Detecting Speaker's bias through questions and modals

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1 Introduction

- This work extends the typology of modal adverbs/particles by identifying **dependent modals**[1] in Japanese, which are formed with two base forms and three modes of verbal conjugations.[2]

(1) **Two base forms and three conjugations of Japanese dependent modals**
{hyo-tto / moshi-ka} - {shi-te / shi-ta-ra / sur-u-to}
{HYO-that / if-KA} - {do-CONJ / do-PAST-then / do-NPST-then}

- Empirical observations:

- (i) dependent modals may only occur in polar questions and epistemic possibility statements

- (ii) they signal speaker's expectation for the prejacent in both of these environments.

- Analytical claims:

- Dependent modals themselves do not contribute modal inferences but are dependent on inferences drawn with polar questions and epistemic possibility statements.

- They uniformly contribute to speaker bias in questions and modal statements relative to *Question under Discussion* (QUD) (Roberts, 2012).

2 Dependent modals in questions

The conjoining dependent modals and the present conditional dependent modals may occur in polar questions while past conditional dependent modals are degraded.

[1] I thank to Lisa Hofmann (p.c.) for suggesting me this terminology.
[2] See Appendix I for examples.

(2) **Dependent modals in polar questions**

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

b. ?? Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni ir-u?
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST

c. 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).

(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))

In polar questions, dependent modals contribute *question bias*, e.g., Ladd (1981); Sudo (2013) (see handout for further examples and contexts to distinguish *epistemic* and *evidential* bias.)

(5) **Diagnosing question bias**
Context: You have things to discuss with Yuji in person, but he is not in his office today.

a. Scenario 1 (**Evidence against the possible answers to "where is Yuji?" that were more likely than** *p*):
Yuji usually works at his favorite cafe around this time of day, but you cannot find him there either. You ask his flatmate whether he is at home. → (2a) ok / (2b) ?? / (2c) ok

b. Scenario 2 (**Evidence against the most likely possible answer to "where is Yuji?"**):
Yuji usually works at his favorite cafe or at home around this time of day. You ask his flatmate whether he is at home. → (2a) ? / (2b) ?? / (2c) ?

c. Scenario 3 (**No evidence for any possible answers to "where is Yuji?"**):
You ask Yuji's flatmate whether he is at home. → (2a) ?? / (2b) ?? / (2c) ??

Crucially, epistemic bias toward the prejacent alone does not make dependent modals felicitous.

(6) Scenario 4 (**Epistemic bias toward** *p*): You have things to discuss with Yuji in person today. It is Wednesday and he usually work at home on Wednesday. → (2a) ?? / (2b) ?? / (2c) ??

In contrast, a plain polar question is fine in all these contexts.

(7) **Plain polar questions do not introduce bias**
Yuji-wa ie-ni ir-u?
Yuji-TOP home-at exist-NPST
"Is Yuji at home?" → ok in Scenario 1-4

Dependent modals in polar questions express that the speaker did not think that the prejacent is likely compared with other alternatives, but they change their mind due to evidence against them.

3 Dependent modals in modal statements

All types of dependent modals may occur in epistemic possibility statements.[3]

(8) **Dependent modals in an epistemic possibility modal statement**

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 {*hyottoshitara* / *moshikashitara*} ie-ni ir-u kamoshirena-i.
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST might-NPST

c. 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.).

(9) **Modal concord in English: two modal expressions express a single modal inference**
He *may perhaps* have forgotten.

a. He *may* have forgotten.

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

However, dependent modals may not occur outside the scope of a licensor, i.e. ? and ◊.

(10) **Dependent modals in declaratives without licensing epistemic modal**

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

b. # Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni ir-u.
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST

c. # 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."

Furthermore, they contribute an inference that is similar to that of the question bias shown in (5-6).

[3]Dependent modals may not occur with epistemic necessity "ni chigai nai." They may not occur with deontic necessity "naker-eba-nara-nai" and weak deontic necessity "beki" either. It sounds degraded with deontic possibility "te-mo-ii" but I am less sure about this. At least, the present conditional dependent modals sound much better than the three expressions mentioned above.

