1. Introduction

This paper examines constructions with a combination of an indeterminate numeral accompanied by the Japanese suffix mo, as shown in (1). The quirky characters of this construction is that apparently mo applies over the denotation of an indeterminate numeral as a syntactic binder and at the same it invokes a scalar reading.

(1) Nan-nin-mo Gakusei-ga kita.
What-Cl-Mo student-Nom ame
‘A large number of students came.’

To the best of my knowledge, Kobuchi-Philip (2010) and Oda (2012) are the only works that deal with this construction— I will call a construction like (1) the indeterminate numeral construction. Especially Oda extensively discusses every possible means to explain this construction and works out a solution by assuming that the suffix mo functions multiply as an existential quantifier and a scalar particle. In this paper I will support her claim for its double functions, but I will clarify that the functions are both derived from a core semantic property of mo, namely, maximality. My claim through this paper is summed up as follows:

(2) Maximality is the key semantic property of mo.

The main purpose of this paper is to provide an appropriate explanation to the indeterminate numeral construction. The construction shows tricky characteristics in that it involves at least two operators, namely, a syntactic operator over the wh-restrictor and a scalar particle. One possible answer, worked out by Oda, is that the suffix mo plays those two roles. More specifically, mo is an existential quantifier over the wh-restrictor and at the same time, serves as a scalar particle, presupposing that the numeral is large. While I back up Oda’s basic stance partly, I will advocate that the syntactic (semantic) and pragmatic roles of mo should be defined in terms of maximality (cf. Giannakidou and Cheng (2006) and Xiang (2008)).

Our discussion is based on the assumption that mo itself does not bear a universal quantificational force (cf. Yamashina and Tancredi 2005 and Mizuguchi 2005). Rather, the universal quantification associated with mo, I assume, comes from a covert operator. Since I cannot conduct a survey of the issues relevant to universal quantification due to limited space, I will refer readers to the above-mentioned papers.

This paper is structured as follows: Section 2 will attempt to characterize mo as a scalar particle in terms of maximality. Section 3, which is substantially the main section of this paper, discusses the indeterminate numeral construction and clears our argument, distinct from Oda (2012). Finally I sum up the discussion in Section 4, but I also state the need of reconsideration of our stance from more comprehensible works by Szabolcsi (2010) and Szabolcsi et.al. (2014).

2. Scalar mo

I assume that scalar mo, like English even, is truth-conditionally vacuous, but introduces a scalar presupposition. In the examples below, even and mo both presuppose that the assertions are less likely to occur among their alternative propositions.

(3) a. John-mo kita.
   Jonn-Mo came.
   b. Even John came.

Nakanishi (2008, 2010) assume that syntactically even undergoes movement in LF, as illustrated in (4a), and introduces a scalar presupposition (4c):
Basically I will follow her treatment of scalar *mo*, but in order to make more explicit the relation with the iota-as-maximality operator, I will redefine the definition of scalar *mo* in terms of maximality. Obviously, unlike *mo* as the iota-as-maximality, scalar *mo* does not contribute to the semantic component, but in the pragmatic component it induces a scalar reading as a maximality operator. I assume specifically that it operates on the assertion *p* and a set of its alternative propositions *C* and that its application conveys that *p* induces the maximal degree on the scale of ‘unexpectedness’ (cf. Nakanishi 2008, 2010), as follows:

\[(5)\]

\[\begin{align*}
\text{a. } & \exists y \neq x \wedge C(y) \wedge p(x) \\
\text{b. } & \forall y \neq x \rightarrow \text{unexpected}(P(x)) > \text{unexpected}(P(y))
\end{align*}\]

Given (5), Example (3a) implies that the assertion *John-ga kita* ‘John came’ has the greatest degree on the scale of unexpectedness among its alternatives. Put differently, *mo* requires that the value of the assertion is maximally high with respect to strength of unexpectedness.

Precisely speaking, however, *mo* does not require the assertion to be the most unexpected alternative among its relevant alternatives. Imagine a situation in which a professor has five students in his seminar, Arlon, Bill, Chris, Dan and Frank; Arlon is the laziest, followed by Bill and next, Chris. The rest of the students, Dan and Frank, are both diligent enough to come to the seminar regularly. In this situation, some will say.

\[(6)\]

‘Even Arlon came.’

