The Small Reading of the Scalar Particle *Mo* in Japanese and Negative Polarity*

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Abstract. The scalar particle *mo* in Japanese gives rise to ambiguity in negative contexts. In this paper we argue that the ambiguity cannot be accounted for as a scopal ambiguity, and propose a lexical ambiguity account. In particular, we observe that the distribution of the small reading of *mo* is limited to a subset of NPI licensing environments, and is sensitive to presuppositions, from which we conclude that *mo* in the small reading is a strong NPI.

Keywords: scalar particle, negative polarity, Japanese

1 Introduction

The Japanese focus particle *mo* can be interpreted as an additive or scalar particle. In this paper we are only concerned with the latter reading, which is particularly prominent when *mo* combines with numerals or other scalar expressions. For example, in (1), *mo* attaches to a scalar expression *100 yen* and generates a non-at-issue inference that 100 yen is a large amount of money for John to have in this context.

(1)   John-wa   100-en-mo   motteiru yo
          John-TOP 100-yen-MO have   PRT
          'John even has 100 yen'

  Interestingly with a clausemate negation, the sentence becomes ambiguous.[1]

(2)   John-wa   100-en-mo   mottei-nai yo
          John-TOP 100-yen-MO have-NEG PRT
          a.   'John does not have 100 yen, which is a large amount of money'
          b.   'John does not have 100 yen, which is a small amount of money'

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[1] English *even* seems to only allow the small reading in a similar context, unlike the Japanese (2) (but see [6]). We do not discuss this crosslinguistic difference here.

Although truth-conditionally equivalent, the two readings are clearly distinguished by the inferences they are associated with. From one reading (2a), it can be inferred that 100 yen is a large amount of money, just as in (1), while from the other reading (2b), one obtains the opposite inference that 100 yen is a small amount. We call these readings the *large* reading and the *small* reading of the scalar particle *mo*, respectively.[2]

One way to analyze the ambiguity in (2) is to analyze it as a scopal interaction between *mo* and the negation. However, as we will show below, this type of account faces empirical puzzles. Instead, we propose a lexical ambiguity account, postulating two distinct lexical items for *mo*. In particular, we maintain that the item responsible for the small reading is a strong Negative Polarity Item (NPI).

2   The Scope Theory

It is better on conceptual grounds to analyze the ambiguity of (2) with a single lexical entry for *mo* than with two. In this section, we examine this possibility, although as we will show in the following section, there are several empirical problems for this account.

The main idea is to analyze the ambiguity of (2) as a scopal ambiguity. The particular version of this idea that we consider here has two crucial assumptions, following the previous analyses of similar readings for English *even* (cf. [3], [6], [10]; see Section 6.2 for differences between Japanese and English). One is that numerals receive the so-called *at-least* readings, and are totally ordered by (generalized) entailment. Also they are assumed to be formal alternatives to each other, thus for any number n, the set of its alternatives $ALT(n)$ is the whole set of numbers.

Another crucial assumption is the semantics of *mo*, namely, it is assumed that *mo* itself undergoes Quantifier Raising (QR) and introduces a scalar presupposition at a propositional level. Specifically, $[\![mo_C]\!](p)$ asserts that p and presupposes that p is the least likely proposition in the alternative set C that is presupposed to contain p, and at least one more true alternative. Here C is assumed to be a contextually determined subset of the set of alternative propositions (cf. [7], [8]).

With this semantics, the scope theory explains the small reading of (1) with the following Logical Form (LF).[3]

(3) mo_C (not (John has 100 yen))
  a.   Assertion: It is not the case that John has 100 yen
  b.   Presupposition: (3a) is the least likely proposition among C

The assumption that numerals receive at-least readings plays a crucial role here. Because for all $n < 100$, the proposition that John does not have n yen entails

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[2] [6] discusses another type of large reading where the numeral takes scope over the negation, which is not easily available for (2) presumably because of the possessive construction. We will not discuss the wide scope large reading in this paper.