(11) **Diagnosing speaker expectations**
Context: New students came to your lab and some of them share research topics with Yuji. So, you wanted to introduce them to him, but he is not in his office today.

a. Scenario 1 (**Evidence against the possible answers to "where is Yuji?" that were more likely than** p):
Yuji usually works at his favorite cafe around this time of day, but you cannot find him there either. You told the students that Yuji might be at home.
→ (10a) ok / (10b) ok / (10c) ok

b. Scenario 2 (**Evidence against the most likely possible answer to "where is Yuji?"**):
Yuji usually works at his favorite cafe or at home around this time of day. You told the students that Yuji might be at home. → (10a) ? / (10b) ? / (10c) ?

c. Scenario 3 (**No evidence for any possible answers to "where is Yuji?"**):
You told the students that Yuji might be at home. → (10a) ?? / (10b) ?? / (10c) ??

(12) Scenario 4 (**positive epistemic bias toward** p): New students came to your lab and some of them share research topics with Yuji. So, you wanted to introduce them to him. It is Wednesday and he usually work at home on Wednesday. → (10a) ?? / (10b) ?? / (10c) ??

Compare them with a simple epistemic possibility statement.

(13) **Different prior expectations with different epistemic modals**
Yuji-wa ie-ni ir-u kamoshirena-i.
Yuji-TOP home-at exist-NPST might-NPST
"Yuji might be at home." → ok in Scenario 1-4

(13) would not be the most natural utterance to make in this context, considering that the possibility of Yuji being at home is not made particularly relevant here. And yet, (13) is a way to suggest such a possibility in a neutral way regardless of the speaker's expectation on the possible answers.

4 Proposal

- These observations suggest parallelism in polar questions and epistemic possibility statements.

- In both environments, dependent modals introduce question bias in regard to a contextually given question, i.e. *Question Under Discussion* (Roberts, 2012, a.o.).

(14) **An informal felicity condition of dependent modals**
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,

b. S has evidence against some possible answers to Q that are more likely to resolve Q than p, and

c. Q remains unresolved after c is updated with ϕ.

- Crucially, (14c) requires that $\Diamond_{dep}(p)$ is embedded in a polar question or an epistemic possibility modal statement: both ensure that Q is not resilved by the utterance.

- This correctly predicts the observed distribution of dependent modals in Japanese.

5 Conclusion and further prospects

- This poster submitted two empirical observations:

- (i) dependent modals may only occur in polar questions and epistemic possibility statements.

- (ii) they signal speaker's bias toward the prejacent in both environments in a similar manner.

- I proposed a felicity condition for utterances containing dependent modals such that:

- (i) dependent modals express that the speaker thought that the prejacent is not likely to resolve the QUD, but it has become a better option because of evidence against other alternatives.

- (ii) dependent modals themselves must not resolve the QUD, which require them to be embedded under the scope of the polar question operator or the epistemic possibility modal.

- Remaining issues and further prospects:

- **Embedding under other non-vedicical operators**

- The proposed felicity condition predicts that dependent modals are licensed under the scope of *non-veridical* operators, and one should test sentences in which dependent modals are embedded under the scope of non-veridical operators other than ? and $\Diamond$.

- **Strength of the requirement for evidence against competing answers**

- I am assuming that dependent modals semantically require evidence against the more likely possible answers to the QUD, but it can also be a pragmatic condition, which shall be explored.

- **Connection with other concord phenomena**

- The proposed way of obligating embedding of $\Diamond_{dep}$ under ? or $\Diamond$ is reminiscent of analyses of *dependent indefinites* (Brasoveanu and Farkas, 2011; Henderson, 2014, a.o.):

- dependent indefinites have to sit under the scope of (c)overt distributive quantifier because their value has to *co-vary* with another variable and distributivity is a prerequisite for co-variation.

- More generally, the relation between dependent modals and other concord phenomena, e.g., *negative concord*, is worth exploring.

