A compositional account of Japanese *ka*
in Inquisitive Semantics

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1 **Japanese *ka***

- The multifunctional particle *ka* occurs in questions, indefinites, and disjunctions. This calls for a compositional treatment in inquisitive semantics (Szabolcsi 2015, Ciardelli, Groenendijk & Roelofsen 2018).

1.1 **Questions**

- Both yes/no and constituent questions in Japanese often contain the question particle *ka* (e.g. Kratzer & Shimoyama 2002, Szabolcsi 2015, Uegaki 2018).

- Yes/no questions can be formed directly from a declarative sentence by adding a sentence-final *ka*:

\[ \text{John-wa} \ ikimashita \ *ka*? \]
\[ 'Did John go?' \]

\[ \text{John-TOP} \ ikimashita \ Q \]

- *Wh*-phrases in constituent questions remain in-situ. *Wh*-words such as *dare* and *nani* are commonly referred to as indeterminate pronouns (Shimoyama 2001).

\[ \text{Dare-ga} \ ikimashita \ *ka*? \]
\[ 'Who went?' \]

\[ \text{Who-NOM} \ ikimashita \ Q \]

\[ \text{John-wa} \ nani-o \ tabemashita \ *ka*? \]
\[ 'What did John eat?' \]

\[ \text{John-TOP} \ nani-o \ tabemashita \ Q \]

- Another use of *ka* is to turn an indeterminate pronoun (e.g. *dare*) into an indefinite:
1.2 Indefinites

(4) Dare-ka-ga ikimashita.
who-INDEF-NOM went
‘Someone went.’

• \textit{ka} is also used to mark the disjuncts of a disjunction:

1.3 Disjunctions

John-DISJ Mary-DISJ-NOM went
‘John or Mary went.’

• The only inquisitive semantic treatment so far is \textit{Szabolcsi (2015)}, which is ambitious in its scope but does not provide a compositional account.

• \textit{Uegaki (2018)} is a unified compositional account but uses alternative rather than inquisitive semantics.

• Alternative semantics is well known to interact poorly with binding \textit{(Shan 2004)}, while inquisitive semantics presents no such problems \textit{(Ciardelli, Roelofsen & Theiler 2017)}.

• Here we provide novel evidence that \textit{ka} is able to long-distance bind indeterminates, and present a compositional account.

• For illustration, we first couch our account in classical predicate logic, and switch to inquisitive semantics in the second part.

2 Long-distance binding of indeterminates by \textit{ka}

• We start by focusing on the nature of the relationship between question-forming \textit{ka} and indeterminates.

2.1 \textit{Wh}-Locality Effects

• \textit{Wh}-phrases in Japanese have been said to scope outside of islands, e.g. complex noun phrase island in \textit{(6a)} adjunct island in \textit{(6b)}.
This poses problems for theories that assume in-situ wh-phrases covertly move to Spec, CP (e.g. [Lasnik & Saito 1990], [Hoji 1985]; see also [May 1985]).

But it has been claimed that wh-phrases resist scoping out of wh-islands ([Nishigauchi 1986], [Shimoyama 2001, 2006], [Watanabe 1992]).

The following judgment is from [Shimoyama 2006]:

(7) Taro-wa [Yamada-ga dare-ni nani-o okutta ka] tazunemasita ka?
Taro-TOP Yamada-NOM who-DAT what-ACC sent Q asked Q
a. ‘Did Taro ask what Yamada sent to whom?’
b. ?*‘Who \( x \) did Taro ask what Yamada sent to \( x \)?’
c. *‘What \( x \) did Taro ask to whom Yamada sent \( x \)?’
d. ?*‘Who \( x \) did Taro ask whether Yamada sent what to \( x \)?’

[Shimoyama (2006)] takes the scope of Japanese wh-phrases to be limited by wh-islands but by no other islands.

This motivates her to adopt an alternative semantics analysis ([Hamblin 1973], [Rooth 1985]), which interprets wh-phrases in-situ.

The alternatives introduced by a wh-phrase are propagated up until C. After C, the alternatives cannot be accessed by a higher clause.

2.2 Wh-Locality is Not a Hard Constraint

[Shimoyama’s] theory is designed to rule out a matrix scope interpretation of a wh-phrase in an embedded question.