[3] The lexical items are partially converted to English for the readability's sake.

that John does not have 100 yen, if C contains any of those alternative propositions, it can never be the case that (3a) is the least likely among C (cf. [4], [6]). Therefore, C must be a subset of the following set that contains the proposition that John does not have 100 yen.

(4)   { John does not have 100 yen, John does not have 101 yen, John does not have 102 yen, ... }

In such a set C, 100 yen is a relatively small amount of money, and hence the inference that 100 yen is a small amount.

There is an alternative LF for (2) where the negation takes scope over *mo*, which accounts for the large reading.

(5)   not (mo_C (John has 100 yen))
  a.   Assertion: It is not the case that John has 100 yen
  b.   Presupposition: that John has 100 yen is the least likely proposition among C

By a similar reasoning as above, C must be a subset of the following set of alternatives that contains the proposition that John has 100 yen.

(6)   { John has 100 yen, John has 99 yen, John has 98 yen, ... }

In such a set, 100 yen is the largest amount of money, and therefore one obtains the inference that 100 yen is a large amount of money for John to have.

3   Three Problems of the Scope Theory

3.1   Problem 1: Other Scale Reversers

The scope theory predicts that when any Downward Entailing (DE) operator, not only negation, intervenes between *mo* and the numeral, the small reading will be generated. This is because DE operators (generally) reverse the entailment relation among the alternative propositions containing numerals (cf. [9]).

However, this prediction is not borne out. For example, *fewer than 10 students* is a DE operator and reverses the entailment, but does not give rise to the small reading. For instance (7) only has a large reading.

(7)   10-nin-miman-no   gakusei-ga 100-en-mo   motteiru
        10-CL-fewer.than-GEN student   100-yen-MO have
        'Fewer than 10 students have 100 yen, which is a large amount of money'

Under the scope theory, (7) is predicted to have a small reading with the following LF.

(8) mo_C (fewer than 10 students (have 100 yen))
  a.   Assertion: Fewer than 10 students have 100 yen
  b.   Presupposition: (8a) is the least likely proposition among C

In order for the presupposition to be true, C must be a subset of the following set of propositions, because for any n smaller than 100, the proposition that fewer than 10 students have n yen entails the assertion.

(9)   { fewer than 10 students have 100 yen, fewer than 10 students have 101 yen, fewer than 10 students have 102 yen, ... }

Thus it is predicted that (7) has a small reading, contrary to fact.

It is possible to save the scope theory by assuming that *mo* cannot QR above the subject in (7) for syntactic reasons, and hence the above LF is not syntactically wellformed. Thus we present below two more counterarguments against the scope theory.

3.2   Problem 2: Non-monotonic Numerals

According to the scope theory, when the alternatives in C do not stand in a total entailment relation, neither small nor large reading is forced. However, contrary to this prediction, the large reading is obligatory in such a case. For instance, (10) obligatorily implies that 100 yen is a large amount of money.[4]

(10)   John-wa   choodo 100-en-mo   motteiru yo
        John-TOP exactly 100-yen-MO have   YO
        'John has exactly 100 yen, which is a large amount of money'

Thus, it appears to be incorrect to derive the large reading by restricting the alternative propositions with their entailment relation.

Notice that a non-monotonic numeral with *mo* never gives rise to a small reading. For example, adding a negation to (10) does not result in an ambiguous sentence, and (11) is still obligatorily associated with the large inference.

(11)   John-wa   choodo 100-en-mo   motte-nai yo
        John-TOP exactly 100-yen-MO have-NEG YO
        'John does not have exactly 100 yen, which is a large amount of money'

Therefore, even if the scope theory could assign a large reading to (10) with an additional mechanism, (11) would remain as a problem as it would be predicted to have the small reading. In other words, these two sentences strongly suggest that the large and small readings are generated by distinct mechanisms.

3.3   Problem 3: Modified Monotonic Numerals

Thirdly, not all expressions whose alternatives stand in entailment relations give rise to the readings predicted by the scope theory. For example, the following sentence only has a large reading unlike the ambiguous (2).

