

Indeterminate Numeral Quantifiers, 'Some' and 'Many' Readings, and Questions in Japanese*

Mana Kobuchi-Philip
(Utrecht University)

Kobuchi-Philip, Mana. 2010. **Indeterminate Numeral Quantifiers, 'Some' and 'Many' Readings, and Questions in Japanese.** *Korean Journal of Linguistics*, 35, 503-530. The Japanese indeterminate numeral quantifier (WH-CL) can directly combine with a quantificational particle *ka* or *mo*, forming, e.g., *nan-nin-ka* 'what-CL_{person}-KA' or *nan-nin-mo* 'what-CL_{person}-MO'. This paper focuses on the empirical evidence that the former gives rise to a 'some' reading while the latter a 'many' reading, and discusses, from semantic and pragmatic perspectives, how these readings are formally derived. Semantically, we assume, in accord with Hamblin (1973), that the indeterminate numeral quantifier (NQ) is a set of alternatives. Following Jayaseelan (2001), *ka* is treated as a disjunction operator that takes a set of alternatives and produces a disjunction of it. Adopting Shimoyama's direct restrictor view of indeterminate phrase quantification, we derive the 'some' reading of the indeterminate NQ-*ka*. In contrast, the 'many' reading of an indeterminate NQ-*mo* is attributed to the pragmatics of *mo*, which triggers a presupposition like English *even* (Karttunen and Peters 1979).
(Utrecht University)

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1. Introduction

The Japanese numeral quantifier (NQ) is a combination of a numeral and a classifier, in that order, taking the form [numeral-classifier]. (1a) is a sentence in which an NQ occupies a prenominal position, while (1b) is a sentence in which NQ occupies a preverbal position, as a so-called floating NQ:

- (1) a. *san-nin-no gakusei-ga hashitta.*
3-CL-GEN student-NOM ran
b. *gakusei-ga san-nin hashitta.*
student-NOM 3-CL ran
'Three students ran.'

When the numeral of an NQ, such as *san-nin* '3-CL' in (1), is replaced with an indeterminate pronoun *nani* 'what', it forms an indeterminate NQ (=NQ containing an indeterminate pronoun).¹ A clause containing such an NQ may contain the interrogative particle *ka* in clause-final position, yielding a 'how many' question, as illustrated in (2):²

- (2) a. *nan-nin-no gakusei-ga hashitta-ka.*
what-CL-GEN student-NOM ran-KA
b. *gakusei-ga nan-nin hashitta-ka.*
student-NOM what-CL ran-KA
'How many students ran?'

Alternatively, a clause with an indeterminate NQ may contain clause-final *mo*, yielding 'no-matter-how-many' reading, as shown in (3):

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¹ The term 'indeterminate pronoun' used with respect to Japanese wh-words is due to Kuroda (1965). Note that in English, a wh-word such as *who* and *what* intrinsically contains Case features, whether they are phonetically realized as with *whom*, or not. In contrast, in Japanese Case is always overtly (morphologically) represented by a bound-morpheme, i.e. by Case particles such as *ga* (nominative) or *o* (accusative). An indeterminate pronoun, then, is a wh-word without the Case features.

² The lexical item *nani* 'what' systematically becomes /nan/ in association with a classifier due to a morphological rule.

- (3) a. nan-nin-no gakusei-ga kite-**mo** korokiamu-wa enki-da.
 what-CL-GEN student-NOM come-MO colloquium-TOP postpone-COPULA
 b. gakusei-ga nan-nin kite-**mo** korokiamu-wa enki-da.
 student-NOM what-CL come-MO colloquium-TOP postpone-COPULA
 ‘No matter how many students come, the colloquium will be postponed.’

Yet another possibility is that an indeterminate NQ is associated with the particle *demo*, yielding a free choice reading:

- (4) nan-nin-no kodomo-**demo** mendoo-o mite-ageru.
 what-CL-GEN child-DEMO care-ACC look-give
 ‘I will take care of any number of children.’

The indeterminates (wh-pronouns) are a topic of much discussion in the syntax and semantics literature, not only with respect to interrogative constructions but also with respect to polarity and free choice items (e.g. Haspelmath 1997).³ Especially, Japanese indeterminates in combination with *mo* have attracted much attention in the literature in relation to universal quantificational force (in an affirmative context) and the NPI (in a negative context) (e.g. Ohno 1989, Nishigauchi 1990, Shimoyama 2001, 2006, Watanabe 2004, among many others). Typically, sentences such as those in (4) are the object of investigation.

- (5) a. dono gakusei-mo ronbun-o kai-ta. (universal quantification)
 which student-MO paper-ACC write-PAST
 ‘Every student wrote a paper.’
 b. dare-mo ronbun-o kaka-nakat-ta. (NPI)
 who-MO paper-ACC write-NEG-PAST
 ‘Nobody wrote a paper.’

However, the construction to be examined in this paper is the construction in which *ka* and *mo* are directly postposed to an indeterminate NQ, i.e. phrases of the form of [WH-CL-KA] and [WH-CL-MO]. The interesting observation is that the former gives rise to an interpretation equivalent to English ‘some’, while the latter has a ‘many’ reading, as exemplified in (6)-(7):

- (6) a. nan-nin-ka-no gakusei-ga hashitta.
 what-CL-KA-GEN student-NOM ran
 b. gakusei-ga nan-nin-ka hashitta.
 student-NOM what-CL-KA ran
 ‘Some students ran.’
- (7) a. nan-nin-mo-no gakusei-ga hashitta.
 what-CL-MO-GEN student-NOM ran
 b. gakusei-ga nan-nin-mo hashitta.
 student-NOM what-CL-MO ran
 ‘Many students ran.’

In the literature, *ka* and *mo* are generally discussed in terms of existential and universal quantificational force, respectively (e.g. Hagstrom 1998, Shimoyama 2001, 2006, Yatsushiro 2009 among many others). However, its combination with an indeterminate NQ has not been carefully studied, especially the ‘some’ vs. ‘many’ reading contrast. In this paper, I discuss how these interpretations are derived from the semantic and pragmatic properties of the indeterminate NQ and the two particles.