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6 Appendix I: Decomposition

The ingredients of Japanese dependent modals other than "hyo" can independently be observed in other constructions.

First, "sur-u" and "shi-ta" are vanilla light verbs in Japanese.

(15) ***sur-u* and *shi-ta* as light verbs**

a. Yuki-wa itsumo mado gawa-no seki-o yoyaku-*sur-u*. Aki-mo yoku soo-*sur-u*.
Yuki-TOP always window side-GEN seat-ACC reserve-do-NPST. Aki-also often so-do-NPST
"Yuki drove the newest electric car. Aki did so, too."

b. Yuki-wa saishin-no denki jidoosha-o unten-*shi-ta*. Aki-mo soo-*shi-ta*.
Yuki-TOP latest-GEN electric car-ACC drive-do-PAST. Aki-also so-do-PAST
"Yuki drove the newest electric car. Aki did so, too."

Second, V-*te* conjoins two clauses.

(16) Maki-wa gakuwari-o tsuka-*tte* zenkoku-o mawa-tta.
Maki-TOP student discount-ACC use-CONJ entire country-ACC go around-PAST
"Maki went around the entire country with her student discount."

Third, "moshi," "-ra" and "-to" are conditional markers.

(17) ***Moshi* as an optional conditional marker and PAST-*ra* as an obligatory conditional marker**
(*Moshi*) densha-ga okure-ta-*ra* hikooki-no jikan-ni maniawa-na-i.
(if) train-NOM delay-PAST-then plane-GEN time-to make-NEG-NPST
"If the train gets late, we cannot make it to the plane."

(18) ***Moshi* as an optional conditional marker and NPST-*to* as an obligatory conditional marker**
(*Moshi*) densha-ga okurer-u-*to* hikooki-no jikan-ni maniawa-na-i.
(if) train-NOM delay-NPST-then plane-GEN time-to make-NEG-NPST
"If the train gets late, we cannot make it to the plane."

This would point to an approach in which the semantic contribution of dependent modals is derived with the semantic contributions of these expressions.[4]

Further possible support for a decompositional approach comes from a subtle variation in the distribution of dependent modals within the class of epistemic possibility modals. One may express epistemic possibility with "it is possible that *p*" as well.

(19) **Epistemic possibility with "it is possible that *p*"**
Yuji-wa ie-ni ir-u kanousei-ga ar-u.
Yuji-TOP home-at exist-NPST possibility-NOM exist-NPST
"It is possible that Yuji is at home.'

The distribution of dependent modals is different with "kamoshirena-i" (might) and "kanousei-ga ar-u" (it is possible).

(20) **Dependent modals in "it is possible"**

a. ?? Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni ir-u kanousei-ga ar-u.
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST possibility-NOM exist-NPST

b. ?? Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni ir-u kanousei-ga
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST possibility-NOM
ar-u.
exist-NPST

c. Yuji-wa {*hyottosuruto* / *moshikasuruto*} ie-ni ir-u kanousei-ga
Yuji-TOP {pres.cond dep mod / pres.cond dep mod} home-at exist-NPST possibility-NOM
ar-u.
exist-NPST
"It is possible that Yuji is perhaps at home."

One may aim to derive this distributional difference from the difference among the meanings associated with the three conjugation forms.

Appendix II: Double marking with dependent modals

Dependent modals may mark both disjuncts of an *alternative question*. In Japanese, alternative questions are formed with disjunction of two polar questions (Uegaki, 2014, 2018). (21a) exemplifies alternative questions. One may not answer this question with answer particles as exemplified in (21b), which is a signature of alternative questions.

(21) **Alternative questions in Japanese**

a. Yuji-wa ie-ni i-ru? (soretomo) Yuji-wa dekake-tei-ru?
Yuji-TOP home-at exist-NPST (or) Yuji-TOP go out-STATE-NPST
"Is Yuji at home, or going out?"