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[4] This sentence allows for an additive reading as well in an appropriate context. This reading is disregarded here.

(12) John-wa   100-en-izyoo-mo   mottei-nai
      John-TOP 100-yen-at.least-MO have-NEG

 'It's not the case that John has at least 100 yen, which is a large amount
 of money'

The only difference between (2) and (12) is the modification by *izyoo* 'at least' on
the numeral. Under the scope theory, however, *100-en-izyoo* 'at least 100 yen' and
100-en '100 yen' are truth-conditionally equivalent, and furthermore it is natural
to assume that their alternatives are identical. Thus, the same ambiguity as (2)
is predicted for (12), contrary to fact. Notice that it is not possible to assume
under the scope theory that *100-en-izyoo* does not have alternatives altogether,
as they are required in deriving the large reading.

 Similarly, the scope theory wrongly predicts that the following sentence con-
taining *100-en-ika* 'at most 100 yen' has a small reading, but the sentence lacks
a felicitous reading.

(13) #John-wa   100-en-ika-mo   motteiru
      John-TOP 100-yen-at.most-MO have

The reason why the scope theory predicts a small reading for (13) is because
the proposition that John has at most 100 is presupposed to be the strongest
proposition in C, which therefore must be a subset of {that John has at most
100 yen, that John has at most 101 yen, that John has at most 102 yen, ... }.
From such an set of alternatives it can be inferred that *100-en-ika* 'at most 100
yen' is a relatively small amount. Incidentally, (13) remains infelicitous with a
clausemate sentential negation as shown in (14).

(14) #John-wa   100-en-ika-mo   mottei-nai
      John-TOP 100-yen-at.most-MO have-NEG

3.4   Interim Summary

The above three problems show that the scope theory of the ambiguity of (2)
overgenerates the small reading, and undergerates the large reading. Especially,
the differences between the large and small readings presented in the latter two
subsections are hard to capture with a single lexical entry for *mo*. For this reason,
we discard the scope theory and propose a lexical ambiguity account of (2).

 Then it is required to assume that *mo* in the small reading is a kind of NPI,
because it is unavailable in simple positive sentence such as (1). However, recall
that it is not licensed in all DE contexts, as we have seen in Section 3.1, and
therefore some more restrictions are needed. In the next section, we will look at
the distribution of the small reading in more detail, and claim that it is a strong
NPI.

4 Distribution of the Small Reading

In the present section, we closely examine the environments where the small reading of *mo* is licensed. We have already seen in Section 3.1 that the small reading is not licensed under all DE operators. What we will observe in this section is that the small reading of *mo* is licensed in a subset of NPI licensing contexts. In particular, we demonstrate that the licensing is sensitive to presuppositions.

4.1 Licensors of the Small Readings

The only licensor of the small reading we have looked at so far is clausemate sentential negation. In addition to this, antecedents of conditionals license the small reading, as demonstrated by (15).

(15) moshi 100-en-mo mottei-reba, potechi-o   ka-eru yo
      if   100-yen-MO have-if,   potato.chips-ACC buy-can PRT
      'If you have 100 yen, which is a small amount, you can buy potato chips'

Likewise, *maeni* 'before' is a licensor, as shown in (16).

(16) John-wa hito-ga   5-nin-mo kuru-maeni yoitsubureteshimatta
      John-TOP person-NOM 5-CL-MO come-before drank.oneself.to.sleep
      'John drank himself to sleep before 5 people came, which is not many'

In these cases, the large reading is very hard to get (but see below for exceptions).

   Furthermore, the small reading is licensed in embedded clauses if the embedding predicate is negative. Thus, (17a) is ambiguous, while its positive counterpart (17b) is not ambiguous.