2. Indeterminate NQ-ka

In this section, we discuss how the ‘some’ reading of an indeterminate NQ-*ka* can be derived. We approach the task with Hamblin’s (1973) semantics of interrogatives, Jayaseelan’s (2001) analysis

³ Haspelmath’s (1997) work is especially valuable for the typological study of these items across many languages.

of the question particle, and Shimoyama's (2006) direct restrictor analysis of the Japanese indeterminate phrase quantification. As has been suggested by several authors (e.g. Ota 1980, Jayaseelan 2001, 2004), it can be argued that the existential particle associated with an indeterminate pronoun, the question marker, and the disjunction particle have basically the same semantics. We will adopt this hypothesis.

2.1. Deriving the 'some' reading of indeterminate NQ-*ka*

First let us consider the case of *nan-nin-ka* 'some'. From this point on, for brevity, we will focus on the floating NQ construction.⁴ Compare (1b) and (6b), repeated here:

- (1) b. *gakusei-ga san-nin hashitta.*
 student-NOM 3-CL ran
 'Three students ran.'
- (6) b. *gakusei-ga nan-nin-ka hashitta.*
 student-NOM what-CL-KA ran
 'Some students ran.'

The NQ in (1b), namely *san-nin* '3-CL', is replaced in (6b) with *nan-nin-ka* 'what-CL-KA'. This yields the interpretation contrast between 'three people' and 'some people'.⁵ Note that the former consists of two parts; namely, a numeral and a classifier. In contrast, the latter consists of three parts; an indeterminate pronoun, a classifier, and the particle *ka*. However, more precisely, we assume that the numeral and the classifier syntactically combine with each other to form a single unit (e.g. Miyagawa 1989, Kobuchi-Philip 2007a) and *ka* is then attached to the NQ as a whole, as shown in (8).⁶ Furthermore, from the data in (1) and (6), we assume the source of the quantificational meaning as shown in (9):

- (8) a. [*san -nin*]
 3 CL
 b. [[*nan -nin*] -*ka*]
 what CL KA
- (9) a. *san* '3' → 'three'
 b. *nani* 'what' + *ka* 'KA' → 'some'

Obviously, the issue here is what the precise logic behind this is.

The presence of *ka* in association with an indeterminate NQ is quite significant. Observe that a sentence in which an indeterminate NQ is not supported by any quantificational particle is dismally uninterpretable:⁷

- (10) # *gakusei-ga nan-nin hashitta.* (as a declarative sentence)
 student-NOM what-CL ran
 (lit.) 'How many students ran.'

Although the sentence in (10) is uninterpretable, it is not, strictly speaking, 'ungrammatical' in the sense that such a sentence form is unproducible, as the sentence would be perfectly grammatical

⁴ Strictly speaking, sentences with a prenominal NQ and sentences with a floating NQ have slightly different interpretations. Readers are referred to e.g. Kobuchi-Philip (2007b) and Nakanishi (2007b) for the precise differences. The most prominent semantic difference between the two types of NQ sentence is that the floating NQ sentence systematically yields a distributive interpretation, while this is not the case for the prenominal NQ sentence. However, such a difference is not especially relevant to the topic under discussion in this paper.

⁵ The classifier *nin* is designated for counting human individuals. Thus, a more literal translation of *san-nin-no gakusei* '3-CL-GEN student' would be something like 'three person-units of student'.

⁶ The exact syntactic category of *nan-nin* and *nan-nin-ka* is not crucial here, though the former could be categorized as Classifier Phrase and the latter as QP. In this paper I will simply call the former an 'NQ' and the latter a '*ka*-phrase' (or '*mo*-phrase' for the constituent with *mo* instead of *ka*).

⁷ The sentence in (10) is well-formed if and only if the sentence is meant to be a question. In that case either there is a covert *ka* as a sentence-final particle, or interrogative mood is prosodically expressed with a rising pitch at the end of the sentence (at the point of /*ta*/ in 10).

only if the indeterminate NQ *nan-nin* were replaced with a ‘specific’ NQ such as *san-nin* ‘3-CL’, as we have seen in (1) above.⁸

In order to examine the logic of an indeterminate NQ-*ka*, let us then first consider the semantics of a specific NQ such as *san-nin* ‘3-CL’. It is not difficult to hypothesize that the quantificational force of such an NQ lies in the numeral itself. Note that a classifier is generally understood as a ‘unit’ for counting the relevant objects, i.e. as an individualizer (e.g. Downing 1996, Chierchia 1998a, b, and many others, also see FN5). Traditionally, in the syntax literature, the classifier in Japanese has often been taken to be a syntactic agreement morpheme, agreeing with an NP in the same sentence (‘host NP’ as termed by Hasegawa 1991) (e.g. Kitahara 1992). Consequently, the semantics of the classifier has been neglected for a long time. However, focusing on the semantic significance of the numeral and the classifier and the distinctness of the two, Kobuchi-Philip (2003, 2007b) formally characterizes the separate semantics of the numeral and the classifier. Below are the formal denotations of an example of a numeral (*san* ‘3’), an example of a classifier (*nin* ‘CL_{person}’), and the composition of the two, suggested in Kobuchi-Philip (2007b):

- (11) a. Numeral
san ‘3’: $\lambda C_{\langle e,t \rangle} \lambda P_{\langle e,t \rangle} \lambda x_e \exists K [(K \subseteq (C \cap P)) \wedge (|K|=3) \wedge (\oplus K \Pi x)]$
 where C = classifier and P = predicate
- b. (Object) Classifier
nin ‘CL_{person}’: $\lambda x_e [NIN_{AT}(x)] =_{abbr.} NIN_{AT}$
- c. NQ (=Numeral+Classifier):
san-nin ‘3 people’: $\lambda P \lambda x \exists K [(K \subseteq (NIN_{AT} \cap P)) \wedge (|K|=3) \wedge (\oplus K \Pi x)]$
 where AT=atom; \oplus = sum; Π =part-of (as in Link 1983)

Details aside, an NQ such as *san-nin* ‘3-CL_{person}’ syntactically occurs either in the nominal domain or in the verbal domain, as we have seen in (1). Thus, an NQ is a modifier that combines with an NP or a VP, just like an adjective or an adverb, respectively.⁹ Thus, an NQ in (11c) combines with an $\langle e,t \rangle$ element ‘P’. In the nominal domain this is an NP, and the outcome is a larger NP. On the other hand, in the verbal domain ‘P’ would be a VP, and the outcome a larger VP.

