

# The Particle *Mo* in Japanese and its Roles in Numeral Indeterminate Phrases

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It is well known that Japanese *mo* occurs in various environments, as shown below in (1):

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| (1) a. Dono hito- <i>mo</i> hasitta. (universal <i>mo</i> )<br>Which person-Mo ran<br>'Everybody ran.' | b. Dare- <i>mo</i> hasira-na-katta. (indeterminate NPI <i>mo</i> )<br>Who-Mo run-Neg-Past<br>'Nobody ran.' |
| c. John- <i>mo</i> hasitta. (Scalar particle <i>mo</i> )<br>John-Mo ran<br>'Even John ran.'            | d. John- <i>mo</i> hasitta.' (additive <i>mo</i> )<br>John-Mo ran<br>'John also ran.'                      |

It is by no means an accident that *mo* has these various semantic usages and, thus, it is not unreasonable to say that they stem from a core semantic property (cf. Szabolcsi et al. 2014). I will not commit to an extensive survey of all the usages of *mo*: rather I will explore the possibility of pursuing the core property of *mo* in terms of maximality (cf. Giannakidou and Cheng 2006), as shown in (2):

- (2) Maximality is the key semantic property of *mo*. Universal *mo* and scalar *mo* are both maximality operators that are applied over an ordered set and returns a maximal entity (value).

My discussion is based on the assumption that *mo* itself does not bear a universal quantificational force (see Yamashina and Tancredi 2005, Mizuguchi 2005 for details). The main purpose of this paper is to provide an appropriate explanation for the numeral and indefinite numeral constructions, as shown in (3) and (4):

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| (3) Gakusei-ga go-nin- <i>mo</i> kitta.<br>student-Nom five-Cl-Mo came<br>'As many as five students came.' | (4) Gakusei-ga nan-nin- <i>mo</i> kita.<br>student-Nom What-Cl-Mo came<br>'A large number of students came.' |
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I assume that scalar *mo* 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. Xian 2008), as follows:

- (5) a.  $\| mo \|^w (C)(p)$ , where  $p = \lambda w. \gamma(x, w) \wedge C \subseteq \{q: \exists y[y \neq x \wedge q = \lambda w. \gamma(y, w)]\}$ ;  
b. All the alternatives are (partially) ordered on a scale about unexpectedness such that:  
 $\forall q \in C [q \neq \lambda w. \gamma(x, w) \rightarrow \text{unexpected}(p) > \text{unexpected}(q)]$

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 we should note is that the alternatives stand in an entailment relation with the assertion; thus, the numeral included in the assertion is the largest number, which as a consequence, leads to the 'large' reading.

The redefinition of scalar *mo*, based upon maximality, can be extended to the indeterminate numeral construction in (4). To the best of my knowledge, Kobuchi-Philip (2010) and Oda (2012) are the only works that deal with this construction. Oda, for instance, has brought forth a very intriguing analysis: the suffix *mo* functions as an existential quantifier and, at the same time, a scalar particle. Partly supporting Oda's analysis, I will clarify that the functions are both derived from a core semantic property of *mo*, namely maximality. The analysis presented here differs substantially in two ways: (i) syntactically *mo* is treated as a maximal operator that is applied to a set of numbers; (ii) along the lines of the 'scope analysis' (cf. Nakanishi 2008), *mo* has a scope interaction with Neg, inducing large/small readings:

- (6) Gakusei-ga na'n-nin-*mo* ko-na-katta.  
Student-Nom wh-Cl-Mo come-Neg-Past
- (7) a. It is not the case that a large number of students came.  
b. It is not the case that only a few people came.

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

Since *mo* does not interact with scope-relevant elements in Oda's analysis, the possible truth conditions for (6) are obtained through the interaction of the negation and existential *mo*. Their interpretive differences are merely attributed to whether 'Large' or 'Small' *mo* is adopted as a scalar particle. According to Oda, (7c) is derived when truth-conditionally the existential quantifier scopes over the negation and the particle serves as Large *mo*. However, it remains uncertain why, in this case, Small *mo* is not available. If this was the case, we would obtain the following interpretation: There are only a few people who did not come. However, though logically possible, this interpretation is in fact hard to come by. Furthermore, a more serious problem stems from Oda's treatment of *mo* as an existential quantifier. Whether the small or large reading is obtained, at least two students need to be referred to, as seen from the interpretations in (7). If *mo* is an existential quantifier over an ordered set of cardinal numbers, we cannot utterly deny the possibility that the cardinality of the relevant student(s) is the minimum number, *hito-ri* (one-CI). However, as shown in (8), if it is followed by a statement with the minimum number, it gives rise to a contradiction:

(8) Gakusei-ga na'n-nin-mo ko-nakat-ta. #Hito-ri-mo/Futa-ri-mo ko-nakat-ta.

Student-nom wh-CI-Mo come-Neg-Past one-CI-Mo/two-CI-Mo come-Neg-Past

I will attempt to demonstrate, with the assumption of *mo* as a maximality operator, that the maximality-based approach can give a more straightforward explanation of these issues. Precisely speaking, the particle *mo* does not pick out the maximal element (value) in the set of numbers, but should be defined in a 'subset'. This definition is corroborated by the properties of additive *mo*: it is applied to 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 a '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 unreasonable to say that *mo* can be applied to a(n arbitrary) subset of cardinal numerals. Put differently, *mo* can pick up the maximal number in the smallest ordered set  $\langle 2, 1 \rangle$ . Thus it follows that the indeterminate numeral construction implicitly needs to refer to at least two individuals, regardless of the small/large readings. Additionally, *mo* induces a scalar reading, asserting that it is most unexpected for the assertion to happen. While *mo* as a maximal binder picks the maximal element in a set of cardinal numbers, its application as a scalar particle conveys that the assertion induces the maximal value on the scale of unexpectedness. In this way, I will claim that these two functions are both derived from a core semantic property of *mo*. They work individually, but the component of maximality lies at the center of the semantics of both usages.

## References

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