(17)   a. Mary-wa John-ga   100-en-mo   motteiru to omotte-nai
           Mary-TOP John-NOM 100-yen-MO have   C think-NEG
           (i)   'Mary doesn't think that John has 100 yen, which is a small
                 amount of money'
           (ii) 'Mary doesn't think that John has 100 yen, which is a large
                 amount of money'
       b. Mary-wa John-ga   100-en-mo   motteiru to omotteiru.
           Mary-TOP John-NOM 100-yen-MO have   C think
           'Mary thinks that John has 100 yen, which is a large amount of
           money'

This means that licensing can cross a clause boundary. Furthermore, the small reading is possible in certain embedded questions under negative embedding verbs.

(18)   John-ga   100-en-mo   motteiru ka utagawashii/wakaranai/shiranai
       John-NOM 100-yen-MO have   Q doubtful/not.sure/not.know

'I doubt/am not sure/don't know if John has 100 yen, which is a small amount'

It should be mentioned here that questions themselves do not license the small reading, and hence (19) only has a large reading.

(19) John-wa   100-en-mo   motteiru no?
      John-TOP 100-yen-MO have   Q?
      'Does John have 100 yen, which is a large amount of money?'

Also embedded questions are not sufficient to license the small reading, and it is unavailable if the embedding predicate is positive, as shown below.

(20) a. John-ga   100-en-mo   motteiru ka Mary-wa   tazuneta
          John-NOM 100-yen-MO have   Q Mary-TOP asked
          'Mary asked if John has 100 yen, which is a large amount of money'
      b. John-ga   100-en-mo   motteiru ka Mary-wa   shiritagatteiru
          John-NOM 100-yen-MO have   Q Mary-TOP wonder
          'Mary wonders if John has 100 yen, which is a large amount of money'

Notice that an embedded question is known to be a non-monotonic context ([2]), and therefore is another potential problem for the scope theory.

   Also notice that weak NPIs in English (e.g. *ever*) are licensed in both matrix and embedded questions, as shown in (19) and (20) (cf. [2]).

(21) a. Has John ever been to Paris?
      b. Mary asked if John has ever been to Paris
      c. Mary wonders if John has ever been to Paris

Thus, the distribution of the small reading is narrower than that of weak NPIs. In the next subsection, we look at more contexts in which weak NPIs are licensed but the small reading is not. In particular, we observe that the licensing of the small reading is sensitive to presuppositions.

4.2 Disruption by Presupposition

Firstly, factive embedding predicates that license weak NPIs do not license the small reading. For example the sentences in (22) only have large readings.

(22) a. John-ga   100-en-mo   motteiru no-ga   shinji-rare-nai
          John-NOM 100-yen-MO have   NML-NOM believe-can-NEG
          'It is hard to believe the fact that John has 100 yen, which is a large amount'
      b. John-ga   100-en-mo   motteiru no-o   Mary-wa   shir-anai
          John-NOM 100-yen-MO have   NML-ACC Mary-TOP know-NEG
          'Mary does not know the fact that John has 100 yen, which is a large amount'

In contract, weak NPIs are perfectly fine in those factive complements (but see [5] for complications).

(23)   a.   It is hard to believe that John has ever been to Paris
        b.   Mary does not know that John has ever been to Paris

Similarly, the small reading is not licensed in the restrictor of a universally quantified noun phrase, which is associated with an existential presupposition.

(24)   100-en-mo motteiru subeteno hito-ga   kaimono-o   shita
        100-yen-MO have   all   person-NOM shopping-ACC did
        'Everyone who has 100 yen, which is a large amount of money, did some shopping'

Again, weak NPIs are licensed in this context.

(25)   Everyone who has ever been to Paris has been to Berlin too.

Moreover, Strawson DE operators in the sense of von Fintel (1999) such as *John-dake* 'only John' and *odoroita* 'got surprised' do not license the small reading either, as they are presuppositional.

(26)   a.   John-dake-ga   100-en-mo motteiru
               John-only-NOM 100-yen-MO has
               'Only John has 100 yen, which is a large amount of money'
        b.   John-ga   100-en-mo motteiru no-ni   odoroita
               John-NOM 100-yen-MO have   NML-DAT got.surprised
               'I was surprised that John has 100 yen, which is a large amount of money'

As shown in (27), they license weak NPIs.