As can be seen here, the numeral quantificational force of *san-nin* ‘3-CL’ lies in the numeral. Adopting this analysis, since *nan-nin-ka* ‘what-CL-KA’ gives rise to the interpretation ‘some’, we might immediately come up with the following logical representation as the desired denotation of the indeterminate NQ-*ka*:

- (12) *nan-nin-ka* ‘some people’:
 $\lambda P \lambda x \exists K [(K \subseteq (NIN_{AT} \cap P)) \wedge (|K|=SOME) \wedge (\oplus K \Pi x)]$

As we have seen in (9b), somehow *nani* and *ka* together contribute to the part of the logical representation ‘ $|K|=SOME$ ’ in (12). How so? We now have to examine the semantics of the indeterminate pronoun *nani* ‘what’ and the particle *ka*.

Let us first consider the indeterminate pronoun *nani* ‘what’. According to Hamblin (1973), an interrogative lexical item, such as English *what* and *who*, denotes a set of (contextually salient) objects, making it roughly equivalent to the denotation of (*non-human*) *objects/things* and *human individuals*, respectively. Let us assume this here, and consider a specific case. Suppose we are talking about the transportation means from Utrecht to Amsterdam. If there are different means, as shown in (13a), *nani* ‘what’ in the question (13b) would denote a set of these alternatives, as shown in (13c):

- (13) a. Different means one can use to go from Utrecht to Amsterdam:
 train, bus, bicycle, ice-skates, boat, feet, horse, hot air balloon, dog sled
- b. *nan-de* Amsterdam-ni it-ta-ka.
 what-with Amsterdam-to go-PAST-KA
 ‘What did you go to Amsterdam with?’
- c. *nani*: { train, bus, bicycle, ice-skates, boat, feet, horse, hot air balloon, dog sled }

⁸ Here and throughout the paper, we will use the NQ with a specific numeral a ‘specific NQ’. This contrasts with an ‘indeterminate NQ’. We will not use a possible term ‘determinate NQ’ since it may possibly be confused with the concept of determiner.

⁹ Some linguists also have taken the numeral in languages such as English to be an adjectival element (Verkuyl 1981, Link 1983, Krifka 1999, among others).

Japanese *nani* ‘what’ has the general interpretation ‘things/objects’ found also in English *what*. However, when it occurs in an indeterminate NQ such as *nan-nin* ‘what-CL’, the things/objects interpretation of *nani* is irrelevant. *Nani* ‘what’ in an indeterminate NQ has nothing to do with any object, and only a numeral is licensed. Thus, we assume that the denotation of an indeterminate NQ is determined without the composition of the denotation of the indeterminate pronoun and the classifier, but rather as a single unit, as follows:

- (14) *nan-nin*: { hito-ri, futa-ri, san-nin, yo-nin, go-nin, . . . }
 what-CL_{person} 1-CL_{person} 2-CL_{person} 3-CL_{person} 4-CL_{person} 5-CL_{person}

This is a set of quantities of people. This implies that ‘|K|=SOME’-part in (12) is actually a set of quantities, as shown in (15):

- (15) { |K|=1, |K|=2, |K|=3, |K|=4, . . . }

Given such an open set, however, we cannot immediately arrive at the ‘some’ meaning. We have to find a way which turns the set (15) into ‘|K|=SOME’.

Intuitively, *some* in *some people* indicates the existence of people but the cardinality of these people is simply not specified. So, if there were a way to pick out one of the equation elements of the set in (15), but without specifying which one, that would correspond precisely to the meaning ‘some’. This mechanism of ‘picking-out-without-specifying-which-one’ can be attributed to *ka*.

It may be noticed that the disjunctive *or* in English has precisely the same function. For example, when a speaker utters a sentence such as *John or Mary ran*, he or she may be certain that one of the two alternatives ran but unable to specify which one. Japanese *ka* functions exactly the same way, as the meaning of the sentence (16a) can be represented as (16b) below:

- (16) a. [John-ka Mary]-ga hashitta.
 John-OR Mary-NOM ran
 ‘John or Mary ran.’
 b. R(jvm)
 c. { j, m } + v → jvm

As shown in (16b), *ka* can be considered the operator ‘v’. It takes a set of elements and produces a disjunction of elements, as shown in (16c). Now, the idea of connecting the disjunctive operator to the particle associated with an indeterminate pronoun was suggested by Jayaseelan (2001, 2004), and adopted for Korean by Gill, Harlow and Tsoulas (2004).¹⁰ Thus, adopting this analysis, we hypothesize that *ka* is a function which takes the set of alternatives (15) and outputs (17a), which we abbreviate as (17b):

- (17) a. (|K|=1)v(|K|=2)v(|K|=3)v(|K|=4)v . . .
 b. |K|=1v2v3v4v . . .

This is no longer a set. One alternative is singled out and its value is any one of the alternatives. Thus, the denotation of an indeterminate NQ-*ka* will be just like the denotation of a specific NQ, only its numeral value is nonspecific (or indeterminate), since the pick is not known. We know only that it is one of the alternatives, hence the ‘some’ reading.

More precisely, the interpretation of (6b) can be calculated as shown in (18). Here let us suppose for concreteness that the contextually relevant possible number of people is either 1, 2 or 3:

- (18) a. *sentence with syntax*
 [[∅ gakusei]_{DP}-ga [[nan-nin-ka]_{KaP} hashitta]_{VP}].
 student-NOM what-CL-KA ran
 ‘Some students ran.’
 b. *lexical entries*

¹⁰ Jayaseelan (2001, 2004) explores the question particle *-oo* in Malayalam, which is also used in association with an indeterminate phrase in the language. Jayaseelan discusses at the same time the cases of Korean *-na* and Japanese *-ka* as well, demonstrating similar patterns cross-linguistically.

gakusei (student):	$\lambda x [\text{STUDENT}(x)]$
∅ ‘a’:	$\lambda X_{\langle e,t \rangle} \lambda Y_{\langle e,t \rangle} \exists y [X(y) \wedge Y(y)]$
nan-nin-ka (some):	$\lambda P \lambda x \exists K [(K \subseteq (\text{NIN}_{\text{at}} \cap P)) \wedge (K =1 \vee 2 \vee 3) \wedge (\oplus K \Pi x)]$
hashitta (ran):	$\lambda x [\text{RAN}(x)]$
c. <i>result</i>	$\exists y [\text{STUDENT}(y) \wedge \exists K [(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (K =1 \vee 2 \vee 3) \wedge (\oplus K \Pi y)]]$

