

Distributivity and collectivity in the world domain: Evidence from Japanese modality*

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Abstract

The referential theory of conditionals (Stalnaker 1968, Schein 2001, 2003, Schlenker 2002, 2004) analyzes *if*-clauses as definite descriptions of possible worlds, similarly to definite descriptions of individuals. This paper explores to what extent the assumed parallel between the world and the individual domain holds. Specifically, I investigate whether there is evidence for a distributive vs. collective distinction for conditionals. Drawing on Japanese prioritizing modals, I argue that the collective construal of conditionals is indeed manifest.

1 Introduction

In formal semantics, the referential theory of conditionals (Stalnaker 1968, Schlenker 2002, 2004, Schein 2001, 2003) analyzes conditionals as predicative constructions, rather than quantification as on the standard framework (Kratzer 1986, 2012). Motivated by the observation that both *the* and *if*-clauses are non-monotonic (Lewis 1973, Schlenker 2002, 2004), the referential theory treats *if*-clauses as definite descriptions of possible worlds. This paper explores to what extent the assumed parallel between the individual and the world domains holds, focusing on the division between distributivity and collectivity.

It is well-known that predication over individuals may obtain a distributive or a collective interpretation depending on the property of the predicate involved, as shown in (1) (see Champollion to appear for an overview of the major phenomena related to distributivity and collectivity).

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|-----|----|--|--|
| (1) | a. | The students are tired. | <i>(be tired: inherently distributive)</i> |
| | b. | The students gathered in the hall way. | <i>(gather: inherently collective)</i> |
| | c. | The students carried a piano upstairs. | <i>(carry a piano upstairs: ambiguous)</i> |

With the assumed parallel between the individual and the world domains, one might expect to find the equivalence of (1a-c) in conditionals as well. However, the existing defenses of the referential analysis (e.g. Schlenker 2002, 2004, Bhatt and Pancheva 2017) do not try to make hay of the option to have collective readings in conditionals. I adduce data from Japanese prioritizing modals, and argue that the conditional construal of collective predication is indeed manifest in natural language.

This paper is structured as follows. Sec 2 outlines the referential theory of conditionals. Sec 3 introduces the basic properties of Japanese prioritizing modals and reviews Kaufmann (2017)'s

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account. Sec 4 discusses novel data that constitute an argument in favor of an collective analysis of Japanese prioritizing modals. Sec 5 concludes the paper.

2 The referential theory of conditionals

The referential theory of conditionals is motivated by the observation that both *if*-clauses and definite descriptions are non-monotonic. It is well-known that conditionals fail Strengthening of the Antecedent; that is, the truth of ‘*If p, then q*’ does not entail ‘*If p and r, then q*’, as shown in (2). If conditionals allowed strengthening, we would expect the utterance of the two conditionals in (2) in a single sequence to be contradictory, contrary to speaker’s intuitions.

- (2) If the USA threw its weapons into the sea tomorrow, there would be war; but if the USA and the other nuclear powers all threw their weapons into the sea tomorrow, there would be peace; but...
(Adapted from Lewis 1973: 10)

Definite descriptions of individuals behave similarly in that their restrictors fail strengthening, as in (3) (cf. Lewis 1973).

- (3) [Uttered in LA] (Schlenker 2004: 419 (5))
The students are happy; but the students at the Sorbonne are not.

Building on arguments along those lines (see Schlenker 2002, 2004 for detailed discussions), the referential theory of conditionals analyzes *the* and *if* in a uniform fashion: among the objects satisfying the restrictor, *if* and *the* pick out the one(s) that are highest on a measurement scale, and are undefined if no such object exists. Specifically, the selection of individuals is determined by their *salience* (Lewis 1973), and the selection of worlds depends on their *similarity* with the world of evaluation (Stalnaker 1968). Hence, (2) is not contradictory because the worlds where all nuclear powers throw their weapons into the sea are so far-fetched that they are ignored at the point when the first conditional is uttered. The same can be said for (3).