(27)   a.   Only John has ever been to Paris
        b.   I was surprised that John has ever been to Paris

Therefore what is relevant here seems to be presuppositions. This generalization is further supported by the fact that conditionals lose the small reading, when read as 'factive conditionals' where the antecedent is presupposed. For instance, the following sentence only has a large reading.

(28)   moshi hontooni 100-en-mo   mottei-ru nara, potechi-o
        if   indeed   100-yen-MO have-PRES if,   potato.chips-ACC
        kae-ba?
        buy-COND
        ' If you indeed have 100 yen, which is a large amount of money, why don't you buy potato chips?'

Similarly, factive *before*-clauses only have large readings.

(29) 50000-en-mo   kariru   maeni hito-koto itte yone!
50000-yen-MO borrow before one-word say PRT

'You should have told me before borrowing 50000 yen, which is a large amount of money'

In addition to the presuppositions of the licensers, presuppositions triggered by a third item distinct from the licensor all act as interveners (cf. [5]). For example, the following examples do not have small readings, despite the presence of a licensor in the matrix clause.

(30) a. 100-en-mo   motteiru-no-ga John-da ka wakaranai/shiranai
100-yen-MO have-NML-NOM John-be Q not.sure/not.know

'I am not sure if/don't know if it is John who has 100 yen, which is a large amount of money'

b. John-ga   naze 100-en-mo   motteiru ka
John-NOM why 100-yen-MO have   Q
wakaranai/shiranai
doubtful/not.sure/not.know

'I am not sure/don't know why John has 100 yen, which is a large amount of money'

c. John-dake-ga   100-en-mo   motteiru ka wakaranai/shiranai
John-only-NOM 100-yen-MO have   Q not.sure/not.know

'I am not sure/don't know if only John has 100 yen, which is a large amount of money'

(30a) involves a cleft in the embedded clause and has a presupposition that someone has 100 yen, and similarly (30b) and (30c) presuppose that John has 100 yen due to the presupposition triggers *naze* 'why' and *dake* 'only'.

5   Conclusions

To summarize, we have observed that the licensing conditions of the small reading of *mo* include:

(31) a. Clausemate sentential negation
b. Embedded declarative clauses under non-presuppositional negative predicates
c. Embedded questions under non-presuppositional negative predicates
d. Antecedents of conditionals
e. *Before*-clauses

Licensors of weak NPIs that do not license the small reading of *mo* include:

(32) a. *Fewer than n*
b. Restrictor of a universally quantified noun phrase

> c. Matrix questions
> d. Factive contexts
> e. Embedded clauses under positive predicates
> f. Strawson DE operators

In addition, presuppositions triggered between *mo* and the licensor intervene.

Given this distribution, it seems reasonable to conclude that the small reading of *mo* is a strong NPI (however there are a few differences from strong NPIs in English; see Section 6.1). An immediate consequence of this is that the large reading cannot be accounted for by the same lexical item, because not all environments that license the large reading are licensing environments for strong NPIs. Given the differences between the two readings we observed in the previous section, however, we consider that this is a good feature of our proposal.

Now, let us evaluate our account against the problems for the scope theory presented in Section 3. The first problem that not all DE operators license the small reading is what we mainly discussed in the previous section, and with the assumption that the small reading is due to a strong NPI, it is no longer a problem, although why it is a strong NPI remains to be a question. See Sections 6.1 and 6.2 for some considerations.

The second and third problems we presented in Section 3 were that non-monotonic numerals like *choodo 100-en* 'exactly 100 yen' and modified monotonic numerals *100-en-izyoo* 'at least 100 yen' only receive large readings and never give rise to small readings with *mo*. Furthermore, *100-en-ika* 'at most 100 yen' is infelicitous under both readings. What this suggests is that the strong NPI *mo*, which is responsible for the small reading, cannot combine with modified numerals at all, while the large *mo* are fine with the first two but not with the third. At this moment, we have no insightful explanation as to why this is the case, but crucially, our account has the flexibility to account for them unlike the scope theory.