This analysis follows that of Kobuchi-Philip (2007b), in which the plurality theory of Link (1983) and Landman (2000) is assumed.¹¹ The logical representation in (18c) asserts that there is a set of people who ran, that the cardinality of this set of people is an ‘unknown specific’ positive integer n (=‘some’), and that the sum of these people is part of a (sum-) element in the denotation of the student. This captures the meaning of (18a), with the desired ‘some’ reading.¹²

We have just presented an analysis of the indeterminate NQ-*ka* that makes crucial use of the disjunction operator. A recent analysis of Japanese *ka* proposed in Yatsushiro (2009) uses a similar but distinct semantic device, namely the choice function (e.g. Reinhart 1997, Kratzer 1998). Specifically, Yatsushiro proposes that *ka* is a choice function variable, which is bound by an existential quantifier. The existential quantifier is provided by existential closure (Heim 1982), immediately above every node of type t (Reinhart 1997). Thus, this analysis implies that the quantificational interpretation of *ka* is completed at the sentential level (IP/TP, CP, vP), where an open variable is closed with an appropriate quantifier. Although this alternative analysis incorporates mechanisms that seem theoretically adequate, an empirical issue that immediately arises with respect to the sentence with an indeterminate NQ is that it is not clear how to distinguish the following two sentences:

- (2) a. nan-nin-no gakusei-ga hashit-ta-ka. (‘how-many’ question)
 what-CL-GEN student-NOM run-PAST-KA
 ‘How many students ran?’
- (6) a. nan-nin-ka-no gakusei-ga hashit-ta. (declarative sentence)
 what-CL-KA-GEN student-NOM run-PAST
 ‘Some students ran.’

If it is assumed (plausibly) that the *ka* associated with an indeterminate and sentence-final particle *ka* are the same grammatical morpheme, then, given that *ka* is bound by an existential quantifier at the sentential level, the prediction seems to be that these two sentences will have the same interpretation, contrary to fact. Since Yatsushiro discusses neither the indeterminate NQ nor the question sentence, we cannot say how serious a problem this is for her choice function analysis. However, at least the analysis presented here can account for the distinct interpretations of these two sentence types in a very straightforward manner, using the same semantics of *ka* for the question. This is the topic of the next subsection.

2.2. A unified analysis of *ka*

In the previous subsection, we concentrated on how to derive the ‘some’ reading of indeterminate NQ-*ka*. We treated *ka* as a disjunction operator which applies to a set of elements and outputs a disjunction of these elements.¹³ In this section, we show that another instance of *ka*, namely *ka* as a question particle in sentence-final position, can be analyzed as a disjunction operator as well. As noted earlier, this idea has been in the literature for quite some time (e.g. Ota 1980, Jayaseelan

¹¹ In addition, the presence of a phonetically null determiner equivalent to English indefinite article *a* is assumed. The principal justification for this assumption is, briefly, that it makes possible a simple account of the definite/indefinite and singular/plural ambiguities of Japanese bare nominal (see Kobuchi-Philip 2006 for its details).

¹² The expression “unknown specific” is borrowed from Haspelmath (1997).

¹³ Of course, *ka* has selectional restrictions. It cannot combine with any linguistic element which denotes a set of elements. For example, assuming a common noun such as *neko* ‘cat’ denotes a set of cats, it cannot combine with *ka* to yield a disjunction of individual cats. Jayaseelan (2001) specifically suggests the following condition:

(i) A conjunction/disjunction operator can be applied to a focused variable in its domain by association with focus; it then interprets the variable as an infinite conjunction/disjunction. (Jayaseelan 2001; 84)

This is in particular applicable to the indeterminate pronouns, which accords with the semanticists’ intuition that wh-elements are focus elements.

2001, 2004). However, here we will show specifically how the interpretation of the sentence with an indeterminate NQ can adequately be derived, with and without sentence-final *ka*.

Consider the paradigmatic data in (19):

- (19) a. #gakusei-ga nan-nin hashitta. (=10)
 student-NOM what-CL ran
 (uninterpretable)
- b. gakusei-ga nan-nin-ka hashitta. (=6b)
 student-NOM what-CL-KA ran
 ‘Some students ran.’
- c. gakusei-ga nan-nin hashitta-ka. (=2b)
 student-NOM what-CL ran-KA
 ‘How many students ran?’
- d. gakusei-ga nan-nin-ka hashitta-ka.
 student-NOM what-CL-KA ran-KA
 ‘Did some students run?’

In (19a), there is an indeterminate NQ and yet no *ka* is involved. As we have discussed, this sentence is ill-formed and uninterpretable. Sentences in (19b-d) are all well-formed. (19b) is the sentence with an indeterminate NQ-*ka*, which we analyzed in (18). This is a declarative sentence, giving rise to the ‘some’ reading. In (19c), there is a single occurrence of *ka*, as a sentence-final particle. This sentence is a ‘how-many’ question sentence. Finally, in (19d), there are two occurrences of *ka*, one associated with the indeterminate NQ and the other as a sentence-final particle. (19d) maintains the ‘some’ reading of the indeterminate NQ-*ka*. In addition, it is a yes-no question. Obviously, the position and number of the occurrences of *ka* have quite significant semantic effects. How can we account for the interpretations of all these sentences?

Let us step back for a moment and consider simpler question sentences. There are three types of simple direct questions: (i) yes-no questions, (ii) either-or questions, and (iii) wh questions:

- (20) a. Did Fred come to the party? (yes-no question)
 b. Is Joe an American or a Canadian? (either-or question)
 c. What is Sue drinking? (wh question)

In Japanese, a direct question is systematically associated with a sentence-final particle *ka*. Thus, the three types of questions in (20) can be translated into Japanese as follows:

- (21) a. Fred-wa party-ni kita-ka. (yes-no question)
 Fred-TOP party-to came-KA
 ‘Did Fred come to the party?’
- b. Joe-wa amerikajin-ka, kanadajin-ka. (either-or question)
 Joe-TOP American-KA Canadian-KA
 ‘Is Joe an American or a Canadian?’
- c. Sue-wa nani-o nondeiru-ka. (wh question)
 Sue-TOP what-ACC drink-PROG-KA
 ‘What is Sue drinking?’

