Dependent modals

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Introduction

- This talk is about what I call **dependent modals**, which triggers modal inferences parasitic to its 'licensor'.
  - Dependent modals in Japanese are formed with two base forms and a verbal conjugation, i.e. verbal conjunction and conditional.

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

  - I call the one with the *te* form **conjoining dependent modal** and the ones with the PAST-*ra* or the NPST-*to* form **conditional dependent modals**.

A distributional puzzle

- The conjoining dependent modals may only occur in polar questions and epistemic possibility statements.
- In contrast, the conditional dependent modals can occur in a non-modal statement more readily modulo speaker variation.
- which properties of dependent modals are responsible for their syntactic distribution?

A discourse oriented approach

- This talk pursues a **discourse-oriented approach**:
  - dependent modals signals a *conjecture* to the immediate question shared in the context and this property requires a dependent modal to take a polar question or a modal statement,
  - i.e. a dependent modal relates its prejacent p with the question Q such that (i) p informs us about a 'good' answer to Q but (ii) Q is still open after the whole utterance.
  - A non-modal statement cannot meet these conditions: if p is an answer to Q and the context entails p, it necessarily resolves Q.

Syntactic decomposition

- I treat the base form and the verbal conjugation as independent building blocks.
  - This offers a loophole to conditional dependent modals: conditionals may quantify over non-actual worlds while verbal conjunction may not.
  - i.e. conditionals cancel entailment of a non-modal statement p so that it does not resolve Q.

Roadmap

Polar question

- A dependent modal may occur in polar questions *modulo* variation in the PAST-*ra* form.

(2) a. Aki-wa *hyottoshite* ie-ni ir-u?
Aki-TOP conj dm home-at exist-NPST

b. % Aki-wa *hyottoshitara* ie-ni ir-u?
Aki-TOP pst.cond dm home-at exist-NPST

c. Aki-wa *hyottosuruto* ie-ni ir-u?
Aki-TOP prs.cond dm home-at exist-NPST
"Is Aki perhaps at home?"

Polar question.Cont

- The interpretation is similar to “perhaps” in polar question:

(3) Is it *perhaps* resin?

a. Yes, it is.

b. ?Yes, perhaps it is.

c. #Yes, but perhaps it is something else.

(4) Might it be resin?

a. ?Yes, it is.

b. Yes, it might be.

c. Yes, but it might be something else.

(Incurvati and Schlöder, 2019, p.12: (19-20))

- it does not introduce a modal interpretation of the prejacent, but “gives a suggestion as to a possible answer” (Bellert, 1977).

Epistemic possibility

- Dependent modals may occur in epistemic possibility statements.

(5) a. Aki-wa *hyottoshite* ie-ni ir-u kamoshirena-i.
Aki-TOP conj dm home-at exist-NPST might-NPST

b. Aki-wa *hyottoshitara* ie-ni ir-u kamoshirena-i.
Aki-TOP pst.cond dm home-at exist-NPST might-NPST

c. Aki-wa *hyottosuruto* ie-ni ir-u kamoshirena-i.
Aki-TOP prs.cond dm home-at exist-NPST might-NPST

"Aki might perhaps be at home."

Epistemic possibility.Cont

- Here, dependent modals do not introduce (additional) modal interpretation of the prejacent.
  - cf. *modal concord* (Halliday, 1970; Lyons, 1977; Geurts and Huitink, 2006, a.o.).

(6) He *may perhaps* have forgotten.

a. He *may* have forgotten.

b. *Perhaps* he has forgotten. (Huitink, 2008)

Declaratives without modals

- The conjoining dependent modals may not occur in declaratives without modals but conditional ones may *modulo* variation.

(7) a. # Aki-wa *hyottoshite* ie-ni ir-u.
Aki-TOP conj dm home-at exist-NPST

b. % Aki-wa *hyottoshitara* ie-ni ir-u.
Aki-TOP pst.cond dm home-at exist-NPST

c. % Aki-wa *hyottosuruto* ie-ni ir-u.
Aki-TOP prs.cond dm home-at exist-NPST
"Aki is perhaps at home."