For the sake of explicitness, I adopt the version of the referential analysis that introduces plurality. Hence, *the* and *if* refer to *pluralities* of individuals and worlds, respectively (Schein 2001, 2003, Schlenker 2002, 2004). For simplicity, I assume that atomic and plural terms denote objects of the same semantic type (cf. Landman 1989). Subsequently, the predicates in predicative constructions apply to individual-pluralities, and the propositions of conditional consequents are predicates of world-pluralities, rather than sets of worlds. I generalize Link (1983)’s pluralization operator $*$ to apply for both sets of individuals and sets of worlds. In both cases, an expression denoting a set of singular objects is mapped to the maximal element of its closure under sum, e.g. $*\{u, v, w\} = u \oplus v \oplus w$. The denotation of *the* is illustrated in (4).

- (4) $\llbracket \text{the} \rrbracket^w = \lambda P_{\langle e, t \rangle} . * \{x | x \in P \ \& \ x \text{ is salient in } w\}$; defined iff $\{x | x \in P(w) \ \& \ x \text{ is salient in } w\} \neq \emptyset$

For conditionals, I implement the similarity-based selection of worlds in the following way. Among the worlds that verify the proposition described by the *if*-clause, *if* selects those that are at least as ideal as others in view of what is stereotypically the case at the world of evaluation. Formally, the selection relies on a pre-order induced by a function **ST**, defined as in (5) (in the spirit of Kratzer 2012’s ordering source). The entry for *if* is given in (6).

- (5) a. $\mathbf{ST} = \lambda w . \{p : p \text{ describes a normal course of events at } w\}$
b. \mathbf{ST} can induce a pre-order $\leq_{\mathbf{ST}(w)}$ on a set of worlds: For any worlds i and j , $i \leq_{\mathbf{ST}(w)} j$ iff $\{p | p \in \mathbf{ST}(w) \ \& \ p(j) = 1\} \subseteq \{p | p \in \mathbf{ST}(w) \ \& \ p(i) = 1\}$

- (6) $\llbracket \text{if} \rrbracket^w = \lambda p_{\langle s,t \rangle} . * \{v | v \in p \ \& \ \forall u [u \in p \rightarrow v \leq_{\text{ST}(w)} u]\}$; defined iff $\{v | v \in p \ \& \ \forall u [u \in p \rightarrow v \leq_{\text{ST}(w)} u]\} \neq \emptyset$

Conditionals check whether each atom of the world-plurality that the *if*-clause refers to also verifies the consequent, as in (7). \sqsubset accesses the atomic elements of a plural term.

- (7) Once defined, $\llbracket \text{if } p, q \rrbracket^w = 1$ iff for all $v \sqsubset \llbracket \text{if } p \rrbracket^w$, $\llbracket q \rrbracket^v = 1$.

In essence, the semantics in (7) boils down to distributive predication, with the consequent being predicated of each atom of the world-plurality denoted by the antecedent. The construal is thus analogous with the *be tired*-type of predication over individuals, as exemplified in (1a). Schlenker (2004: 459, footnote 8) leaves it open whether collective predication can be attested in conditionals.

3 Japanese prioritizing modals

Conditionals in Japanese are marked by antecedent-final connectives such as *-reba*, *-tara* and *-temo*. For expressing prioritizing modals (that is, deontic modals, for rules; teleological modals, for goals; and bouletic modals, for desires), Japanese uses a construction that looks like regular hypothetical conditionals with an evaluative predicate in the consequent. Compare the regular hypothetical conditional in (8) with the modal construction in (9).

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|---|---|
| <p>(8) <i>tabe-nak-ereba onaka-ga suk-u.</i>
eat-NEG-COND stomach-NOM be.empty
'If you don't eat, you'll get hungry.'</p> | <p>(9) <i>tabe-nak-ereba nar-ana-i.</i>
eat-NEG-COND become-NEG-NPST
lit. 'If you don't eat, it doesn't become.'
\approx 'You must eat.'</p> |
|---|---|

So far, the most extensive investigation of Japanese prioritizing modals in formal semantics is offered by Kaufmann (2017). I adopt her assumption that the modals receive the compositional interpretation of the *if*-clause, the conditional connectives and the **GOOD/BAD** evaluative predicates. Hence, expressions like *-nakereba naranai* in (9) are not atomic morphological markers that are fossilized from syntactically complex constructions. See Kaufmann (2017) for evidence in favor of a compositional account. In the rest of the paper, I leave aside the complexities regarding how conditional connectives contribute to the compositional interpretation of prioritizing modals, since they are largely orthogonal to our current concerns.