Following Karttunen (1977), we assume that direct questions belong to a subclass of indirect questions. In English, an indirect question sentence has a question clause headed by some question word (*if, whether, who, what, etc.*), with a matrix part containing a verb which selects a question clause complement. Semantically, a direct question differs from an indirect question only in that it lacks the matrix part. The pragmatic difference is that it is typically a request for the truth regarding the issue the speaker is concerned about. Observe that a direct question is always paraphrasable with an indirect question:

- (22) As a paraphrase of (20a, b, c)
- a. I would like to ask you (to tell me) if Fred came to the party.
 b. I would like to ask you (to tell me) whether Joe is an American or a Canadian.
 c. I would like to ask you (to tell me) what Sue is drinking.

Now, as Hamblin (1973) and Karttunen (1977) note, the denotation of a question sentence is a set of propositions, specifically the possible/true answer sentences. Thus, the question sentences in (20) can be considered the set of possible answers (in the context) as follows:

- (23) a. {Fred came to the party. Fred didn't come to the party.}
 b. {Joe is an American. Joe is a Canadian.}
 c. {Sue is drinking a Bloody Mary. Sue is drinking a Dry Manhattan.
 Sue is drinking a Moscow Mule.}

The possible answers are declarative sentences. For a yes-no question, the possible answers are: (i) the declarative sentence transformationally relatable to the question and (ii) its negation. For an either-or question, the possible answers are the declarative sentences derivable from the question sentence using each alternative in the disjunctive phrase. Finally, for a wh-question, the possible answers are declarative sentences substituting in each alternative denoted by the indeterminate.

To be specific, Hamblin (1973) states that a question denotes a set of propositions, and notes that the "question sets up a choice-situation between a set of propositions..." (Hamblin 1973; 48). Karttunen (1977) adopts Hamblin's idea, but explicates the notion of a 'choice-situation' by conjoining the alternative propositions with disjunction operators. Now, from the point of view of set theory, a set of propositions and a disjunction of propositions are virtually equivalent: If one of the set of propositions is true, the disjunction of propositions is true, and if none of the set of propositions are true, the disjunction of propositions is not true. However, if these two things are exactly equal, an indeterminate would denote a disjunction of alternatives. If so, an indeterminate with *mo*, in which *mo* is a universal quantifier (as we will see in the next section), would be a disjunction and a conjunction at the same time, leading to an illogical state of affairs. Therefore, in this paper we treat a set of propositions and a disjunction of them as distinct semantic entities. A set of propositions is just a set, and the relationship between the propositions is not determined. In contrast, a disjunction of propositions is a string of propositions and the propositions are related to each other by the disjunction relation.

However, a string of propositions conjoined with disjunction operators does not fully explain the 'choice-situation' either. As we mentioned earlier, a question is a 'request' that the listener communicate a true proposition. Given a set of alternative propositions, a direct question explicitly marks this request. For this reason, we may assume that a direct question is associated with a covert CHOOSE command as the outermost element of a direct question sentence, as follows:

- (24) [CHOOSE [P-*ka*]] (where P represents a proposition)

Now, assuming that the function of *ka* is to connect the alternatives with disjunction operators, [[P]-*ka*] yields a disjunction of propositions. For example, English (20) and its Japanese equivalent (21) would be represented as follows:

- (25) a. CHOOSE [(Fred came to the party.) ∨ (Fred didn't come to the party.)]
 b. CHOOSE [(Joe is an American.) ∨ (Joe is a Canadian.)]
 c. CHOOSE [(Sue is drinking a Bloody Mary.) ∨ (Sue is drinking
 a Dry Manhattan.) ∨ (Sue is drinking a Moscow Mule.)]

We suggest here that the CHOOSE command is associated only with the sentence-final *ka*, as a sentence with a sentence-final *ka* lacks an overt matrix verb. That is, if *ka* is embedded inside the sentence, the CHOOSE function is suppressed. This is crucially important to distinguish a declarative sentence with an embedded *ka* from a question sentence with the sentence-final *ka*.

Now we are ready to consider the sentences in (19), repeated here.

- (19) a. # *gakusei-ga nan-nin hashitta.* (=10)
 student-NOM what-CL ran
 (uninterpretable)
 b. *gakusei-ga nan-nin-ka hashitta.* (=6b)
 student-NOM what-CL-KA ran
 'Some students ran.'
 c. *gakusei-ga nan-nin hashitta-ka.* (=2b)
 student-NOM what-CL ran-KA
 'How many students ran?'

- d. gakusei-ga nan-nin-ka hashitta-ka.
 student-NOM what-CL-KA ran-KA
 ‘Did some students run?’

As we saw in the previous section, the meaning of (19b) can be represented as follows:

$$(18) \quad c \quad \exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1 \vee 2 \vee 3) \wedge (\oplus K \Pi y)]]$$

In (19b), *ka* is associated with the indeterminate NQ. Thus, its function is limited to producing a string of numerical alternatives. As discussed above, this sentence as a whole is a declarative sentence with a ‘some’ reading.

Now, consider (19d). This is (19b) plus a sentence-final *ka*. Since (19b) is a declarative sentence (‘Some students ran’), adding *ka* to this will produce two alternative propositions, namely, (18c) and its negation. In addition, since this is a direct question with a declarative sentence, the CHOOSE command would be employed. Therefore, the meaning of (19d) can be logically represented as follows:

$$(26) \quad \text{CHOOSE} \\
 [\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1 \vee 2 \vee 3) \wedge (\oplus K \Pi y)]] \vee \\
 \neg [\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1 \vee 2 \vee 3) \wedge (\oplus K \Pi y)]]]]$$

Informally, this is a request that the listener say whether some students ran or not. It is a yes-no question.

Next, consider (19a). This sentence has an indeterminate NQ, but there is no *ka* involved. As is, the indeterminate NQ is a set of alternatives and hence, the sentence is a set of alternative propositions. This may be represented as follows:

$$(27) \quad \{\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1) \wedge (\oplus K \Pi y)]], \\
 \exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=2) \wedge (\oplus K \Pi y)]], \\
 \exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=3) \wedge (\oplus K \Pi y)]\}$$

There is no *ka*, so these propositions are not connected with disjunction operators. What can we do with such a set of propositions? Without *ka*, there is no CHOOSE command either. Thus, there is no instruction as to what to do with the open set of propositions. We suggest that this is why (19a) is uninterpretable.