Veridicality is not a licensing property

(8) A propositional operator F is *veridical* iff $F(p)$ entails p, and non-veridical, otherwise.

(9) a. Is Aki at home? $\nrightarrow$ Aki is at home.

b. Aki might be at home. $\nrightarrow$ Aki is at home

- However, dependent modals may not occur in the scope of other non-veridical operators.

Veridicality is not a licensing property.Cont

(10) a. *Negation*

Aki-wa *hyottoshite* ie-ni i-**na**-i.
Aki-TOP conj dm home-at exist-NEG-NPST

"Aki is perhaps not at home."

b. *Complement of 'believe'*

Yuki-wa Aki-ga *hyottoshite* ie-ni ir-u to
Yuki-TOP Aki-NOM conj dm home-at exist-NPST that
omo-tte-iru.
think-STATE-NPST

"Yuki thinks that Aki is perhaps at home."

Modality is not a licensing property

- The conjoining dependent modal is not licensed by epistemic necessity modal nor deontic possibility modal.

(11) a. *Epistemic necessity*

Aki-wa *hyottoshite* ie-ni ir-u **ni chigaina**-i.
Aki-TOP conj dm home-at exist-NPST must-NPST

lit"Aki must perhaps be at home."

b. *Deontic possibility*

Aki-wa *hyottoshite* ie-ni i-**te mo i**-i.
Aki-TOP conj dm home-at exist-is allowed to-NPST

"Aki may perhaps stay at home."

Inquisitiveness is not a licensing property

- Dependent modals are not licensed in *wh*-questions.
  - This effect is observed with both types of dependent modals.

(12) a. # Aki-wa *hyottoshite* doko-ni ir-u?
Aki-TOP conj dm home-at exist-NPST

b. # Aki-wa *hyottoshitara* doko-ni ir-u?
Aki-TOP pst.cond dm home-at exist-NPST

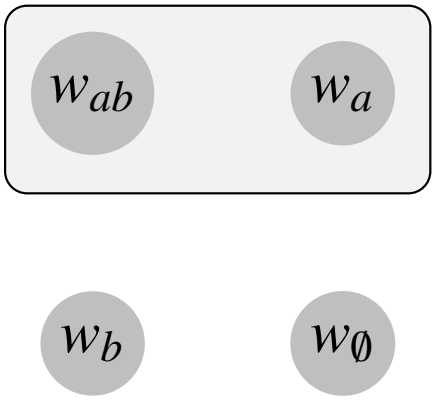
c. # Aki-wa *hyottosuruto* doko-ni ir-u?
Aki-TOP prs.cond dm home-at exist-NPST

"Where is Aki perhaps at?"

Attentiveness might be a licensing property

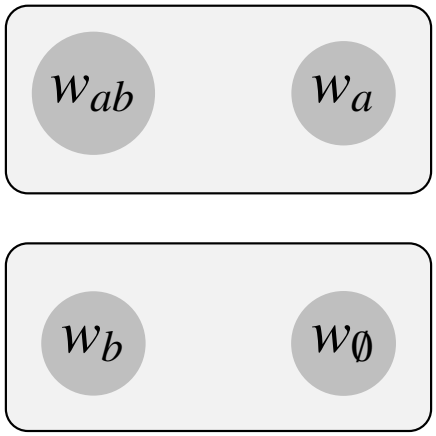
- Ciardelli et al. (2009) suggests that the *might-p* **draws attention to** *p* while it does not eliminate non-*p* worlds, i.e. *p* is *attentive*.
  - Adopting their term, I call this layer *conjectural meanings*.

(13) Ana runs.