But the matrix scope reading is attested, in contradiction to the generalization above: (e.g. [Richards 1997], [Hirotani 2003], [Kitagawa 2005]).
(8) John-wa [Mary-ga nani-o katta ka] shirimasu ka?
             John-TOP Mary-NOM what-ACC bought Q know Q
‘Does John know what Mary bought?’ (embedded scope)
‘What x does John know whether Mary bought x?’ (matrix scope)

- Notably, Hirotani (2003) presents experimental evidence that speakers of Tokyo Japanese find this reading more readily available when presented with a certain prosody.

- Shimoyama’s account undergenerates the full range of possible question meanings in Japanese.

2.3 Kratzer’s (2005) Local Movement

- In response to Hirotani, Kratzer (2005) implements a minor change to Shimoyama’s account. Here we show that this is not sufficient.

- Kratzer suggests that the wh-phrase in (8) may undergo covert movement to Spec, CP.

- This gives the wh-phrase an escape hatch—no longer c-commanded by the embedded ka, its alternatives are accessible to the matrix clause.

- See below for Kratzer’s (2005) covert local movement.
• This analysis does not violate the *wh*-island constraint.

• That constraint *should* be violated if we embed the *wh*-phrase under yet another island.

• In sentence (10a), the *wh*-phrase is in a complex noun phrase island. In (10b), it is in an adjunct island. Japanese consultants judged both readings to be available in each case.

(10) a. John-wa [[nani-o osieru sensei]-ga kitano ka] kikimashita ka?
John-TOP what-ACC teach teacher-NOM came Q asked Q
‘Did John ask what the teacher who came teaches?’
‘What x did John ask whether a teacher who teaches x came?’
John-TOP Mary-NOM what-ACC did after LOC nap-NOM did Q  
asked  
Q  
‘Did John ask what x is such that Mary napped after she did x?’  
‘What x did John ask whether Mary napped after she did x?’

- **Kratzer** presents the covert local movement as subject to island constraints, so this will not account for the matrix scope readings in (10).

- This motivates a system that builds in more flexible scope-taking of *wh*-phrases.

### 3 A Semantics for *Wh*-phrase Binding

- In this section we develop an analysis in the spirit of [Baker (1970)] and [Karttunen (1977)], in which Q morphemes may bind any number of *wh*-phrases, similarly to unselective quantifiers ([Lewis 1975]).

- **Shimoyama (2001)** considers essentially this analysis before discarding it in favor of alternative semantics.
  
  - *ka* takes in a TP with 0 or more variables. After lambda abstraction, *ka* combines with the TP, resulting in a set of propositions.
  
  - This set contains propositions in which any variables have been substituted with actual entities in the domain.

- Individual entries for different instances of *ka*, modeled after the Q morpheme in [Karttunen (1977)]...  

\[
\begin{align*}
\text{(11)} & \quad [ka^0] = \lambda A_{(st)} \lambda p_{(s,t)} : (p = A(x) \lor \lambda w_s. -A(w)) \\
\text{b. } [ka^1] = & \lambda A_{(e,st)} \lambda p_{(s,t)} : (\exists x. p = A(x)) \lor (p = \lambda w_s. -\exists x. A(x)(w)) \\
\text{c. } [ka^2] = & \lambda A_{(e, (e,st))} \lambda p_{(s,t)} : (\exists x \exists y. p = A(x)(y)) \lor (p = \lambda w_s -\exists x \exists y. A(x)(y)(w)) \\
& \text{... and so on.}
\end{align*}
\]

- ...can be captured in this single generalized entry (*x* represents a series of zero or more variables).

\[
\begin{align*}
\text{(12)} & \quad [ka] = \lambda A_{(e^n,(e,st))} \lambda p_{(s,t)} : (\exists x. (p = A(x))) \lor (p = \lambda w_s. -\exists x A(x)(w))
\end{align*}
\]
In this system, an indeterminate pronoun denotes a variable.

\[ [\text{dare}_1] = v_1 \]

In order to avoid interpreting indeterminates as ordinary pronouns, we also propose a condition on \( wh \)-binding:

(13) \( Wh \)-Binding Condition

All \( wh \)-phrases must be bound.