To conclude, our lexical ambiguity theory still has many open questions to solve, but is empirically more adequate than the scope theory. In the final section, we would like to address three open issues that arise as consequences of the proposed account.

6   Further Issues

6.1   The distribution of English Strong NPIs

We proposed that *mo* in the small reading is a strong NPI, and assumed that this explains its peculiar distribution. However, its distribution is somewhat different from that of canonical strong NPIs in English, which include expressions such as *in years* and punctual *until*. Essentially, their distribution is narrower than that of the small reading of *mo*. For example, they are not licensed in the antecedent of conditionals or *before*-clauses.

(33)   a. *If John met Mary in years, ...

> b. *Before John meets Mary in years, ...

Also, they are not licensed in certain embedded contexts where the small reading is available. For example, negative embedding predicates such as *not sure* and *not know* do not license *in years*, unlike *doubt*.

(34) a. I doubt that John met Mary in years
  b. ?*I am not sure if John met Mary in years
  c. *I don't know if John met Mary in years

Thus, it seems that the distribution of the small reading of *mo* is wider than that of the canonical strong NPIs in English and narrower than that of weak NPIs. We leave open why this is the case here, but a plausible hypothesis is that it is somehow due to the semantic differences between these items. However, as we will discuss in the next subsection, the meaning of *mo* alone seems to be not enough to explain everything about its distribution.

6.2 Differences from English 'Even'

Another question that remains open here is why the small reading of *mo* is a strong NPI, rather than a weaker NPI. This is an interesting question given that the distribution of the small reading of *even* in English is much broader. For example, it is licensed in the restrictor of universally quantified noun phrases, unlike *mo*.

(35) Every employee who even earns $5 an hour donated.

Also it is available in factive complements of negative verbs.

(36) a. Mary was surprised that John even has $10
  b. Mary doesn't know that John even has $10

This means that the meaning itself does not require the small reading of *mo* to be a strong NPI. Ideally, this crosslinguistic difference should be located in an independent difference between the two languages. We leave this for future work.

6.3 Minimizers

In this paper, we have intentionally avoided the numeral *one*, because *one+mo* can be interpreted as a minimizer. Interestingly enough, the distribution of minimizers is narrower than that of the small reading we discussed in the body of this paper. Specifically, it is licensed under clausemate negation, but not in antecedents of conditionals or *before*-clauses.

(37) a. John-wa 1-en-mo mottei-nai
     John-TOP 1-yen-MO have-NEG
     'John does not have a red cent'

    b. *moshi 1-en-mo   mottei-reba, nanika-ga   ka-eru   yo
         if   1-yen-MO have-if,   something-NOM buy-can PRT

    c. *John-wa   hitori-mo kuru-maeni yoitsubureteshimatta
         John-TOP 1.CL-MO   come-before drank.himself.to.sleep

In the literature ([11]) it is assumed that only clausemate negation can license Japanese minimizers, but according to our informal survey, at least some speakers allow long-distance licensing. For example, for those speakers, the following sentences are acceptable.

(38)   a. John-ga   1-en-mo   motteiru ka wakar-anai
             John-NOM 1-yen-MO have   Q not.sure-NEG
             'I am not sure if John has any money'

        b. Mary-wa John-ga   1-en-mo   motteiru to omotte-nai
             Mary-TOP John-NOM 1-yen-MO have   C think-NEG
             'Mary doesn't think that John has any money'

Just as the small reading we discussed above, presuppositions are relevant in the licensing of minimizers, and they are not licensed in factive complements such as the following.

(39)   *Mary-wa John-ga   1-en-mo   motteiru no-o   shir-anai
         Mary-TOP John-NOM 1-yen-MO have   NML-ACC know-NEG

For either types of speakers, the distribution of *one+mo* is narrower than the small reading of *mo* with larger numerals. Whether the same lexical entry for *mo* can account for both cases is left unanswered here.

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