‘Arlon came’ is the most unlikely alternative and of course, *mo* works nicely as a maximality operator because it conveys that *p* induces the highest value on the scale of unexpectedness. However, even if the second or third laziest student came, those alternatives hold true:

\[(7)\]

‘Even Bill (Chris) came.’

This fact suggests that the application of *mo* does not induce the maximal value, but requires the assertion to fall within the unexpectedness range. Apparently appealing to maximality may sound too demanding. Note, however, that if *mo* is defined in a ‘subset’ of its alternatives, it should be feasible to maintain maximality as the core property, as follows:

\[(8)\]

\[\begin{align*}
\text{a. } & \exists y \neq x \wedge Q(y) \wedge p(x) \\
\text{b. } & \forall r \in Q, \forall r \neq p \rightarrow \text{unexpected}(r)) > \text{unexpected}(p))
\end{align*}\]

This weakened version of *mo* even brings us one advantage: the additive usage of *mo* satisfies the maximal property of *mo* in a subdomain of the alternatives. If the subject in Example (7) is pronounced with a falling prosodic pattern, it is natural to take it as an additive case. In my view the additive *mo* is syntactically vacuous as well, but it yields a pragmatic interpretation. When (7) is taken as an additive case, it implicitly says that there is at least one other person in addition to Bill (Chris). Here I assume that *mo* applies over a subset of alternative individuals to the denotation of the focused element and returns the supremum. That is, the subdomain contains the focused element and at least one individual, and also it is an ordered set in that each element is (partly) ordered on ‘part-of’ relation. What *mo* does is to pick out the largest element containing the focused element, introducing the implicit meaning that there is at least one individual behind the scene.

The redefinition of scalar *mo*, based upon maximality, can be extended to the case in which the focused part is replaced by numerals (more precisely, numeral+classifiers).

\[(9)\]

\[\begin{align*}
\text{a. } & \text{Gakusei-Nom five-Cl-Mo came} \\
\text{b. } & \text{Gakusei-Nom five-Mo ko-na-katta}
\end{align*}\]
As many as five students did not come. / Only five students did not come.

Note that mo is compatible with both positive and negative statements. The varied readings—the large reading in (9a) and the large/small readings in (9b) --- are thought to be due to the scalar particle mo, and thus their truth conditions are equivalent to the assertions without the particle in (10).

(10) Gakusei-ga go-nin kita/ko-na-kattta.
‘Five students came/ did not come.’

I will not make a commitment to the detailed discussion of the large/small readings here— I will concede it to the next section—but I will just lay out my analysis of the unexpected reading for the positive statement. Here, again, the analysis will proceed along the lines proposed by Nakanishi (2008, 2010). The role mo plays is to introduce a scalar presupposition, asserting that the proposition is the “most unexpected” among a set of its alternative propositions. What is to note is that the alternatives only consist of those that the assertion entails. In other words, the assertion ‘Five students came’ is the most unexpected proposition, and its alternative propositions need to be entailed by the assertion: if five students came, less than 4 students came’ is entailed, but not vice versa. It thus follows that the implicit reading of (9a) is derived based upon the following set of alternatives:

(11) C = {Five students came, Four students came, … One student came}

Here scalar mo applies over this set of alternatives, introducing the presupposition that the assertion is least likely to happen. Furthermore, notice that the numeral included in the assertion is the greatest number, which, as a consequence, leads to the ‘large’ reading.

I will here reconsider the scalar presupposition of mo in terms of maximality, but need to slightly modify it when it applies to the case in which the focused element is a numeral-Cl. Below I present the slightly altered version, as follows:

(12)a. [ [ mo ] ] (C)p, where ∃n ≠ m: C(n-many k) ∧ p(m-many k); C is the alternative set to a proposition p.
b. All the alternatives are (partially) ordered on a scale about unexpectedness such that:
∀n ≠ m: p(m-many k) is more unexpected than p(n-many k)

Given the presupposition in (12b), the maximality operator applies in the pragmatic component, requiring that the value of the assertion on the scale of unexpectedness is greater than those of other alternatives.