A sample derivation with these assumptions:

(14) a. Mary-wa dare-o mimashita ka?
    Mary-TOP who-ACC saw Q
    ‘Who did Mary see?’

b. \([\text{Mary-wa dare}_1 \text{-o mimashita}]^{w, \delta} = \lambda w.\text{saw}_w(Mary, v_1)\]

c. \([\text{Mary-wa dare}_1 \text{-o mimashita \ ka}_1]^{w, \delta} =
    \lambda p_{(s, t)}.(\exists x.p = \lambda w.\text{saw}_w(Mary, x)) \lor (p = \lambda w_s.\neg\exists x.\lambda w.\text{saw}_w(Mary, x)(w))
    = \{\text{Mary saw Bill, Mary saw Julie...}\}\]

3.1 Derivation of Both Readings

Using the semantics outlined above, we can now straightforwardly derive the two possible readings of question (15):

(15) John-wa [Mary-ga nani-o katta \ ka] shirimasu ka?
    John-TOP Mary-NOM what-ACC bought Q know Q
    ‘Does John know what Mary bought?’ (embedded scope)
    ‘What x does John know whether Mary bought x?’ (matrix scope)

In the embedded scope reading, the embedded \( ka \) binds the \( wh \)-phrase, and the matrix \( ka \) does not bind anything:

\[ [\ldots \text{wh}_1 \ldots \text{ka}_1] \text{ ka}]\]

In the matrix scope reading, the embedded \( ka \) does not bind the \( wh \)-phrase. It is instead bound by the matrix \( ka \), which gives the phrase matrix scope:

\[ [\ldots \text{wh}_1 \ldots \text{ka}] \text{ ka}_1] \]

See Fig. [1] and [2] in the Appendix for full derivations.
4 Interim conclusion

- Japanese questions have in large part motivated the use of Hamblin-Rooth style theories of questions (Shimoyama 2006, Kratzer 2005).
- Our new Japanese data is problematic for these analyses.
- In the system so far:
  1. *wh*-phrases denote variables bound by question morpheme *ka*.
  2. This question morpheme binds any number of *wh*-phrases.
- The account straightforwardly models ambiguities in Japanese questions.
- This account on its own does not explain why the matrix-scope reading of embedded *wh*-phrases is more marked.
  - But, interpretation is highly sensitive to prosodic and pragmatic factors (Hirotani 2003, Kitagawa 2005). A hard syntactic constraint is therefore not likely to provide an explanation for this.

5 Indefinites

- We have assumed that indeterminate pronouns denote variables, so that they can be nonlocally bound by Q-forming *ka*.
- This turns out to be necessary even for indefinites: the following is grammatical for some speakers (Yatsushiro 2009, Uegaki 2018):

\[(16) \begin{array}{l}
\text{[Nani-o nusunda juugyouin]-ka-ga taihosareta.} \\
\text{what-ACC stole employee-INDEF-NOM be.arrested} \\
\text{‘An employee or other who had stolen something was arrested.’}
\end{array}\]

- According to Uegaki (2018) whether an indeterminate is interpreted as a question word or as an indefinite depends on whether *ka* binds it from a CP or sub-CP position.
- Japanese lacks determiners, so we assume that the existential force of the (complex) subject is contributed by a silent operator ∃.
- We assume that *ka* takes scope at the edge of the noun phrase, above this operator:
In simpler examples, we Montague-lift dare before we abstract over its variable. This allows us to reuse our entry for ka:

(17) Dare-ka-ga nemutta.
who-INDEF-NOM slept
'Someone slept.'
6 Disjunction

- Szabolcsi (2015) argues that in disjunction uses, each ka marks a disjunct and is itself meaningless.

- An abstract coordinator, which is licensed by the presence of ka, contributes semantic disjunction.

- This makes sense given that the coordinator can also be overt (Uegaki 2018).

- This can be straightforwardly implemented in the style of Partee & Rooth (1983):

  (18) John-ka Mary-ka-ga nemutta.
  John-ka Mary-ka-NOM slept
  ’John or Mary slept.’

- Again, one problem with this is that there is nothing in common between the disjunction use and the other uses of ka.

- Also, Uegaki (2018) observes that when two ka-marked CPs (as opposed to smaller constituents such as TPs or DPs) are coordinated, the result is a question. Crucially, this is the case even when these CPs are themselves declarative (19). But coordinating two of our declarative CPs would result in a disjunction, not a question.

