Dependent modals

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Introduction This work extends the typology of modal adverbs/particles by identifying *dependent modals* in Japanese, which are formed with one of the two base forms and a verbal conjugation, i.e. verbal conjunction and conditional, modulo variation as shown in (1).

(1) {hyo-tto / moshi-ka} - {shi-te / shi-ta-ra / sur-u-to / %sur-eba}
{HYO-that / if-KA} - {do-CONJ / do-PAST-then / do-NPST-then / do-then}

I show that the conjoining dependent modals may only occur in polar questions and epistemic possibility statements, i.e. they are dependent on a modal inference, while the conditional ones are subject to variation. I propose that they highlight a possible answer p to a question Q while preserving its inquisitiveness: since p may resolve Q, it has to be embedded under inquisitive operator such as epistemic possibility modal and the question operator. The variation within the class of dependent modals further comes from the difference between conjunction and conditionals.

Main data While there is subtle variation among the three types of the conditional dependent modals, I put it aside here and focus on the non-past conditional dependent modal. The conjoining and the conditional dependent modals may occur in polar questions as shown in (2).

(2) a. Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni ir-u?
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST

b. Yuji-wa {*hyottosuruto* / *moshikasuruto*} ie-ni ir-u?
Yuji-TOP {pres.cond dep mod / pres.cond dep mod} home-at exist-NPST
"Is Yuji perhaps at home?"

The interpretation is similar to English "perhaps" in polar question: it does not introduce a modal interpretation of the prejacent, but "gives a suggestion as to a possible answer" (Bellert, 1977). Both types of dependent modals may occur in epistemic possibility statements as (3) shows.

(3) a. Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni ir-u kamoshirena-i.
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST might-NPST

b. Yuji-wa {*hyottosuruto* / *moshikasuruto*} ie-ni ir-u kamoshirena-i.
Yuji-TOP {pres.cond dep mod / pres.cond dep mod} home-at exist-NPST might-NPST
"Yuji might perhaps be at home."

Here, dependent modals do not introduce (additional) modal interpretation of the prejacent, but are interpreted in concord with the epistemic possibility modal, cf. *modal concord* (Halliday, 1970; Lyons, 1977; Geurts and Huitink, 2006, a.o.) exemplified in (4).

(4) He *may perhaps* have forgotten.
≃ He *may* have forgotten. ≃ *Perhaps* he has forgotten. (Huitink, 2008)

So far, dependent modals in Japanese behave exactly like "perhaps" in English. However, dependent modals may not occur outside the scope of a licensor, i.e. ? and ◊ as (5) shows: the conjoining one is infelicitous and the acceptability of the conditional one varies across speakers.

(5) a. # Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni ir-u.
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST

b. % Yuji-wa {*hyottosuruto* / *moshikasuruto*} ie-ni ir-u.
Yuji-TOP {pres.cond dep mod / pres.cond dep mod} home-at exist-NPST
"Yuji is perhaps at home."

Proposal The gist of the proposal is given in (6). Crucially, (b) requires that $\Diamond_{dep}(p)$ is embedded in a polar question or an epistemic possibility modal statement: both ensure that Q is not resolved by the utterance. This correctly predicts the observed distribution of dependent modals in Japanese.

(6) **An informal sketch**: if $\Diamond_{dep}(p)$ is part of ϕ, the speaker S may felicitously utter ϕ in a context c iff c involves an unresolved question Q such that: (a) p is a possible answer to Q, and (b) Q remains unresolved after c is updated with ϕ.

The intuition is as follows: "Yuji is at home." is a possible answer to the question "where is Yuji?" I argue that $\Diamond_{dep}$ conjectures that p is the answer to Q while preserving this question.

I offer an analysis with *Intensional Compositional DRT* (Brasoveanu, 2007; Hofmann, 2024) and *Dynamic Inquisitive Semantics* (Dotlačil and Roelofsen, 2019, 2021; Roelofsen and Dotlačil, 2023). I adopt three basic types: t for truth values, w for worlds and i for *states*, which models variable assignments. I take a *discourse referent* (dref) ω as a function from a state g to a *downward closed* set of worlds, i.e. whenever $s_{\langle wt\rangle} \in \omega(i)$, for each $s' \subseteq s$, $s' \in \omega(i)$. This corresponds to propositions in Inquisitive Semantics, i.e. a downward closed set of *inquisitive states*. This notion of propositions includes declaratives and interrogatives: a proposition $P_{\langle wt,t\rangle}$ is *inquisitive* iff $\cup P \notin P$, and *non-inquisitive* iff $\cup P \in P$. I take the context c to be a set of assignments and an utterance ϕ is a function from a context to another context. I abbreviate type $\langle st, st\rangle$ as T.