3. Numerical Indeterminate Phrases and Mo

With the assumptions we have made in mind, let us examine the construction in discussion, as repeated in (13)

(13) Gakusei-ga na-nin-mo kita.
student-Nom what-Cl-Mo came
‘A large number of students came.’

When we scrutinize the wh expression, na’n-nin-mo, it is composed into the indeterminate pronoun, the classifier, and the suffix mo, i.e., ‘what-Cl-Mo’. There has been no compelling discussion of this construction except Kobuchi-Phillip (2010) and Oda (2012). Pointing out some deficiencies of Kobuchi-Phillip, Oda builds her argument that the suffix mo in this construction functions as a combination of an existential quantifier and a scalar particle. Our analysis basically follows Oda in that the suffix mo plays two roles. However, in our analysis, mo is not an existential quantifier but a maximal operator. As will become clear later, this analysis his will end up in a profitable result.

Before laying out our analysis, we will overview Oda’s approach to this construction. She sets the following hypotheses, claiming that her theory could account for all the date relevant to the wh-Cl-mo expression.

(14) a. Mo itself is an ∃-quantifier that binds na’n-nin ‘what-Cl’
b. Mo also serves as a scalar particle, and carries the scalar presupposition that a number is large. (slightly modified from Oda 2012: 304)

What is puzzling about the sentence (13) in the first place is that na’n-nin induces an existential reading,
translated as 'a large number of students' or 'many students'. This observation seems to motivate her to assume that \textit{mo} is an $\exists$-quantifier.

Let us see in more details how Oda’s hypotheses are at work. Given the hypotheses in (14), the semantics of (13) would be like (15a), where \textit{mo} binds \textit{na’n-nin ‘wh-Cl’}, inducing existentiality of a cardinal number.\footnote{Kobuchi-Philip (2010) develops her argument, based upon the assumption that \textit{mo} itself should be associated with universal quantificational force. According to her, once \textit{mo} combines with \textit{n wh-Cl na’n-nin}, its semantic property, universality, disappears, and instead, its presuppositional property is manifested. The so-called ‘many’ reading in the indeterminate-Cl-\textit{mo} is derived from the ‘higher number than expected’ presupposition of \textit{mo}. Put differently, the manifestation of the presupposition brings about the quasi-quantificational force ‘many’.

Intuitively, her analysis is very intriguing, but there are some obscure points left. As Oda (2012) has pointed out, it is not clear why the quasi-quantificational effect comes into effect only in \textit{wh-Cl-mo}. It is also unclear why universality, the semantic property of \textit{mo}, should be cancelled in the construction under question. It seems that the mechanism in which scalar \textit{mo} rescues the uninterpretability of the construction and yields the quasi-preservation effect should be made more specific.}

Further, \textit{mo} serves as a scalar particle, introducing the presupposition in (15b). That the assertion is less likely happens with means that its alternatives all contain a smaller number of students. As we have seen in the previous section, the calculated alternative propositions are all entailed by the assertive proposition. Among the alternatives the cardinal numeral in the assertion is the largest, thus giving rise to ‘a large number of students’ or ‘many students’.

When the predicate is negated as in (16), things become slightly more complicated. The negated sentence has three pragmatic interpretations, as shown in (17).

(16) \textit{Gakusei-ga na’n-nin-mo ko-n-a-katta.}

Student-Nom wh-Cl-Mo come-Neg-Past

(17)a. It is not the case that a large number of students came.

b. It is not the case that only such few people came.

c. There are a large number of students who did not come.

(18)Assertion: (17a) and (17b)

\[
\neg \exists n [n \in \text{cardinality} (m) \land \exists x [\text{student} (x) \land |x| = n \land \text{come} (x)]
\]

a. Presupposition of "Large mo" (17a)

$\exists n \forall m \neq n$: that \textit{n}-many students came is less likely than that \textit{m}-many students came, in other words, \textit{n} is a large number.

b. Presupposition of "Small mo" (17b)

$\exists n \forall m \neq n$: that \textit{n}-many students came is more likely than that \textit{m}-many students came, in other words, \textit{n} is a small number.