  Hanako-NOM ran-seem-DISJ Jiro-NOM ran-seem-DISJ tell
  ‘(Tell me) which is true: It seems that Hanako ran or it seems that Jiro ran.’
  *(Tell me) it seems that Hanako ran or it seems that Jiro ran.’
7 Moving towards a Unified Analysis of *ka*


- One issue with this: in his semantics, *ka* does not get “bound”, it just introduces alternatives (as in Kratzer & Shimoyama 2002). Thus there is no handle on long-distance binding of indeterminates.

- Introducing binding into alternative semantics runs into technical issues (Shan 2004).

- Inquisitive Semantics sidesteps this issue (Ciardelli, Roelofsen & Theiler 2017).

- We start by introducing the basics of Inquisitive Montague Grammar (developed in unpublished notes since 2015 by Ivano Ciardelli, Lucas Champollion and Floris Roelofsen; similar to Ciardelli, Roelofsen & Theiler 2017).

8 Inquisitive Montague Grammar

- Inquisitive Montague Grammar (InqMG) reconstructs inquisitive semantics within the resources of Ty2 (Gallin 1975).

- We use $s$ for the type of possible worlds, and $w, w', \ldots$ for variables over possible worlds. We model states as sets of possible worlds (type $\langle s, t \rangle$). We use $s, s' \ldots$ for variables over states. We write $p, p' \ldots$ for variables over inquisitive propositions (ie. sets of states).

- For $s_0$ a state (type $\langle s, t \rangle$), we write $\hat{s}_0$ for the powerset of $s_0$, that is, the set of all states that entail $s_0$, written out as $\lambda s.s \subseteq s_0$. This predicate is of type $\langle st, t \rangle$. More generally, for any nonnegative integer $n$, if $s_n$ is an $n + 1$-place relation between $n$ entities and a world, we write $\hat{s}_n$ for the relevant relation $\lambda \bar{x} \lambda s.s \subseteq s_n(\bar{x})$.

- Assume that the object language contains a constant $\text{talks}$ of type $\langle e, st \rangle$ that represents the relation that holds between an entity $x$ and a world $w$ iff $x$ talks at $w$. We then let $\text{talks}$ denote the relation that holds between an entity $x$ and a state $s$ iff $s$ entails that $x$ talks:

$$
(20) \quad \text{talks} = \lambda x \lambda s.s \subseteq \lambda w.\text{talks}(x)(w) \quad \text{type } \langle e, \langle st, t \rangle \rangle
$$

- We will abbreviate the type $\langle st, t \rangle$ as $T$. 

• Using the notation just introduced, we can write this more simply as follows:

\[(21) \text{talks} = \lambda x.\widehat{\text{talks}}(x) \quad \text{type } \langle e, T \rangle \]

• We represent proper names as constants:

\[(22) \begin{align*}
&\text{a. } [\text{John}] = j \quad \text{type } e \\
&\text{b. } [\text{Mary}] = m \quad \text{type } e
\end{align*} \]

• So we have, by function application:

\[(23) [\text{John talks}] = \widehat{\text{talks}}(j) = \{s \mid \forall w \in s. \text{talks}(j)(w)\} \quad \text{type } T \]

• We treat transitive verbs analogously: Assume a constant \(\text{loves}\) of type \(\langle e, \langle e, \langle e, \text{st} \rangle \rangle \rangle\) that maps any \(x\) and \(y\) to the state that \(x\) loves \(y\). Then we represent the denotation of \(\text{loves}\) as follows:

\[(24) [\text{loves}] = \lambda y \lambda x.\lambda s.s \subseteq \lambda w.\text{loves}(x)(w) \quad \text{type } \langle e, eT \rangle \]

• This can be equivalently written as:

\[(25) [\text{loves}] = \lambda y \lambda x.\widehat{\text{loves}}(x)(y) \quad \text{type } \langle e, eT \rangle \]

9 Connectives and quantifiers

• We assume the intersective, type-polymorphic theory of \(\text{and}\) (e.g. Partee & Rooth [1983]). Simplifying slightly, define an inquisitive-conjoinable type as either the type \(T\) or a type \(\langle \alpha, \beta \rangle\) where \(\alpha\) is any type and \(\beta\) is an inquisitive-conjoinable type. Then for any inquisitive-conjoinable type \(\tau\) we define:

\[(26) \begin{align*}
&\text{a. } [\text{and}] = \lambda P.\lambda Q.\tau.P \cap Q \quad \text{type } \langle \tau, \tau\tau \rangle \\
&\text{b. } [\text{or}] = \lambda P.\lambda Q.\tau.P \cup Q \quad \text{type } \langle \tau, \tau\tau \rangle
\end{align*} \]