Kaufmann (2017) assimilates Japanese prioritizing modals with the conditionals whose antecedents behave like the argument of the consequent, rather than an adjunct (so-called 'non-logical conditionals', Williams 1974, Pullum 1987 among others). As have been proposed by several authors (e.g. Pullum 1987, Grosz 2011, Longenbaugh 2019), those conditionals can be treated as predicative constructions, as exemplified in (10) with English *good* and its translation (*modulo* mood marking, but see Sode 2018, 2020 for the relevant discussions).

- (10) It would be good if this analysis were right. \rightsquigarrow **good**_w($\lambda w'$.**right**_{w'}(**this.analysis**))

Kaufmann draws on the referential analysis of conditionals and treats evaluative predicates as collective predicates applying to the world-plurality that the *if*-clause refers to. For negative evaluative predicates like *naranai* 'doesn't come about', she gives the entry in (11). I assume that **Fact** maps a world w to the set of worlds compatible with the contextually relevant facts holding at w , and **Best** selects from **Fact**(w) those that are maximally ideal in terms of the contextually salient goals, rules, or desires (of a salient agent) holding at w .

$$(11) \quad \llbracket \text{Bad}_{coll} \rrbracket^w = \lambda P_s. (\{w' : w' \sqsubset P\} \cap \mathbf{Best}(w) = \emptyset), \text{ where } \mathbf{Best}(w) \subseteq \mathbf{Fact}(w)$$

For positive evaluative predicates like *ii* ‘good’, I assume the entry in (12) along the same lines.

$$(12) \quad \llbracket \text{Good}_{coll} \rrbracket^w = \lambda P_s. \{w' : w' \sqsubset P\} \subseteq \mathbf{Best}(w), \text{ where } \mathbf{Best}(w) \subseteq \mathbf{Fact}(w)$$

Importantly, (11) and (12) ensure that the criteria for evaluating the good/badness of their arguments come from the *actual world*, rather than the atoms of the world-plurality denoted by the *if*-clause. This assumption is crucial for Kaufmann to capture the fact that the antecedent of conditionals like (10) are evaluated based on the goals/desires/rules holding at the actual world. In other words, in (10), the speaker’s preference for the analysis to be right is independent of whether the analysis is actually correct (see Grosz 2011, Sode 2018, Kaufmann 2017 and Longenbaugh 2019 for more discussions). The truth conditions of Japanese prioritizing modals under this analysis are shown in (13).

$$(13) \quad \text{Once defined, } \llbracket \text{if } p, \text{ Good/Bad}_{coll} \rrbracket^w = 1 \text{ iff } \llbracket \text{Good/Bad}_{coll} \rrbracket^w (\llbracket \text{if } p \rrbracket^w) = 1.$$

To see how Kaufmann’s analysis works, consider (14a) and (15a), and their corresponding truth conditions.

- (14) a. *tabe-nak-ereba nar-ana-i*.
eat-NEG-COND become-NEG-NPST
lit. ‘If you don’t eat, it doesn’t become.’ \approx ‘You must eat.’ (=9))
- b. $\llbracket (14a) \rrbracket^w = 1$ iff no atom of the world-plurality of the most *w*-stereotypical worlds where you don’t eat is among the maximally ideal worlds according to some salient goals/rules/desires of *w*.
- (15) a. *tabe-reba i-i*.
eat-COND good-NPST
‘If you eat, it’s good.’ \approx ‘You should eat.’
- b. $\llbracket (15a) \rrbracket^w = 1$ iff all atoms of the world-plurality of the most *w*-stereotypical worlds where you eat are among the maximally ideal worlds according to some salient goals/rules/desires of *w*.