In this way, when the negation takes a wider scope and Large \textit{mo} is adopted as in the case of (18a), then the assertion ends up having the large reading as its implicit meaning. On the other hand, when the small \textit{mo} is adopted, the assertion has the small reading.

Note incidentally that given the assumption of

\footnote{Here I ignore the compositionality for (13). See Oda (2012: 305) for the detailed discussion.}
the suffix *mo* as an existential quantifier, one might wonder if there is a case in which the cardinality of students is ‘one’. which is obviously incompatible with the large reading. Put differently, as long as the existential quantifier applies in a set of numerals {one, two, three, ...}, we could have the reading in which the cardinality of *gakusei* ‘student’ is ‘one’. Of course, this scenario may be excluded by speculating that since Large *mo* presupposes that the assertion should be less likely, the alternative propositions need be confined to those that include smaller cardinals: it thus follows that the cardinality of students in the assertive proposition should be at least greater than ‘one’. When it comes to Small *mo*, such a speculation is not necessary, because a proposition involving cardinality ‘one’ is the strongest one that entails any alternative, never bringing about a presupposition failure.

However, in fact, a real problem we will have to tackle upon concerns the pragmatic interpretation in (17c). It is yielded with the truth conditions below in (19a) where the existential quantifier scopes over the negation. Further, when the particle serves as Large *mo*, presupposing (19b), the interpretation in (17c) results.

\[ (19) \]
\[ \text{a. Assertion} \]
\[
\exists \! n \! \big| n \in \{ m : \text{cardinality} (m) \} \land \exists x [\text{student} (x) \\
\land |x| = n \land \neg \text{come} (x)]
\]
\[ \text{b. Presupposition of Large } \text{mo} \]
\[
\exists \! n \! \forall m \neq n : \text{that } n\text{-many students came is less likely than that } m\text{-many students came, in other words, } n \text{ is a large number.}
\]

As far as the interpretation (17a) is concerned, the reading in which the cardinality of *gakusei* may be ‘one’ could be blocked by appealing to the compatibility with the presupposition of Large *mo*, as I have just suggested; on the other hand, for (17b), the smallest reading was predicted to be available by resorting to Small *mo*, and in fact it is. However, the discussion here leads us to predict a wrong pragmatic interpretation with the truth conditions in (19a). Consider the case in which the particle serves as Small *mo*, introducing the presupposition (20).

\[ (20) \]
\[
\exists \! n \! \forall m \neq n : \text{that } n\text{-many students came is more likely than that } m\text{-many students came, in other words, } n \text{ is a small number.}
\]

In this way, if the particle functions as an existential quantifier and, at the same time, serves as Small *mo*, we will logically obtain the pragmatic interpretation shown in (21):

(21) There are only such few people that did not come.

However, this interpretation is not in fact available. Since Small *mo* requires *n*-many students to be smaller than *m*-many students in any alternative proposition, it could give rise to a small reading observed in (21). As long as *mo* is assumed to induce existential force and the lexical analysis has been adopted, an implausible readings like (21) is wrongly derived, though logically possible.

I have briefly argued against Oda’s treatment of *mo* from the empirical domain. Theoretically, it seems awkward to assume that *mo* functions as an existential quantifier, in addition to the traditional universal quantifier. Oda defines the domain of existential *mo* and that of universal as complementary, as follows:

\[ (22) \]
\[
\text{Distribution of universal } \text{mo and existential } \text{mo} \]
\[
\text{Mo is an existential quantifier when its sister denotes a set of scalar alternatives. Otherwise, it is a universal quantifier. (Oda 2012: 311)}
\]