• As a special case, we will write \(\lor\) (pronounced \(\text{inquisitive or}\) or \(\text{i-or}\)) for the case where we disjoin two inquisitive propositions \(p\) and \(q\) of type \(T\). That is, \(\lambda p.\lambda q.\lambda s.(p)(s) \lor q(s)\). Similarly for \(\land\).
Inquisitive conjunction and disjunction share various desirable properties with ordinary conjunction and disjunction, such as idempotence and associativity.

We assume that proper names can be lifted to generalized quantifiers (note the type):

\[ \text{Lift}(\text{John}) = \lambda_{(eT)} P(j) \quad \text{type } \langle eT, T \rangle \]

We assume that declarative sentences contain a silent complementizer \( C_{\text{decl}} \) that flattens meanings. This denotes the noninquisitive closure of its complement:

\[ ! \overset{\text{def}}{=} \lambda_{pT} \varphi(\bigcup(p)) = \lambda_{pT} \lambda_{wst} \forall w. s(w) \rightarrow \exists s'. p(s') \wedge s'(w) \quad \text{type } \langle T, T \rangle \]

\[ [C_{\text{decl}}] = ! \]

This has the following effect, familiar from the inquisitive semantic literature: Where \( A \lor B \) denotes the set of all states that entail \( A \) or entail \( B \), \( !(A \lor B) \) denotes the set of all states that entail \( A \lor B \), including those that do not entail one of the disjuncts.

\[ [C_{\text{decl}} \text{ [John or Mary walk]}]
= !(\hat{W}(j) \lor \hat{W}(m)) \quad \text{type } T
= \lambda_{wst} s \subseteq [\lambda w. W(j)(w) \lor W(m)(w)] \]

By comparison, here is what we would get if we did not apply \( ! \):

\[ [\text{John or Mary walk}]
= \hat{W}(j) \lor \hat{W}(m) \quad \text{type } T
= \lambda_{wst} [s \subseteq \lambda w. W(j)(w)] \lor [s \subseteq \lambda w. W(m)(w)] \]

We define inquisitive negation, \( \neg \), as in basic inquisitive semantics:

\[ \neg_{\langle T, T \rangle} = \lambda_{pT} \lambda_{wst} \forall s'. p(s') \rightarrow s \cap s' = \emptyset \quad \text{type } \langle T, T \rangle \]

We represent the meaning of truth-functional linguistic negation via inquisitive negation.

\[ [\text{not}] = \lambda_{pT}. \neg p \quad \text{type } \langle \alpha, T \rangle \]

We write \( \exists x \varphi \), where \( \varphi \) is of type \( T \), for \( \lambda_{s_{(s,t)}} \exists x. \varphi(s) \).

We write \( \forall x \varphi \), where \( \varphi \) is of type \( T \), for \( \lambda_{s_{(s,t)}} \forall x \varphi(s) \).
• One could also define $\exists$ and $\forall$ categorically as $\lambda P. \bigcup_x P(x)$ and $\lambda P. \bigcap_x P(x)$.

• One can define $\lor$ as $\lambda p \lambda q. p \cup q$. This brings out the similarity with $\exists$. Similarly for $\land$ and $\forall$.

10 Questions

• We can formalize question-marking $ka$ in InqMG, following the predicate logic entry in the first part:

$$[ka] = \lambda P'' ? \exists x! P(x)$$

• The $\exists$ introduces a different alternative for each possible value of the indeterminate pronoun(s).

• If there are no indeterminate pronouns, ? turns this into a YNQ. If there are, ? introduces an alternative for “none of the above”.

• The ! in $ka$ flattens alternatives before outputting an inquisitive proposition. This is necessary because disjunctions and indefinites lose their inquisitive potential under question-marking $ka$:

  John-DISJ Mary-DISJ-NOM came Q tell
  ‘Tell me whether either John or Mary came.’ (YNQ)
  *‘Tell me which is true: John came or Mary came.’ (AltQ)

(36) Nani-ka-o katta ka oshiete.
  what-INDEF-ACC bought Q tell
  ‘Tell me whether you bought something.’ (YNQ)
  *‘Tell me what you bought.’ (ConstQ)

• That the alternatives are live before the complementizer kicks in is suggested by counterfactual antecedents, which validate SDA (Ciardelli 2016; Ciardelli, Zhang & Champollion 2018). Here the complementizer is the conditional marker.