Here it is perhaps a good time to make a comment regarding the significance of the overt presence of disjunction operators. If, taking Hamblin’s proposal literally, a question denotes a set of propositions, rather than a disjunction of propositions, the Japanese sentence in (19a) should be interpretable as a question, since it does yield a set of propositions as shown in (27). However, empirically this is not the case. It might be countered that the reason why (19a) is ill-formed is simply because the CHOOSE command cannot be expressed, since *ka* is missing. However, if *ka* is directly identified as the CHOOSE function itself, a sentence with an embedded *ka* such as (19b) would be a how-many question as well, contrary to fact. Thus, it seems simpler to treat *ka* as a disjunction operator. In this case, the uninterpretability of (19a) is attributed to the absence of the disjunction operator.

Finally, consider (19c). In this sentence, *ka* occurs just once as a sentence-final particle. That is, (19c) is (19a) plus a sentence-final *ka*. As we have just discussed, (19a) denotes the set of propositions in (27). This alone is not interpretable. However, thanks to *ka*, (26) becomes a disjunction of alternative propositions, as shown in (28a):

$$(28) \quad a. \quad [\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1) \wedge (\oplus K \Pi y)]] \vee \\
 \exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=2) \wedge (\oplus K \Pi y)]] \vee \\
 \exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=3) \wedge (\oplus K \Pi y)]]] \\
 b. \quad p \vee q \vee r.$$

As given, (28a) is not a question yet, since it is a statement of the form shown in (28b). However, the sentence final *ka* brings in the CHOOSE command. Thus, the outcome is what is represented in (29a), which can be informally paraphrased as in (29b):

$$(29) \quad a. \quad \text{CHOOSE} \\
 [\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1) \wedge (\oplus K \Pi y)]] \vee$$

- $$\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=2) \wedge (\oplus K \Pi y)]] \vee$$
- $$\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=3) \wedge (\oplus K \Pi y)]]$$
- b. ‘Tell me which of the followings is true; one student ran, or two students ran, or three students ran.’

This is a how-many question.

The analysis we just presented is informal as is, and a more rigorous formalization of the analysis is desired. While we postpone this job for another occasion, it seems to derive the desired interpretation of each type of sentence quite straightforwardly, without any extra stipulations. The analysis is also free from the potential problem we mentioned with respect to Yatsushiro’s analysis.¹⁴

3. Indeterminate NQ-mo

Let us now turn to the indeterminate NQ-*mo* such as *nan-nin-mo* ‘what-CL-MO’, which gives rise to the ‘many’ reading. The mechanism of this phrase, giving rise to the ‘many’ reading, turns out to be pragmatic rather than semantic, unlike the indeterminate NQ-*ka* we have seen in the previous section.

3.1. Semantics of indeterminate phrase quantification

Let us now consider sentences with an indeterminate NQ-*mo* in comparison with sentences with a specific NQ. Consider again (1b) and (7b):

- (1) b. *gakusei-ga san-nin hashitta.*
student-NOM 3-CL ran.
‘Three students ran.’
- (7) b. *gakusei-ga nan-nin-mo hashitta.*
student-NOM what-CL-MO ran.
‘Many students ran.’

The quantificational part in (1b), namely *san-nin* ‘3-CL’, is replaced in (7b) with *nan-nin-mo* ‘what-CL-MO’, and this causes the interpretations of the sentences to differ with respect to their quantificational components (‘three people’ vs. ‘many people’). In the previous section, we discussed the case of the indeterminate NQ-*ka*, which yielded a ‘some’ reading. The question before us now is how to derive the ‘many’ reading of (7b).

¹⁴ If the analysis suggested here is on the right track, *ka* is locally calculated, unlike Yatsushiro’s (2009) analysis in which *ka* is a choice function variable which is bound by an existential quantifier at the sentential level. This distant binding in Yatsushiro’s analysis is motivated by an empirical observation. The sentence in (i) is interpreted with *dare-ka* ‘someone’ as a specific person, i.e. taking scope wider than ‘every bag’.

(i) *dare-ka-no dono kaban-mo tsukue-no ue-ni aru.*
who-KA-GEN which bag-MO desk-GEN top-on exist
‘Someone’s every bag is on the desk.’

Assuming [*dare-ka-no dono kaban*] forms a syntactic constituent, the quantifier *mo* binds *dare-ka*, and the scope relation should be every > some, contrary to fact. Thus, in order to obtain the desired some > every scope order, Yatsushiro proposes an analysis in which the existential quantifier is outside the scope of *mo*. Of course, if *ka* is a local operation as we propose, this fact can pose a problem. However, this can be handled by hypothesizing a different syntactic structure. Suppose the syntactic structure of [*dare-ka-no dono kaban*] as shown in (iii), unlike Yatsushiro’s (ii):

(ii) [[[[*dare-ka-no*]_{DP} [*dono kaban*]_N]_{NP}]_{DP} *mo*]_{MoP} (Yatsushiro 2009; 149)

(iii) [_{DP} [_{FP} [*dare-ka-no*]_{PrepP} [_{XP} [[*dono kaban*]_{NP} *mo*]_{MoP} t X]_{XP} F]_{FP} D]_{DP}

Here, we hypothesize that *dono kaban-mo* ‘every bag’ and *dare-ka-no* ‘someone’s’ form the subject-predicate relation of a small clause XP (*dono kaban-mo-ga dare-ka-no-da*. ‘Every bag is someone’s’ in which *dare-ka* ‘someone’ is a specific person), and the predicate *dare-ka-no* ‘someone’s’ is inverted over the subject, landing in the spec FP position, to form a nominal constituent *dare-ka-no dono kaban-mo*. This is inspired by the so-called ‘predicate inversion hypothesis’ advocated by Kayne (1994), Den Dikken (1995, 1998), Corver (1998), and others. If we assume such a syntactic structure, *dare-ka* ‘someone’ is not in the scope of *mo* and the problem Yatsushiro tries to solve does not arise in the first place. In such a structure, *mo* only takes scope over the indeterminate NP *dono kaban* ‘which bag’. This analysis also fits better with the indeterminate phrase quantificational analysis of *mo* by Shimoyama’s (2001, 2006).