For our purpose of distinguishing collectivity and distributivity in conditionals, it suffices to note that in (14b) and (15b), the criteria for good/badness are provided by the world of evaluation. We can surely make (13) more fine-grained by implementing factors such as the difference in modal force between *-nakereba naranai* (as strong necessity, i.e. ‘must’) and *-reba ii* (as weak necessity, i.e. ‘should’), but I will have to leave it for another occasion.

4 Distributive vs. collective predication for prioritizing modals

The previous section showed that Japanese prioritizing modals constitute a plausible candidate for the collective construal of referential conditionals. To explore how referential conditionals fit the three-way distinction shown in (1), it is necessary to ask whether Japanese prioritizing modals could also be interpreted as distributive predication.

Let us first consider what the evaluative predicates would have to look like in order to be compatible with the distributive construal of conditionals shown in (7). First, we would need to make sure that the evaluative predicates apply to individual worlds, rather than world-pluralities. We would also want to preserve the spirit of the entries in (11) and (12) that the good/badness of the predicate’s argument gets evaluated with respect to actual standards, rather than hypothetical standards. These requirements give rise to the entries along the lines of (16a) and (16b).

- (16) a. $\llbracket \text{Bad}_{dist} \rrbracket^w = \lambda u.u \notin \mathbf{Best}(w)$
 b. $\llbracket \text{Good}_{dist} \rrbracket^w = \lambda u.u \in \mathbf{Best}(w)$

Following (7), Japanese prioritizing modals would be interpreted as in (17) if construed distributively.

- (17) a. Once defined, $\llbracket \text{if } p, \text{Bad}_{dist} \rrbracket^w = 1$ iff for all $v \sqsubset \llbracket \text{if } p \rrbracket^w$, $\llbracket \text{Bad}_{dist} \rrbracket^v = 1$,
 iff for all $v \sqsubset \llbracket \text{if } p \rrbracket^w$, $v \notin \mathbf{Best}(v)$.
 b. Once defined, $\llbracket \text{if } p, \text{Good}_{dist} \rrbracket^w = 1$ iff for all $v \sqsubset \llbracket \text{if } p \rrbracket^w$, $\llbracket \text{Good}_{dist} \rrbracket^v = 1$,
 iff for all $v \sqsubset \llbracket \text{if } p \rrbracket^w$, $v \in \mathbf{Best}(v)$.

We are now ready to compare the interpretation of the collective and the distributive construals of Japanese prioritizing modals, namely (13) and (17). It is easy to see that while distributive predication shifts the evaluation of good/badness to each antecedent-world (cf. the shaded parts in (17)), collective predication does not shift and holds on to the actual world for evaluating the good/badness of the *if*-clause's referent. In particular, for distributive predication, although the evaluative predicates fix the criteria for good/badness to the world of evaluation (cf. (16)), the criteria nevertheless shift to each antecedent world in conditionals, due to the distributive interpretation in (7).

We thus predict the collective and the distributive construals to yield different interpretations for prioritizing modals whose *if*-clause can affect the goals/rules/desires that constitute the evaluative criteria for good/badness. Consider (18), an example where the *if*-clauses describe a change in the goals that constitute the evaluative criteria (cf. Frank 1996, Condoravdi and Lauer 2016 among others).

- (18) It's about time for high school students to decide which university to apply for, but Hanako still can't make up her mind, so she goes to see her teacher. The teacher is fully aware of Hanako's situation: she dreams of becoming a mathematician, so she wants to go to a school with a top-class mathematics department; she also wants to stay close with her parents, and commute from home if possible; both preferences are equally important to her. The teacher also knows that (i) Kyoto University and the University of Tokyo have the country's best mathematics departments; (ii) Kyoto is close enough for Hanako to commute, but Tokyo is too far; and (iii) it is impossible to apply for both schools at the same time, and it is also unrealistic to study for both schools since each requires a different method.
- a. *Kyoudai-ni shigan shi-te sore-ni muke-te benkyou su-reba ii. (True)*
 Kyoto.U-DAT apply do-CONT that-DAT turn-CONT study do-COND good
 'If you are to apply for Kyoto University and study for it, it's good.'
 ≈ 'You should apply for Kyoto University and study for it.'
- b. *Toudai-ni shigan shi-te sore-ni muke-te benkyou su-reba ii. (False)*
 Tokyo.U-DAT apply do-CONT that-DAT turn-CONT study do-COND good
 'If you are to apply for the University of Tokyo and study for it, it's good.'
 ≈ 'You should apply for the University of Tokyo and study for it.'