[4]While I do not discuss it in this presentation, the V-*eba* form is also an obligatory conditional marker and "hyottosur-eba" and "moshikasur-eba" are arguably also instances of dependent modals.

b. {#Hai / #Iie / Yuji-wa ie-ni ir-u(-yo)}
{yes / no / Yuji-TOP home-at exist-NPST-yo}
{Yes / No / Yuji is at home}

With this background, (22a) and (22b) show that it is perfectly fine to put a dependent modal on one of the disjoined questions. For an expository sake, I focus on the conjoining dependent modal.

(22) **Dependent modals may mark one of the disjuncts in an alternative question**

a. Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni i-ru? (soretomo) Yuji-wa
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST (or) Yuji-TOP
dekake-tei-ru?
go out-STATE-NPST

b. Yuji-wa ie-ni i-ru? (soretomo) Yuji-wa {*hyottoshite* / *moshikashite*}
Yuji-TOP home-at exist-NPST (or) Yuji-TOP {conj dep mod / conj dep mod}
dekake-tei-ru?
go out-NPST-NPST
"Is Yuji (perhaps) at home or is he (perhaps) going out?"

Dependent modals may mark both disjuncts of a disjunctive question if they are not contradictory, but they cannot if they are contradictory.[5]

(23) **Dependent modals may only mark non-contradictory disjuncts**

a. Context: Yuji is a smoker but he is not smoking right now.
Yuji-wa {*hyottoshite* / *moshikashite*} okane-ga na-i-no? (soretomo) Yuji-wa
Yuji-TOP {conj dep mod / conj dep mod} money-NOM not-NPST-NO (or) Yuji-TOP
{*hyottoshite* / *moshikashite*} tabako-o yame-ta-no?
{conj dep mod / conj dep mod} cigarette-ACC quit-PAST-NO
"Does Yuji perhaps not have money, or did he perhaps quit smoking?"

b. # Yuji-wa {*hyottoshite* / *moshikashite*} ie-ni ir-u(-no)? (soretomo) Yuji-wa
Yuji-TOP {conj dep mod / conj dep mod} home-at exist-NPST(-Q) (or) Yuji-TOP
{*hyottoshite* / *moshikashite*} ie-ni i-na-i(-no)?
{conj dep mod / conj dep mod} home-at exist-NEG-NPST(-Q)
"Is Yuji perhaps at home or is he perhaps not at home?"

This makes sense if dependent modals express that the speaker is biased toward the prejacent and it is inconsistent to be biased to p and $\neg p$ at the same time.

One may conjoin an epistemic possibility statement with a dependent modal and one without it. Here, I focus on the past conditional dependent modal for an expository sake.

[5]Note that (23a) sounds less natural without the sentence-final particle "-no," which has been assumed to introduce evidential bias (Sudo, 2013; Rieser, 2017) and the same thing applies to (25b). This is presumably because the speaker has made an observation that Yuji is not smoking now, which serves as positive evidence for the prejacent propositions of these questions, i.e. that Yuji does not have money and that Yuji quit smoking. This may indicate that the bias of dependent modals work independently of evidential bias toward the prejacent.

(24) **Dependent modals may mark one of the conjoined epistemic possibility statements**

a. Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni i-ru kamoshirena-i
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST might-NPST
shi, Yuji-wa dekake-tei-ru kamoshirena-i.
and Yuji-TOP go out-NPST might-NPST

b. Yuji-wa ie-ni i-ru kamoshirena-i shi, Yuji-wa {*hyottoshitara* /
Yuji-TOP home-at exist-NPST might-NPST and Yuji-TOP {past.cond dep mod /
moshikashitara} dekake-tei-ru kamoshirena-i.
past.cond dep mod} go out-NPST might-NPST
"Yuji might (perhaps) be at home and he might (perhaps) not be at home."