I take the discourse as the pair of c and Q, the immediate question under discussion (cf. Roberts, 2012). One may take Q as a stack (Roberts, 2012) but it is unnecessary for my purpose. Note that Q stores a static inquisitive proposition of type $\langle wt, t\rangle$. Let ω* contain the set of candidates for the actual world. For any $g, h \in c$, $\omega^*(g)=\omega^*(h)$. I adopt the abbreviation ω_c*, i.e. $\omega^*(i)$ for any $i \in c$. Q_c stands for the question paired with the context c. Update rules for c and Q are given below.

(7) a. $c[\exists\omega] = \{h : \exists g \in c\,[g[\omega]h]\}$ (**Existential quantification**)
b. $c[D \wedge D'] = c[D][D']$ (**Conjunction**, i.e. function composition)
c. $c[D \vee D'] = c[D] \cup c[D']$ (**Disjunction**)
d. $c[?D] = c[D] \cup c[\neg D]$ (**?-operator**)
e. $c[\Diamond D] = c \cup c[D]$ (Ciardelli et al., 2009, *might*)
f. $c[\omega \simeq Q] = \{g : g \in c \,\&\, \exists s \in \omega(g)\,[s \in Q_c] \,\&\, \cup\omega(g) = \cup Q_c\}$ (possible resolution)
g. $c[\omega = Q] = \{g : g \in c \,\&\, \omega(g) = Q_c\}$ (question identity)

(8) a. **push**: if ω_c* is inquisitive, add it to Q.
b. **pop**: if $\cup\omega_c$*$\in Q_c$, replace the inquisitive proposition in Q with $\emptyset$.

Now, I propose the semantics of dependent modals with the following denotations and compositions. $\Diamond_{dep}$ stands for the base forms "hyotto" and "moshika." $\omega \simeq Q_c$ requires that ω contains a possible answer to Q_c and ω*$= Q_c$ requires that the question is preserved in the output context.

(9) a. $[\![\textsc{ind}\text{/-te}]\!] = \lambda\phi_{\langle\omega,T\rangle}\lambda c : c[\phi(\omega^*)]$
b. $[\![\textsc{cond}\text{/-to}]\!] = \lambda\phi_{\langle\omega,T\rangle}\lambda c : c[\exists\omega \wedge \phi(\omega)]$
c. $[\![\Diamond_{dep}]\!] = \lambda\zeta_{\langle\langle\omega,T\rangle,\langle\omega,T\rangle\rangle}\lambda\psi_{\langle\omega,T\rangle}\lambda c : c[\zeta(\lambda\omega\,[\psi(\omega) \wedge \omega \simeq Q_c]) \wedge \omega^* = Q_c]$
d. **Composition**: $[\![\Diamond_{dep}]\!]([\![\textsc{ind}]\!])(p)$ (conjoining) / $[\![\Diamond_{dep}]\!]([\![\textsc{cond}]\!])(p)$ (conditional)

In cases of the conjoining dependent modal, ψ cannot be informative: if it is informative and may resolve Q_c, it leads to popping of Q_c and violates the condition ω*$= Q_c$. This correctly predicts that the conjoining dependent modal is felicitous under a polar question and an epistemic statement but not under a declarative. In cases of the conditional dependent modal, however, this leads to

a different result. Since COND introduces a new world dref ω, ψ can be evaluated with inquisitive states that are not members of ω_c*. This creates a loophole for the conditional dependent modal to occur under a declarative. Suppose that ψ provides a possible answer to Q_c and $\psi(\omega)$. Here, $\omega \simeq Q_c$ is satisfied. Still, this does not affect the content of ω* because the conditional morpheme introduces a world dref on its own. As a result, it does not trigger popping and Q_c can be retained in the output context. Note that one may adopt more sophisticated semantics of conditionals, e.g., Brasoveanu (2007), as long as conditional may introduce a new dref with non-actual worlds. Also, note that the proposed analysis does not predict that dependent modals are licensed under disjunction. First, narrowing down of Q with the disjuncts is blocked by $\omega = Q$. Then, $\omega \simeq Q$ requires that the informative content of the disjunction is the same as that of Q, and thus only possible disjunction would be of the form $\psi \vee \neg\psi$ such that ψ is a possible answer to Q. However, such disjunctions are non-informative and results in pragmatic anomaly. In this way, one may achieve a purely meaning-driven approach to the curious distributional pattern of dependent modals.

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