2	monkey-PL	jump-PAST-3PPL
lit. ‘2 2 monkeys jumped’			

- ‘Two monkeys jumped in each time interval’ (Temporal key reading)  
 ‘Two monkeys jumped in each location’ (Spatial key reading)

Because the predicates of the examples in Balusu (2005) are either ‘jumped’ or ‘saw’, which usually apply to individuals, it is not known whether the subject of the following example may act collectively. The example is repeated from (5). I infer from the general discussion in that paper that the example would not have a collective reading.

- (45) Telugu example, as inferred from Balusu’s (2005) discussion (to be checked) (= (5))  
 3-3 boys made a chair.  
 ✓ ‘In each subevent, a triplet of boys made a chair’ (distributes to triplets)  
 # ‘In one event, triplets of boys joined forces to make a chair’ (a collective of triplets)

If this inference is true, numeral reduplication would correspond to split MPs with *-ssik* rather than non-split ones with *-ssik*, because non-split MPs allow collective readings. Since the form of numeral reduplication in Telugu is not parallel to either non-split or split MPs with *-ssik* in Korean, it would not be important for Balusu to check if numeral reduplication may have collective readings.

Another interesting issue come from the fact that both MP-split with *-ssik* and numeral reduplication can be supported by distributive universal quantifiers as well as plurals, as the following examples show.

- (46) Distributive universal supports numeral reduplication (Telugu) and *-ssik* (Korean)
- a. ‘EVERY KID SAW 2 2 MONKEYS’ (Telugu example from Balusus (2005))
    - (i) Every kid saw 2 monkeys [each]. (Participant key reading)
    - (ii) Every kid saw 2 monkeys in each time interval. (Temporal key reading)
    - (iii) Every kid saw 2 monkeys in each location. (Spatial key reading)
  - b. motun ai-ka wenswungi-twu-mali-ssik-ul po-assta  
 Every kid-NOM monkey-two-CL-SSIK-ACC see-PAST
    - (i) Every kid saw 2 monkeys [each]. (Participant key reading)
    - (ii) Every kid saw 2 monkeys in each time interval. (Temporal key reading)
    - (iii) Every kid saw 2 monkeys in each location. (Spatial key reading)

Balusu proposes that, semantically speaking, the sorting key of the distributive operator introduced by reduplication is always a plurality of events, although individuals and subevents may be in a one-to-one relation, giving the illusion of individual-key readings. (Nakanishi and Romero (2004) use a similar idea to account for the full range of meanings of ‘for the most part’ in English; A. Szabolcsi, p.c.) This issue is not a main focus of this paper, but it is worth checking whether Balusu’s proposal applies to Korean data. Szabolcsi (2010: section 8.4) suggests that Balusu’s explanation can be extended to English binominal *each* and Hungarian numeral reduplication.

## 5. Conclusion

In this paper, I examined MP constructions in diverse conditions to identify what the semantic contributions of the MP, of split, and of *-ssik* are. The contribution of each part of MP could be seen by observing an expanded set of data, which have not been considered in one place. The expanded set composes of four kinds of MP constructions: an MP can be either non-split or split, and either with *-ssik* or without *-ssik*. By examining the readings obtained from the four constructions, the role of each part of MP constructions becomes clarified. The MP-split consistently concerns the possibility of distributive and collective readings. The roles of numeral and classifiers in the MP are variable depending on the presence or absence of *-ssik*. One of the important observation is that the presence of *-ssik* does not guarantee the distribution of MPs with *-ssik*. This fact is reported by Gil (1990), but it was not considered in Oh's (2001) analysis. I also tested whether the proposals of previous literature can apply to the expanded data set, because they would work only for a limited set of data. Since their predictions are partially correct and their analysis does not cover the expanded set of data, I adopt Champollion's (2010, 2011) stratified reference to provide a unified explanation of the data and findings. Stratified reference is well provided for applying to MP constructions. The way stratified reference achieves distributivity guarantees the obligatory distributive reading of split MP construction. The size of units, expressed by numerals or classifiers in MPs, is also taken into account for the presupposition through the granularity parameter, one of the devices stratified reference provides.

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