Assuming that applying for a school means having the goal to get in, the *if*-clauses of the sentences in (18) convey two pieces of information. First, a subgoal is added to the addressee's original goals, namely getting in Kyoto U/UTokyo. Second, the addressee acts accordingly to actualize the goal by studying for the school she applies. I also assume that the relevant goals in the evaluation of the sentences in (18) must be consistent among themselves and consistent given the relevant facts (cf. Condoravdi and Lauer 2016's 'effective preferences'). This assumption is plausible since in this context, the goals constitute the criteria that guide the addressee's courses of actions regarding which school to apply for and study for. Assuming that rational agents do not undertake incoherent actions, it is reasonable to assume consistency in the relevant goals. Accordingly, the speaker, as a cooperative interlocutor, should also help maintain consistency when offering advice.

The predictions made by the collective and the distributive construals come apart for (18b). The collective construal correctly predicts (18b) to be false. Recall that under the collective construal, the consequent gets evaluated at the actual world of evaluation w . $\mathbf{Fact}(w)$ contains worlds where (i) Kyoto is close enough for commuting but Tokyo is too far, (ii) UTokyo and Kyoto U have good mathematics departments, and (iii) Hanako cannot apply for or study for both schools at the same time. $\mathbf{Best}^{Hanako}(w)$ simply contains worlds compatible with Hanako's actual goals, that is, (i) going to a school with a good mathematics department, and (ii) living close to her parents. At all world-atoms of the plurality denoted by the *if*-clause of (18b), Hanako applies for and studies for UTokyo; subsequently, at all those worlds, she does not actualize the goal of staying close with her family. (18b) thus comes out false.

In contrast, the distributive construal, where the consequent gets evaluated at each world-atom v of the *if*-clause's referent, wrongly predicts (18b) to be true. $\mathbf{Fact}(v)$ eliminates from $\mathbf{Fact}(w)$ the worlds where Hanako does not apply for UTokyo and does not study for it. $\mathbf{Best}^{Hanako}(v)$ contains the worlds where Hanako goes to a school with a good mathematics department and gets in UTokyo. In particular, her actual goal to stay close with her parents is irrelevant at v , because it conflicts with her goal in v to get in UTokyo, given the facts at v . At all world-atoms of the plurality denoted by the *if*-clause, Hanako applies for and studies for UTokyo, thus actualizing her goals in v optimally. Hence, (18b) comes out true, contrary to speaker's intuitions.

To sum up, collective predication provides the correct construal for Japanese prioritizing modals, as evidenced by examples involving *if*-clauses that signal changes in the goals that constitute the evaluative criteria for good/badness.

5 Conclusion

This article argued that Japanese prioritizing modals are conditionals construed as collective predication, based on the evidence from *if*-clauses involving changes of goals. Although the consequents in the modals do not wear on their sleeves anything like a distributive vs. collective distinction as seen in the individual domain (cf. (1)), they are inherently collective predicates over world(-pluralities), parallel with the *gather*-type predicates over individuals.

What about the distributive construal of conditionals? Ideally, it would be nice to have evidence showing that conditionals can or cannot be unambiguously distributive (with the truth conditions in (7)). However, an argument for the distributive construal of conditionals is complicated by the fact that it can be translated into the standard Kratzer-style construal where the *if*-clause restricts a possibly covert modal operator (Kratzer 1986, 2012). With the assumption that the modal operator is interpreted with respect to some salient background information representing the normal courses of events at the evaluation world, the distributive construal and the restrictor construal of conditionals would yield truth-conditionally equivalent interpretations. A comparison of the referential and the restrictor frameworks and an investigation of the distributive construal of conditionals will have to await future research.

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