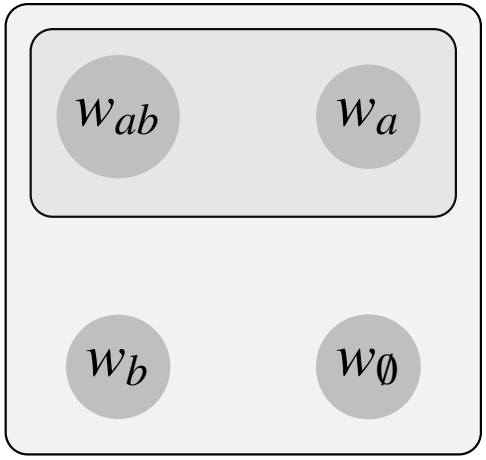
informative

(14) Does Ana run?



inquisitive

(15) Ana might run.



attentive

What's taken care of and what's left

- This gives an intuitive handle on the licensing property for conjoining dependent modals:
  - its licensor has to draw attention to p but must not discard $\neg p$ possibilities.
- It still does not explain why non-epistemic possibility modals and *wh*-questions do not license dependent modals.
  - Propositional anaphora provides the key distinction here.

Propositional anaphora with modals

- Propositional anaphora teases apart epistemic possibility and deontic possibility.

(16) **Context**: John's friend see him holding a red Solo cup at a party, and walks over to guess what he might be drinking. She says:
You may have a beer, but I don't think **that**'s true. (I think you have red wine.)

a. #**that**: John might have a beer. (*may p*)

b. ^{ok}**that**: John has a beer. (*p*) (Snider, 2017)

Propositional anaphora with modals.Cont

(17) **Context**: John's doctor sees him holding a red Solo cup at a party. His doctor says to him:
You may have a beer, but I don't think **that**'s true.

a. **#that**: John is allowed to have a beer. (*may p*)

b. **#that**: John has a beer. (*p*) (Snider, 2017)

Propositional anaphora with questions

- Propositional anaphora teases apart polar questions from *wh*-questions:

(18) a. Did Barb go to the party? Because Steve doubts **that**.
that: Bard went to the party.

b. # Who was at the party? Because Steve doubts **that**.
that: someone was at the party / $\{x : x\}$ was at the party.

(Snider, 2017)

Propositional anaphora with questions.Cont

- Propositional anaphora also teases apart attention to the *yes*-answer from the attention to the *no*-answer:

(19) Did Barb go to the party? Because Nancy told me **that** (and she's unreliable).

a. #**that**: Did Barb go to the party? ($\{p, \neg p\}$)

b. ^{ok}**that**: Barb went to the party. (p)

c. #**that**: Barb didn't go to the party. ($\neg p$)

Propositional anaphora in Japanese

- This pattern is reproduced with Japanese pronoun “sore” (it).

(20) Yuki-wa senshuu Hokkaidoo-ni i-ta. Boku-wa
Yuki-TOP last week Hokkaidoo-at exist-PAST. I-TOP
sore-o Aki-kara kii-ta.
it-ACC Aki-from hear-PST
“Yuki was at Hokkaidoo last week. I heard it from Aki.”

Propositional anaphora in Japanese.Cont

(21) a. Epistemic possibility

Biiru-o nom-u kamoshirena-i kedo, boku-wa **sore**-o
beer-ACC drink-NPST might-NPST but I-TOP it-ACC
shinji-te-ina-i.
believe-STATE-NEG-NPST

"You might have beer, but I do not believe it."

b. Deontic possibility

Biiru-o non-demoi-i kedo, boku-wa **sore**-o
beer-ACC drink-allowed to-NPST but I-TOP it-ACC
shinji-te-ina-i.
believe-STATE-NEG-NPST

"You may have beer, but I do not believe it."