Since indeterminate NQ-*mo* involves an indeterminate pronoun and *mo*, we need an account of the semantics of such a construction. A proposal currently influential is Shimoyama's (2001, 2006) 'direct restrictor' analysis of the indeterminate phrase quantification. This approach is significantly superior to previous accounts of the indeterminate phrase quantification in Japanese (e.g. Ohno 1989, Nishigauchi 1990, Hagstrom 1998, among others), since it provides a straightforward syntax-semantics correspondence, without positing ad hoc devices such as covert quantifier movement, even for sentences with deeply embedded indeterminates. Following the previous authors, Shimoyama does assume that *mo* is a universal quantificational determiner, just like English *every*. The definition of *mo* under Shimoyama's analysis is given in (30):

$$(30) \quad MO = \lambda P \lambda Q \forall x [P(x) \rightarrow Q(x)], \text{ where } x \in D_{\tau}, \text{ and } P, Q \in D_{\langle \tau, t \rangle}, \\ \text{where } \tau \text{ is a variable ranging over any semantic type.}$$

Under the analysis in (30), the *mo*-phrase consisting of *mo* and an NP would be a DP, i.e. a generalized quantifier (Barwise and Cooper 1981), of type $\langle \langle e, t \rangle, t \rangle$. Note that this poses a problem since a sentence with a *mo*-phrase can also contain a subject or an object separate from the *mo*-phrase (e.g. Aoyagi 1994), as shown in (31):

- (31) a. *gakusei-ga dono hito-mo odot-ta.*
 student-NOM which-person-MO danced
 'Every student danced.'
- b. *John-ga gakusei-o dono hito-mo home-ta.*
 John-NOM student-ACC which person-MO praise-PAST
 'John praised every student.'

Assuming that a sentence can have only one logical subject or object (e.g. Heycock 1993), the *mo*-phrase in such a sentence cannot be a DP. Thus, treating a *mo*-phrase as an adjunct instead, Kobuchi-Philip (2009) suggests the following modification of Shimoyama's proposal, taking the semantics of *mo* which combines with a nominal element to be as shown in (32):¹⁵

$$(32) \quad MO = \lambda P \langle e, t \rangle \lambda R \langle e, t \rangle \lambda x e [(AT(\oplus P) \subset AT(x)) \\ \wedge (AT(\oplus P) \subset R) \\ \wedge ((AT(x) - AT(\oplus P)) \cap R \neq \emptyset)]$$

Under this analysis, *mo* does have universal quantificational force, only it is represented by subset relations. Generally, a sentence with an indeterminate and *mo* receives a universal quantificational reading. Thus, associating the universal quantificational force with *mo* is a reasonable assumption. Now, exactly how does this analysis of *mo* help us account for its 'many' reading?

Let us assume that, just like the indeterminate NQ-*ka*, the syntactic structure of the indeterminate NQ-*mo* is as follows:

$$(33) \quad [[\text{nan} \text{ -nin}] \text{ -mo}] \\ \text{what CL MO}$$

Maintaining the same semantic assumptions as before, the indeterminate NQ *nan-nin* 'what-CL_{person}' denotes a set of quantities of people, as shown in (14), repeated here:

$$(14) \quad \text{nan-nin: } \{ \text{hito-ri, futa-ri, san-nin, yo-nin, go-nin, } \dots \} \\ \text{what-CL}_{\text{person}} \quad 1\text{-CL}_{\text{person}} \quad 2\text{-CL}_{\text{person}} \quad 3\text{-CL}_{\text{person}} \quad 4\text{-CL}_{\text{person}} \quad 5\text{-CL}_{\text{person}}$$

Thus, what is required here is a means for *mo* to semantically combine with (14). Note that if *mo* combines with an NP such as *dono hito* 'which person', and if there are three people in the context, say, John, Mary and Tom, as shown in (34a), then universality results as the sum of the three members, as shown in (34b):

- (34) a. *dono hito* 'which person': j, m, t
 b. *dono hito-mo* 'every one': $j \oplus m \oplus t$

¹⁵ Japanese is a null argument language. Thus, it is often the case that the subject or object of a sentence containing a *mo*-phrase is absent.

However, since (14) is a set of various quantities of people, its combination with *mo* outputs the sum of these elements, as follows:

- (35) *nan-nin-mo*: hito-ri ⊕ futa-ri ⊕ san-nin ⊕ yo-nin ⊕ . . .
 what-CL_{person} 1-CL_{person} 2-CL_{person} 3-CL_{person} 4-CL_{person}

What does this do? If we take (35) literally, it means something like ‘one person, as well as two people, as well as three, as well as four, . . . etc.’ modulo relevance in the context. Now, if the numeral is assigned the ‘exact-n’ meaning, (7b) will end up meaning the following: Exactly one student ran, and exactly two students ran, and exactly three students ran, and . . . Obviously, this is dismally contradictory. If instead the numeral is assigned the ‘at least-n’ meaning, (7b) will mean the following: At least one student ran, and at least two students ran, and at least three students ran, and . . . Now, this ends up meaning all the people ran, since (35) exhausts the number of students in the context. That is, if the numeral is construed as having an ‘at least-n’ meaning, (7b) is well-formed and it entails a universal quantificational interpretation. However, in fact (7b) is not interpreted this way. Thus, our semantic approach does not seem to be able to capture the meaning of (7b).

Fortunately, there is a way out. As has been discussed in the literature, Japanese *mo* triggers a presupposition just like English *even*. Furthermore, *mo* combined with an NQ gives rise to a pragmatically significant interpretation, precisely influenced by the presuppositional effect of *mo*. In the next subsection we discuss this topic.

3.2. Pragmatics of indeterminate NQ-*mo*

In the literature, it has often been noted that Japanese *mo* functions pragmatically as a presupposition trigger (Kato 1985, Shudo 2002, Nakanishi 2007a, Kobuchi-Philip 2008b), in a manner comparable to the pragmatics of English *even* (Karttunen and Peters 1979). To see the similarity of English *even* and Japanese *mo*, consider the data in (36):

- (36) a. Even John_F came to the party.
 b. John_F-*mo* party-ni kita.
 John-MO party-to came
 ‘Even John_F came to the party.’

In (36a), *John* is focused (in speech, usually contrastively stressed) and, though the sentence is truth-conditionally identical with the same sentence without *even*, (36a) gives rise to a pragmatically significant interpretation. It signals the (speaker’s) presupposition that John is one of the most unlikely people to come to the party. The Japanese sentence in (36b) is parallel to English (36a) and *mo* has exactly the same function as *even* (though *mo* and *even* differ in their morphological/syntactic properties).