Assuming two types of *mo* might be apparently feasible because each has its own distinct quantificational domain. However, since the existential force is theoretically assumed to be rather the labor of the Japanese *ka*, one cannot help but wonder if the particle *mo* could penetrate into the domain of *ka*. Cross-linguistically, the *mo*-type particles, including Hungarian *mind*, are said to build universal quantifier words and at the same time, serve as connectives, additives and scalar particles. On the other hand, the *ka*-type particle, like *vala* in Hungarian, derives existential and disjunction meanings. Put differently, assuming that *mo* builds an existential quantifier word would even break down the complementary boundary between the *ka*-family and the *mo*-family for their semantic contributions (see also Szabolcsi (2010) and Szabolcsi et.al. (2014). It would take further scrutiny and exploration before we justify the possibility of *mo* as inducing existential force.
3.1 Maximality-Based Approach

In this section I will attempt to prove that the maximality-based approach will give a more straightforward explanation to the indeterminate numeral construction. Following Nakanishi (2008), I assume the scope analysis of *mo* in the first place, and slightly redefine *mo* in terms of maximality when it applies over a set of numerals, as follows:

\[(23)\text{a. } [[\text{mo}]] = \lambda n \in D_{\text{cardinal numerals}}. \text{Max}(m \in D_{\text{cardinal numerals}})\]

\[\text{b. All the alternatives are (partially) ordered on a scale about unexpectedness such that:}\]

\[\forall n \neq m: P(m\text{-many } k) \text{ is more unexpected than } P(n\text{-many } k)\]

Here one might wonder why the maximality operator could be applicable despite the fact that numerals are ‘infinite’. However, recall that in Section 2 we observed that scalar *mo* does not pick up the maximal value, but merely requires the assertion to fall within the unexpectedness range. This observation led us to claim that *mo* should be defined in a ‘subset’ of the assertion and its alternatives. Recall also that additive *mo* is defined to apply into a subdomain that contains the focused element and at least one other individual, i.e., an ordered subset in which each element is (partly) ordered on ‘part-of’ relation. What *mo* does is to pick up the largest element containing the focused element, conveying the implicit meaning that there is at least one individual behind the scene.

Along this line, it does not seem unfeasible to say that *mo* applies over a (n arbitrary) subset of numerals. Thus, let us assume that *mo* picks up the greatest number among a set of at least more than two cardinal numerals. For illustrative purposes, I represent in boldface type a subset of numerals over which *mo* applies, as shown in (24) --- the rest of greater cardinals is not visible in the domain of quantification.

\[(24)\ldots < n < n' < n'' < m < l < k\]

Additionally, *mo* induces a scalar reading, asserting that it is most unexpected for the assertion to happen. The alternative propositions to be calculated are, of course, supposed to be the ones that are all entailed by the assertion. Put differently, the assertion is the strongest proposition among its alternatives and thus is the most unexpected.

With the discussion so far in mind, let us turn to (25) below:

\[(25)\text{Gakusei-ga na’n-nin-mo kita.}\]

\n\text{Student-Nom What-Cl-Mo came}\n
\n‘A large number of students came.’

Assuming, with Krifka (2004), that predicative nouns have a slot for number arguments as well, I bring forth the truth conditions of (25) as in (26a).

\[(26)\text{a. Assertion}\]

\[\exists x [\text{student (Max } m (m \in [n: \text{cardinality}(n)]) (x) \land \text{come}(x)]]\]

\[\text{b. Presupposition of mo}\]

\[\forall n \neq m: \text{that } m\text{-many students came is more unexpected than that } n\text{-many students came, in other words, } m \text{ is a large number.}\]

As a maximality operator, *mo* applies over a subset of numerals, yielding the maximal value for the cardinality of students. At the same time as a scalar particle, *mo* introduces the presupposition in (26b), inducing the implicit reading in which it is most unexpected for the assertion to happen. The numeral included in the assertion is the greatest number among those in the set of alternatives, which, as a consequence, leads to the ‘large’ reading.