(37) #John-ka Gojira-ka-ga kita-ra Mary-wa yorukobu-daroo.
  John-DISJ Godzilla-DISJ-NOM came-if Mary-TOP be.happy-would
  ‘If John or Godzilla came then Mary would be happy.’
• Application to a simple yes/no question:

(38) John-wa ikimashita ka?
John-TOP went Q
‘Did John go?’

?∀\tilde{g}(j)

\tilde{g}(j) ka

λP?∃x!P(\vec{x})

John went
j λx.\tilde{g}(x)

• Application to a wh-question:

(39) Dare-ga nani-o kaimashita ka?
who-NOM what-ACC bought Q
‘Who bought what?’

?∃x∃y!\tilde{b}(y, x)

λyλx.\tilde{b}(y, x) ka

λP?∃x!P(\vec{x})

λx.\tilde{b}(v_1, x) 1

\tilde{b}(v_1, v_2) 2

dare_1 λx.\tilde{b}(x, v_2)

v_1 nani_2 bought
v_2 λyλx.bought(x, y)

11 Embedding

• Let Dox_x^w denote the information state of x in w (the set of all worlds compatible with x’s beliefs).
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- Simplifying a bit, we can then give an entry for know (Ciardelli, Roelofsen & Theiler 2017):

$$[\text{know}] = \lambda p \lambda y \lambda s. s \in p \land \forall w \in s. [\text{Dox}^w_y \in p]$$

(40)

(41) John-wa Mary-ga nani₁-o katta ka₁ shirimasu ka?

John-TOP Mary-NOM what-ACC bought Q know Q
‘Does John know what Mary bought?’

- Recall that our entry for question-embedding ka is $\lambda P?\exists!x.!(x)$.

- When the indeterminate is bound by the lower ka, that ka is in effect interpreted as $\lambda P?\exists!y.!(y)$. The higher ka binds no variable and is in effect interpreted as $\lambda p?!p$.
12 Indefinites

- For indefinite-forming \(ka\) in InqMG, we propose an entry that looks very similar to our predicate logic formalization:

\[
[ka] = \lambda R \lambda P \exists x. R(x)(P)
\]

- Derivation for non-local sub-CP \(ka\)-binding:

\[
[Nani-o nusunda juugyouin]-ka-ga taihosareta.
\]

what-ACC stole employee-INDEF-NOM be.arrested

‘An employee or other who had stolen something was arrested.’
We represent the meaning of the silent indefinite that applies to the complex noun phrase as $!\exists x.P(x)$ and assume that it denotes $\lambda P^!\lambda P!\exists x.P(x) \land P^!(x)$.

As before, in a simpler indefinite, the indeterminate is lifted before $ka$ applies, but this time to form an inquisitive proposition (of type $T$):

(45) Dare-ka-ga nemutta.
who-INDEF-NOM slept
‘Someone slept.’
13 Disjunctions

- As in our predicate logic formalization, ka is a semantically vacuous marker of disjunction.
- We propose that the silent coordinator has the same denotation we defined for English or:

  \[ [\text{coord}] = \lambda P_\tau \lambda Q_\tau. P \cup Q \]

- As a special case, when it coordinates two DPs of type \( \langle eT, T \rangle \), this amounts to the following:

  \[ [\text{coord}_{\text{DP}}] = \lambda Q_2 \lambda Q_1 \lambda P. Q_1(P) \lor Q_2(P) \]

- And when it coordinates two TPs or CPs of type \( T \), we have this:

  \[ [\text{coord}_{\text{CP}}] = \lambda q \lambda p. p \lor q \]

- Recall that Uegaki (2018) observes that sub-CP level disjunctions (e.g. DP, TP) are interpreted as declaratives while CP-level disjunctions are interpreted as alternative questions.

- For sub-CP level disjunction, a silent \( C_{\text{decl}} \) flattens alternatives. We illustrate this first with DP-level disjunction:

  \[ [D_P][\text{John-ka}] [\text{Mary-ka}]\text{-ga nemutta.} \]
  \[ \text{John-DISJ}\quad \text{Mary-DISJ-NOM slept} \]
  \[ \text{‘John or Mary slept.’} \]
• With [Uegaki (2018)] and references therein, we assume that *mitai* “seems” selects for TP complements while *oshiete* “tell” selects for CP complements.