When *mo* directly combines with a specific NQ, the prominent semantic property of *mo*, i.e. that of universality, magically disappears. Instead, only the presuppositional property is manifested. Observe below the sentences with a specific NQ, with and without *mo*:

- (37) *gakusei-ga* 20-nin hashitta.
 student-NOM 20-CL ran.
 ‘20 students ran.’
- (38) *gakusei-ga* 20-nin-*mo* hashit-ta.
 student-NOM 20-CL-MO run-PAST
 ‘As many as 20 students ran.’

The truth-conditions of (37) and (38) are the same; twenty students ran. However, in (38), a presupposition is signaled, as indicated by the English gloss. That is, *20-nin-mo* in (38) signals that the speaker regards ‘20’ as greater than expected.¹⁶ The observation that the ‘less-likely’

¹⁶ The focus particle *shika* is employed when the speaker’s presupposition is that 20 is smaller than expected, as illustrated in (i):

(i) *gakusei-ga* 20-nin-*shika* hashira-na-katta.
 student-NOM 20-CL-SHIKA run-NEG-PAST

presupposition of *mo* transforms into a ‘greater-than-expected’ presupposition in the case of a numeral is due to the logic of the entailment scale (Nakanishi 2007a, Kobuchi-Philip 2008b).¹⁷

Returning to the indeterminate NQ-*mo*, what we propose is that this pragmatic function is directly causing the ‘many’ reading. Let us look at the sentence again:

- (7) b. *gakusei-ga nan-nin-mo hashitta.*
 student-NOM what-CL-MO ran.
 ‘Many students ran.’

Assuming it is the same as proposed above, the denotation of the indeterminate NQ *nan-nin* ‘what-CL’ would be a set of quantities of people, as we saw in (14), repeated again here:

- (14) *nan-nin*: { *hito-ri, futa-ri, san-nin, yo-nin, go-nin, . . .* }
 what-CL_{person} 1-CL_{person} 2-CL_{person} 3-CL_{person} 4-CL_{person} 5-CL_{person}

Recall that this yielded uninterpretability in the case of the sentence in (10), repeated here:

- (10) # *gakusei-ga nan-nin hashitta.* (as a declarative sentence)
 student-NOM what-CL ran

The reason for the uninterpretability, we claimed, was the circumstance that such a sentence produced only a set of propositions as follows:

- (27) The logical representation produced by (10):
 $\{\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=1) \wedge (\oplus K \Pi y)],$
 $\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=2) \wedge (\oplus K \Pi y)],$
 $\exists y[\text{STUDENT}(y) \wedge \exists K[(K \subseteq (\text{NIN}_{\text{at}} \cap \text{RAN})) \wedge (|K|=3) \wedge (\oplus K \Pi y)]\}$

Thus, there really are two questions: (i) how does *mo* prevent (7b) from being uninterpretable, and (ii) how does it yield a ‘many’ reading? These two questions can perhaps be answered in a simple shot: the ‘higher number than expected’ presupposition of *mo* provides the quasi-quantificational force ‘many’. That is, whatever number is chosen, the speaker considers this more than expected, which is tantamount to ‘many’.¹⁸ Since this is not part of the quantificational (formal semantic) part of the sentence but pragmatic part of the meaning, we might represent the interpretation of (7b) as follows:

- (39) Semantics of (7b): #
 Pragmatics of *mo*: the number of the running students is ‘many’.

In this way, the presupposition of *mo* saves the sentence in (7b), transforming it into a well-formed, interpretable, sentence.

4. Summary

In this paper, we discussed the peculiar interpretation of sentences with an indeterminate NQ that is directly associated with *ka* and *mo*. The sentence with an indeterminate NQ-*ka* gives rise to a ‘some’ reading, while the sentence with an indeterminate NQ-*mo* gives rise to a ‘many’ reading.

Following Jayaseelan (2001, 2004), we analyzed Japanese *ka* as a disjunction operator. This generally combines with a linguistic element that denotes a set of elements and outputs a

‘Only 20 students ran.’

Shika has been much discussed in the literature, as it has a number of intriguing properties, the most prominent of which being that it appears to be an NPI. For a recent discussion, see Kobuchi-Philip (to appear).

¹⁷ In English, *even* does not seem to regularly combine with a numeral to express the ‘greater than expected’ presupposition, as shown in (i), and often the expression such as *as many as* seems more explicit and clearer for that meaning, as shown in (ii).

(i) (?) Even twenty students ran.
 (ii) As many as twenty students ran.

¹⁸ *Many* is context-dependent to begin with (Westerståhl 1985). In addition, in the current discussion, whatever the actual number of the running students, the ‘many’ judgment is the speaker’s judgment.

string of all the elements of the set conjoined with disjunction operators (i.e. $avbvcvdv\dots$). In the case of an indeterminate NQ, this is a set of quantities of individuals, in accord with Hamblin's (1973) semantics of interrogatives. Thus, the outcome is 'one or two or three or . . . n pieces' (where 'pieces' represents the general meaning of a classifier). Specifically, it does not remain as a set. Since the disjunction operator removes the members from this set and puts them in disjunction, one of the quantities of individuals in this disjunction must be picked. Thus, we have a specific, but unknown, number of pieces, hence the 'some' reading.

In the case of an indeterminate NQ-*mo*, truth-conditional mechanisms fail to yield the desired 'many' reading, since *mo* generally has universal quantificational force. If the usual semantics applied, then the outcome would be an 'all' reading, contrary to fact. We are led to the conclusion that a pragmatic mechanism yields the 'many' reading of an indeterminate NQ-*mo*. The mechanism in question is the fact that *mo* in Japanese signals a less-likelihood presupposition, comparable with English *even*. In the case of the NQ, this presupposition transforms into a 'greater than expected' presupposition, due to the logic of the entailment scale in the case of numerals. This saves the otherwise uninterpretable sentence with an indeterminate NQ. The sentence with an indeterminate NQ generates a set of propositions, and the sentence is uninterpretable as is. However, *mo* provides the value 'many' as the numerical value of the individuals at issue, providing a quasi-quantificational force. Thus, the semantically uninterpretable sentence is pragmatically saved, yielding the 'many' reading.

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