Propositional anaphora in Japanese

(22) a. Polar question

Yuki-san-wa senshuu Hokkaidoo-ni iki-mashi-ta
Yuki-title-TOP last week Hokkaidoo-at go-POLITE-PST
ka? Aki-san-ga **sore**-o utaga-tte-mashi-te.
KA. Aki-title-NOM it-ACC doubt-STATE-POLITE-TE

"Did Yuki go to Hokkaidoo last week? Aki is doubting it."

b. *wh*-question

Yuki-san-wa senshuu doko-ni iki-mashi-ta
Yuki-title-TOP last week Hokkaidoo-at go-POLITE-PST
ka? # Aki-san-ga **sore**-o utaga-tte-mashi-te.
KA. Aki-title-NOM it-ACC doubt-STATE-POLITE-TE

"Where did Yuki go last week? Aki is doubting it."

The licensing conditions

- Now, I submit the following generalisation.

(23) A dependent modal may combine with a formula ϕ given a question Q iff

a. ϕ makes a propositional discourse referent p available,

b. p resolves the question Q, and

c. Q remains unresolved after ϕ is evaluated.

- e.g., “Aki is at home.” is a good answer to “where is Aki?” but Speaker thinks that this question is worth further consideration.

Question partition and propositional CDRT (Hofmann, 2025a)

- To theorise the proposed generalisation, I need a theory which:
  - deals with propositional anaphora, and keeps track of whether and when a question given in a context is resolved.
- *Question partition and propositional CDRT* (Hofmann, 2025a) comes with these desirable features.
  - Especially, it models question meanings with a propositional discourse referent (*dref*).
  - In this talk, I adopt this idea and apply to dependent modals.

Information states and propositional drefs

- Following Hofmann (2019, 2022, 2025b), I model a propositional dref ϕ as a function from assignments to sets of possible worlds.
  - e.g., $\phi(g_1)$ corresponds to [[Anna runs]] and $\psi(g_1)$ corresponds to [[Bede runs]].

	ϕ	ψ	...
g_1	$\{w_a, w_{ab}\}$	$\{w_b, w_{ab}\}$	...

Table: A state and a propositional dref

Question meanings with propositional drefs

- Following Hofmann (2025a), I let a propositional dref ϕ store a question in a context c, a set of states.
  - e.g., $\{\phi(g) : g \in c\}$ = [[Does Ana run?]], $\phi(g_1)$ = [[Ana runs.]] and $\phi(g_2)$ = [[Ana does not run.]]

c	ϕ	...
g_1	$\{w_a, w_{ab}\}$	...
g_2	$\{w_\emptyset, w_b\}$	...

Table: A state and a propositional dref

  - Hofmann (2025a) has the designated dref ϕ_{QUD} that stores Question under Discussion (Roberts, 2012, *et seq*).
  - For an expository sake, I model the question relevant to dependent modals with the designated dref ϕ_{DC_S}, which models Speaker's commitment (Hofmann, 2025b,a).

Inquisitiveness checker

- One of the two central contributions of dependent modals is that it requires the QUD toremain unresolved in the output context.
  - I define global tests INFO(ϕ) and INQ(ϕ).

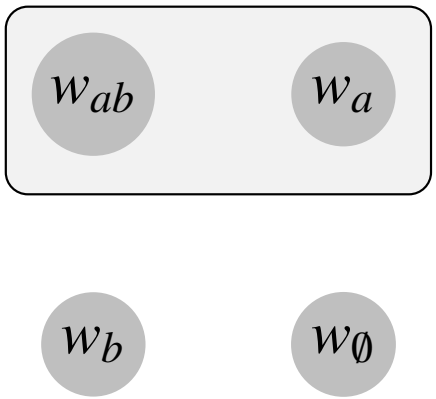
(24) a. $Alt(W) = \{p : \neg\exists p' \in W\,[p \subset p \,\&\, p \in W]\}$

b. $c[\textsc{info}(\phi)] = \begin{cases} c \text{ if } |Alt(W_c\phi)| = 1 \\ \emptyset \text{ otherwise} \end{cases}$

c. $c[\textsc{inq}(\phi)] = \begin{cases} c \text{ if } |Alt(W_c\phi)| > 1 \\ \emptyset \text{ otherwise} \end{cases}$