Double marking is also fine with conjoined epistemic possibility statements. In this case, however, double marking with contradictory statements sounds fine.[6]

(25) **Dependent modals may only mark non-contradictory disjuncts**

a. Context: Yuji is a smoker but he is not smoking right now.
Yuji-wa {*hyottoshitara* / *moshikashitara*} okane-ga na-i-no kamoshirena-i
Yuji-TOP {past.cond dep mod / past.cond dep mod} money-NOM not-NPST-NO might-NPST
shi, Yuji-wa {*hyottoshitara* / *moshikashitara*} tabako-o yame-ta-no
and Yuji-TOP {past.cond dep mod / past.cond dep mod} cigarette-ACC quit-PAST-NO
kamoshirena-i.
might-NPST
"Yuji might perhaps not have money and he might perhaps have quit smoking."

b. Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni ir-u kamoshirena-i
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST might-NPST
shi, Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni i-na-i kamoshirena-i.
and Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NEG-NPST might-NPST
"Yuji might perhaps be at home and he might perhaps not be at home."

This seems to indicate an asymmetry in the strength of bias in polar questions and epistemic possibility statements.

Here, one may assume that a dependent modals requires that no possible answer is more likely than the prejacent, i.e. it tolerates possible answers that are just as likely as the prejacent. Then, (25b) is predicted to be felicitous if the speaker believes that Yuji is as likely to be at home as he

[6]Note that double marking on conjoined modal statements becomes infelicitous if they are also marked with the sentence-final particle "-no." This would be due to an independent difference in the contributions of "-no" in questions and in assertions but I do not have a thing to say about this at this point.

(1) # Yuji-wa {*hyottoshitara* / *moshikashitara*} ie-ni ir-u-no kamoshirena-i shi, Yuji-wa
Yuji-TOP {past.cond dep mod / past.cond dep mod} home-at exist-NPST-NO might-NPST and Yuji-TOP
{*hyottoshitara* / *moshikashitara*} ie-ni i-na-i-no kamoshirena-i.
{past.cond dep mod / past.cond dep mod} home-at exist-NEG-NPST-NO might-NPST
"Yuji might (perhaps) be at home and he might (perhaps) not be at home."

is likely to be not at home. Then, one may try to explain the difference between (25b) and (23b) is that (23b) with the epistemic bias of low negation question (Ladd, 1981, *et seq*): the symmetry observable in (25b) cannot be met in (23b) because of the disjunct with the negated prejacent. However, this may wrongly predict that the p-or-not-questions carry over the epistemic bias toward $\neg p$. Another possibility is that the bias of dependent modals interferes with the *cornering effect*: the speaker 'forces' to answer an answer from the addressee (Biezma, 2009).

(26) Context: You are in charge of coordinating the cooks for the colloquium dinner. John is one of the cooks. You talked to John yesterday and he said he would make stew but did not confirm whether he would also make pasta. Dinner is tomorrow and you need to know what is happening with the pasta.

a. You: Are you making pasta?

b. John: (Silence and dubitative faces)

c. You: Are you making pasta or not? / (C'mon) Are you making pasta?

(Biezma, 2009)

Intuitively, the cornering effect already signals that the speaker has no idea which of p and $\neg p$ is true. Thus, further saying that p and $\neg p$ are in the same likelihood is redundant. However, if one of p and $\neg p$ is more likely than the other, the requirement of dependent modals is not met in one of the disjuncts. Hence, double marking in an alternative question cannot be felicitous in either way. I leave full exploration of this to future research.

Appendix III: An attempt for a full theory (underconstruction)

- I need a framework that (i) may uniformly deal with the effects of polar questions and epistemic possibility modal, (ii) may capture change in the context and speaker's belief.

- For now, I adopt *Dynamic Inquisitive Semantics* (Dotlačil and Roelofsen, 2019).

- Lightning fast intro to Dynamic Inquisitive Semantics:

- A *possibility* p is a pair $\langle w, g\rangle$ of a world w and an assignment g.

- A *state* s is a set of possibilities.

- A *context* c is a *downward closed* set of states, i.e. whenever $s \in c$, for each $s' \subseteq s$, $s' \in c$.

- Some update rules are defined below.