Next, consider the negative statement below:

\[(27)\text{Gakusei-ga na’n-nin-mo ko-na-katta.}\]

\[\text{Student-Nom wh-Cl-Mo come-Neg-Past}\]

\[(28)\text{a. It is not the case that a large number of students came.}\]

\[\text{b. It is not the case that only such few students came.}\]

\[\text{c. There are a large number of students who did not come.}\]

The interpretations of (28a) and (28b) are both conceived as the cases in which the negation scopes...
over $\exists$ and are thus assumed to share the same truth conditions in (29):

$$(29) \neg \exists x [\text{student}(\text{Max}(m \in n: \text{cardinality}(n))) (x) \wedge \text{come}(x)]$$

The variations of the large/small readings stem from the scope effects of $mo$ based on its structural position. The large reading is assumed to be derived from the scope interaction of $\neg \Rightarrow mo \Rightarrow \exists$. Since $mo$ stays below the negation, the domain it applies over is the $p$ set of the positive proposition and its alternatives. Since $mo$ induces the reading in which the assertion is the most unexpected, it can only be compared and calculated against the entailed alternatives. In other words, the calculated alternatives are a set of propositions with ‘smaller’ cardinal numerals than the given maximal numeral. The assertion contains the largest numeral among the alternatives, and as a consequence, we obtain the unexpected and, at the same time, large reading.

Next, consider the small reading in (28b). For example, a professor was expecting half of his thirty students to show up in his seminar, but the truth was that only five students showed up. In this situation *man nin-mo* implicates that the number of students are fewer than expected. This reading is assumed to be derived from the scope interaction of $mo \Rightarrow \neg \Rightarrow \exists$. Note that since negative statements reverse the entailment relation, scalar $mo$ induces the unexpectedness value of the assertion based upon the alternatives $C$ shown in (30b).

$$(30) a. \ldots j < k < l < m < n < n' < n'' < \ldots$$

$$b. C=\ldots \text{It is not the case that } m\text{-many students came. It is not the case that } n\text{-many students came, } \ldots \text{ It is not the case that } n'\text{-many students came, } \ldots$$

Let us say that $m$ is the maximal numeral that the syntactic operator $mo$ picks out in a given subset, i.e., $\ldots j, k, l, m$. Scalar $mo$, in turn, introduces a presupposition, asserting that that $m$-many did not come is more unexpected than its alternatives. Saying that $m$-many students did not come entails that $n$-many students did not come, but not vice versa, which means that the assertion with the maximal $m$ derives the highest value on the scale of unexpectedness among its alternatives and at the same time, $m$ is the smallest cardinal numeral among its alternatives. In this way, by assuming the scope analysis of $mo$ along the lines of maximality, we can also properly capture the small and unexpected reading observed in (28b).1

Finally I will consider the large reading in (28c) that has been left unresolved in Oda’s mechanism. Recall that in her analysis that adopts the lexical analysis of $mo$, an unnecessary reading was wrongly predicted, namely, that there are only such few people that did not come. This wrongly predicted ‘small’ reading could be circumvented nicely in the analysis here. The story is simple and straightforward.

I assume first that the assertion is truth-conditionally represented as in (31a) where $\exists$ scopes over the negation. Further, if the scalar particle $mo$ scopes over those scope elements, only the desirable large reading is derived.

$$(31)a. \text{Assertion:}$$

$$\exists x [\text{student}(\text{Max}(m \in n: \text{cardinality}(n))) (x) \wedge \neg \text{come}(x)) :$$

There are some students that did not come, whose cardinality is maximal (in a subset of cardinals).

$$b. \text{Implicit reading:}$$

There are a large number of students who did not come. ($mo \Rightarrow \exists \Rightarrow \neg$)

The assertive meaning involves the maximal cardinality $m$. Of course, that there are $m$-many students who did not come entails all the propositions in which the smaller cardinals of students are involved, but not vice versa. Thus, the alternative scalar numbers and the set of propositions $C$ are as follows:

$$(32)a. \ldots n'' < n' < n < m < l < k \ldots$$

$$b. C=\ldots \text{There are } n\text{-many students that did not come. There are } n\text{-many students that did not come. There are } m\text{-many students that did not come}$