Inquisitiveness checker.Cont

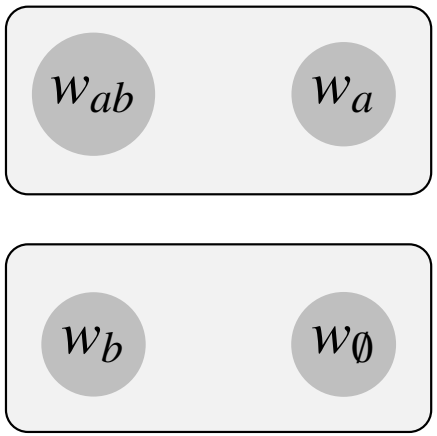
- Suppose $\cup\phi(c) = \{w_{ab}, w_a, w_b, w_\emptyset\}$



informative

$c[\textsc{info}(\phi)] = c$

$c[\textsc{inq}(\phi)] = \emptyset$



inquisitive

$c[\textsc{info}(\phi)] = \emptyset$

$c[\textsc{inq}(\phi)] = c$

Entries for conditionals and conjunction

- I adopt the entry of the declarative mood operator and conjunction from Hofmann (2025b) with modification and simplification.
  - For my purpose, the conditional morphemes have to take two propositions and the antecedent introduces its own set of worlds.

(25) a. $c[\phi \Subset \psi] = \{i : \phi(i) \subseteq \psi(i)\}$

b. $\text{DEC}_S^{\phi} = \lambda P \lambda c.\, c[[\phi]; \phi_{\text{DC}_S} \Subset \phi; P(\phi); \text{INFO}(\phi)]$

c. $\text{AND}^{\phi',\phi''} =$
$\lambda P \lambda Q \lambda \phi \lambda c.\, c[[\phi']; [\phi \Subset \phi']; [\phi'']; [\phi \Subset \phi'']; P(\phi); Q(\phi)]$

d. $\text{COND}^{\phi',\phi''} =$
$\lambda P \lambda Q \lambda \phi \lambda c.\, c[[\phi']; [\phi'']; R(\phi, \phi'); \phi' \Subset \phi''; P(\phi'); Q(\phi'')]$

(26) a. $c[p; q] = c[p][q]$ (Sequencing, i.e. function composition)

b. $c[[\phi]] = \{h : \exists g \in c\,[g[\phi]h]\}$ (**Assignment extension**)

The meaning of dependent modals

- I propose that the base form "hyotto" and "moshika" written as $\Diamond_{dep}$ has a higher-order type entry.
  - ϕ_n is a free occurrence of a propositional dref, performing propositional anaphora.

(27) a. $\Diamond_{dep} = \lambda\zeta\lambda P\lambda\phi\lambda c.\, c[\zeta(P)(P); \phi_n \in \phi_{\text{QUD}}; \text{INQ}(\phi_{\text{QUD}})]$

b. $c[\phi \in \psi] = \begin{cases} c \text{ if } \cup\{\phi(i) : i \in c\} \in \{\psi(i) : i \in c\} \\ \emptyset \text{ otherwise} \end{cases}$

The meaning of dependent modals.Cont

(27a) $\Diamond_{dep} = \lambda\zeta\,\lambda P\,\lambda\phi\,\lambda c.\, c[\zeta(P)(P); \phi_n \in \phi_{DC_S}; \text{INQ}(\phi_{DC_S})]$

- First, it evaluates a dynamic proposition P.
- Second, it requires there to be a dref ϕ whose value resolves the question stored in ϕ_{DC_S}, the question Speaker has in mind.
- Lastly, it requires that the question is still unresolved.

- This captures the proposed generalisation in a compositional way.