(27) a. **Evaluation of n-ary relation**:
$c[R(u_1)...(u_n)] = \{s : \forall\langle w, g\rangle \in s\,[\langle g(u_1), ..., g(u_n)\rangle \in I_w(R)]\}$

b. **Existential quantification**:
$c[\exists u] = \{s' : \exists s \in c\,\forall\langle w, g\rangle \in s\,\exists\langle w', h\rangle \in s'\,[w = w' \,\&\, g[u]h]$
$\&\,\forall\langle w', h\rangle \in s'\,\exists\langle w, g\rangle \in s\,[w = w' \,\&\, g[u]h]\}$

c. **Conjunction** (function composition): $c[\phi \wedge \psi] = c[\phi][\psi]$

d. **Disjunction** (inquisitive/split disjunction): $c[\phi \vee \psi] = c[\phi] \cup c[\psi]$

e. **?-operator**: $c[?\phi] = c[\phi] \cup c[\neg\phi]$

- The notion of propositions includes declaratives and interrogatives.

(28) **Inquisitive and non-inquisitive propositions**:
A proposition p is *inquisitive* iff $\cup c[p] \notin c[p]$, and *non-inquisitive* iff $\cup c[p] \in c[p]$.

- I enrich this system with *Strength Ranking* $\geq_S$ (Beaver and Clark, 2009; Coppock and Beaver, 2014) in a way proposed in Nakamura and Mizutani (2024).

- $\geq_S$ gives a reflexive, antisymmetric and transitive ordering of 'classical' propositions.

- Since downward closing property provides way more ordering candidates than classical propositions, we restrict it to maximal states, also called *alternatives* (Ciardelli et al., 2018).

- A maximal state corresponds to the non-exhaustive construal of a non-inquisitive proposition.

(29) **Maximal states / Alternatives**:
s is a *maximal state / alternative* in c, i.e. $s \in Max(c)$, iff $s \in c \,\&\, \neg\exists s' \in c\,[s \subset s']$

- Since any non-inquisitive proposition p has a greatest element (Ciardelli et al., 2018), non-inquisitive propositions can be distinguished by just looking at their alternatives.

- Accordingly, $\geq_S$ can directly be applied to give an ordering among alternatives.

(30) **The set of ordered propositions**
$c_{\geq_S} = \{s : s \in Max_c \,\&\, \forall s' \in Max_c\,[s \neq s' \rightarrow [s \geq_S s' \vee s' \geq_S s]]\}$

- With these ingredients, I aim to define $\Diamond_{dep}$ in a way that it

- (i) updates $c_{\geq_S}$ so that the maximal state in which p is true is ranked low in $c_{\geq_S}$, and

- (ii) imposes a constraint such that p is not entailed in the global output context.

- (31) gives the first trial for defining an update with dependent modals.

(31) $c[\Diamond_{dep}(p)] = c[p]$ defined iff

a. $\cup c \notin c$, (**the context c is inquisitive**)

b. $\cup c[p] \in c$, (p **may resolve the issue in** c)

c. $|Max(c)| = |Max(c[p])|$, and (**an update with p preserves the original issue in c**)

d. $\cup c[p] \in c_{\geq_S} \,\&\, \exists s \in c_{\geq_S}\,[s \geq_S \cup c[p]] \,\&\, \forall s' \in c[\Diamond_{dep}(p)]_{\geq_S}\,[\cup c[p] \geq_S s']$
(**the rank of p changes from a non-highest position to the highest position**)

- However, this entry does not work ultimately.

- The conditions (31a) and (31b) can be plain input conditions which are stated relative to the prejacent p.

- However, the issue-invariance condition has to be checked against the **global output context**:

- for ϕ such that $\Diamond_{dep}(p)$ is a sub-formula of ϕ, it has to be the case that $|Max(c)| = |Max(c[\phi])|$,

- i.e. it is an instance of *split-scope*.

• To deal with this, the current setting of Dynamic Inquisitive Semantics has to be enriched.

- One way is to implement to this system *post-supposition*, which is a not-at-issue content that is evaluated against the context in which all the at-issue contents have been evaluated.

- This allows one to check the issue-invariance condition against $?(\Diamond_{dep}(p))$ and $\Diamond(\Diamond_{dep}(p))$.

• Other split-scope mechanism would do as well and I leave this exploration for future research.