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1 Note incidentally that the maximal definitions of $mo$ are established in opposite directions for Max $mo$ and scalar $mo$, respectively. The former operator applies into a subset of cardinalities with $m$ the largest cardinality, i.e., $\langle j, k, l, m \rangle$. On the other hand, scalar $mo$ applies into the alternative set $C$ with $m$ the smallest cardinality in (30). Apparently this theory may be confusing, but it is a natural consequence as long as we assume that $mo$ plays two roles as a syntactic binder and as a scalar particle.
The maximality binder *mo* applies into the ordered subset of cardinal numerals and picks the greatest cardinal *m*, and at the same time, *mo* serves as a scalar particle, whose application conveys the implicit meaning that the assertion is the most unexpected among the relevant alternatives. The assertion with the maximal *m* derives the highest value on the scale of unexpectedness among its alternatives and at the same time, *m* is the greatest cardinal among its alternatives.

Given this analysis, the unobserved interpretation that was wrongly derived in Oda, namely that the fewest cardinal *one* is involved, would never come out. In the maximality-based analysis, *mo* is defined on the presupposition that it should apply into an ‘ordered set’ of numerals. Thus, the case in which the maximal numeral is the minimum ‘one’ would never be derived; otherwise it would give rise to a presupposition failure.5

In this section we have so far discussed the wh-Cl-*mo* construction in terms of maximality. Basically following Oda (2012), we have appealed to the necessity of assuming that *mo* plays two roles. However, what substantially differs from Oda (2012) is that we consistently have defined *mo* as a maximalizer, not as an existential quantifier. Further, note also that the discussion here suggests that the scope analysis of *mo* should be more appropriate than the lexical analysis (Nakanishi 2008, 2010).

5. Conclusion

This paper has mainly discussed the scalar readings induced by the constructions with an indeterminate numeral plus the Japanese suffix *mo*. Basically I have supported Oda’s (2012) claim that *mo* serves as a binder over as a set of alternatives to the denotation of the indeterminate and at the same time, as a scalar particle. However, on the other hand, I have clarified that the functions are both derived from a core semantic property of *mo*, namely, maximality. Specifically, *mo* serves as the iota-as-maximality operator (cf. Giannakidou and Cheng 2006) and likewise as a scalar particle. These functions work individually, but the component of maximality is placed in the center of the semantics of both usages.

In many languages the same particles that build quantifier words serves as connectives, additives, scalar particles, questions markers, etc. It seems to me that the most insightful and cross-linguistic studies are a series of works by Szabolcsi (2010) and Szabolcsi at.al (2014). The *mo*-type particle, including say, *mind(en)* in Hungarian, is said to derive universal and conjunction meanings, which are both represented in terms of set-theoretic intersections (Gil 2008). On the other hand, the *ka*-type particle, like *vala/vagy* in Hungarian, derives existential and disjunction meanings, which are both treated as special cases of the join operation of lattice theory that finds the least upper bound of two appropriate things. In the series of her analyses each type of particle has to do with join ∪ and meet ∩, respectively, and further, they impose the same requirement. It is reasonable to treat the both particles in parallel fashions, and if either one is characterized independently, we might miss the whole picture and fails to obtain parallel insight for the other particle’s role (Szabolcsi pc). In fact, if it is assumed that *ka* is a meaningful particle, for example, as a choice-function variable, as proposed by Yatsushiro (2009), it does not offer any parallel insight for *mo*’s role. This criticism, of course, holds true of the maximality-based analysis developed in this paper. This is a methodological question with respect to which Szabolcsi has raises our awareness in studies of this sort. The characterization of *mo* should be expected to fit into a bigger picture that could also accommodate that of the other particle. Further, it should also be expected to explain the similarities and differences in the distribution of its Chinese and Hungarian counterparts in the framework of a model-theoretic semantics. Hopefully, the analysis here will leads to a bigger picture, which I would like to draw by presenting their compositional analyses in future work.

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5 The analysis here derives a reading that allows the number of students to be two in the large reading in (28c). In our system in which the maximal operator applies over a set of numeral values that contains at least two numerals, it could even pick ‘two’ as the maximal value. Imagine a situation in which no one is expected to show up in a seminar. Under this situation, that two students came amounts to saying that as many as two students came. Probably the cardinal ‘two’ would be large enough to hold up in a setting like this. The same could hold true of negative statements.
Reference