The conjoining dependent modal

(27a) $\Diamond_{dep} = \lambda\zeta\,\lambda P\,\lambda\phi\,\lambda c.\, c[\zeta(P)(P); \phi_n \in \phi_{DC_S}; \textsc{inq}(\phi_{DC_S})]$

(25c) $\textsc{and}^{\phi',\phi''} =$
$\lambda P\,\lambda Q\,\lambda\phi\,\lambda c.\, c[[\phi']; [\phi \Subset \phi']; [\phi'']; [\phi \Subset \phi'']; P(\phi); Q(\phi)]$

(28) $\Diamond_{dep}(\textsc{and}) = \lambda P\,\lambda\phi\,\lambda c.\, c[[\phi']; [\phi \Subset \phi']; [\phi'']; [\phi \Subset \phi'']; P(\phi'); P(\phi''); \phi_n \in \phi_{DC_S}; \textsc{inq}(\phi_{DC_S})]$

- (28) evaluates P first, and require there to be a dref ϕ_n that resolves ϕ_{QUD} but ϕ_{QUD} still remains inquisitive after all this.
  - DEC operator requires $\phi_{DC_S} \Subset \phi$ and thus P.

The conditional dependent modal

(27a) $\Diamond_{dep} = \lambda\zeta\,\lambda P\,\lambda\phi\,\lambda c.\, c[\zeta(P)(P); \phi_n \in \phi_{DC_S}; \textsc{inq}(\phi_{DC_S})]$

(25d) $\textsc{cond}^{\phi',\phi''} = \lambda P\,\lambda Q\,\lambda\phi\,\lambda c.\, c[[\phi']; [\phi'']; R(\phi,\phi'); \phi' \Subset \phi''; P(\phi'); Q(\phi'')]$

(29) $\Diamond_{dep}(\textsc{cond}) = \lambda P\,\lambda c.\, c[[\phi']; [\phi'']; R(\phi,\phi'); \phi' \Subset \phi''; P(\phi'); P(\phi''); \phi_n \in \phi_{\mathrm{DC}_S}; \textsc{inq}(\phi_{\mathrm{DC}_S})]$

- Unlike (28), (29) does not require that ϕ entails ϕ' and ϕ''.
  - Thus, even if P is a plain assertion without modals nor the question operator, ϕ_{DC_S} does not entail it.

Conclusion

- This talk described the distributional property of dependent modals in Japanese and proposed a discourse-oriented approach to it.
- This sheds light on the typology of modal adverbs/particles.

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Disjunction I

(30) # Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni
Yuji-TOP {conj dep mod / conj dep mod} home-at
i-ru-**ka** (matawa) ofisu-ni i-ru.
exist-NPST-KA (or) office-at exist-NPST
"Yuji is perhaps at home or at the office."

Disjunction II

- Note that this does not single out disjunctions because each disjunct of a disjunction makes subsequent propositional anaphora available.[1]

(31) a. Steve cheated on the test, or he got really lucky. He told the whole class **that**, but I don't quite believe him.
that: Steve got really lucky. (left disjunct)

b. Either Joyce won the lottery, or she wants everyone to believe **that**.
that: Joyce won the lottery. (right disjunct) (Snider, 2017)

[1]Snider (2017) further shows that left disjunct is available only within the disjunct, i.e. a pronoun outside the disjunct cannot refer back to the left disjunct. This does not matter for my purpose, though.

Disjunction III

- I suggest that disjunction may not license dependent modals for an independent reason:

(32) *Fact*: A disjunction S_1 *or* $S2$ *or* ... *or* S_n constitutes a possible answer to a question Q only if all of $S_1, ..., S_n$ constitute possible answers to Q. (Simons, 1998)

- Given a Q and $p \vee q$, both p and q have to be possible answers to Q.
- This means that the resultant context still retain an issue whether p or q, i.e. $p \vee q$ does not resolve Q because it still leaves p-possibility and q-possibility as options.