• For TP-level disjunction, a silent $C_{\text{Decl}}$ flattens the alternatives as in the DP case. We omit the contribution of *seems* here:

\[(50) \quad \text{[TP][John-ga nemutta-ka] [Mary-ga nemutta-ka]} \mitai \text{-da.}
\]
\[\text{John-NOM slept-DISJ Mary-NOM slept-DISJ seem-COP}
\]
\[\text{‘It seems that John slept or Mary slept.’}
\]
In the case of CP-level disjunction, the coordinator takes in two CPs; there is no higher $C_{\text{decl}}$ that would flatten the alternatives of the disjunction. This explains the AltQ reading:

(51) $[_{CP}[\text{John-ga nemutta-ka}] [\text{Mary-ga nemutta-ka}]]$ (oshiete).

'Tell me which is true: did John sleep or did Mary sleep?'

\[
\lambda p. p \not\forall p' \lor \lambda p'. \lambda p. p \not\forall p'
\]

\[
\lambda A.(\forall x.(p = A(x)) \lor (p = \lambda w. \neg \exists x A(x)(w)))
\]

Uegaki (2018) uses type mismatches to determine whether a disjunction has declarative or question-denoting force. Sub-CP disjunctions trigger a type shifter that collapses the two alternatives into one.

It is not clear to us how this distinguishes TP- from CP-level disjunction since the two have the same type.

14 Conclusion

Our predicate logic denotations for $ka$ did not appear to have much in common:

(52) Question-marking: $[ka] = \lambda A.(\forall x.(p = A(x)) \lor (p = \lambda w. \neg \exists x A(x)(w)))$

(53) Indefinite-marking: $[ka] = \lambda R \lambda P \exists y. R(y)(P)$

(54) Disjunction: $\lambda Q_2 \lambda Q_1 \lambda P. Q_1(P) \lor Q_2(P)$
• It is not obvious what the first has in common with the second and third.

• Our InqMG denotations for ka all contribute inquisitive meaning:

\[(55)\] Question-marking: \([ka] = \lambda P^n?\exists\vec{x}!P(\vec{x})\]

\[(56)\] Indefinite-marking: \([ka] = \lambda R\lambda P\exists x.R(x)(P)\]

\[(57)\] Disjunction: \([\text{coord}] = \lambda P_1\lambda Q_1.P \cup Q\) (presence indicated by ka on the disjuncts)

• Recall that one can define \(\lor\) as \(\lambda p\lambda q.p \cup q\) and \(\exists\) as \(\lambda P.\bigcup_x P(x)\).

• So have we achieved a unified treatment?

• We have improved on the first part by making question-forming ka similar to the others in that they are now all defined in terms of union. This is in the spirit of InqSem.

• The remaining differences are due to two factors:

  – In the case of disjunction, we may have two ka rather than one as one might expect from English. We have followed [Szabolcsi (2015)] and assumed that there is underlingly just one coordinator.

  – For indefinites, we have generalized from the worst case: the nonlocal indefinite formation. But aside from this, even for simple cases, it does not seem easy to reuse the question-marking or disjunction entry without changes.

• Ordinary predicate logic does not allow us to even come up with a unified kernel for this multifunctional particle. Inquisitive semantics holds out the promise that this might be possible, and inquisitive Montague Grammar provides the resources for modeling nonlocal binding cases.

• The question whether a fully unified and compositionally explicit account in inquisitive semantics is possible remains open.
Appendix

Figure 1: Predicate logic derivation of embedded scope reading for (15)
\[
\begin{align*}
\lambda p_{(s,t)} . (\exists x. p = \lambda w_s. \text{know}_w (john, [\lambda q_{(s,t)} . (q = \lambda w'_s. \text{buy}_{w'} (mary, x))] \lor (q = \lambda w'_s, -\text{buy}_{w'} (mary, x)))) \\
\lor (p = \lambda w_s, -\exists x. \lambda w_s. \text{know}_w (john, [\lambda q_{(s,t)} . (q = \lambda w'_s. \text{buy}_{w'} (mary, x))] \lor (q = \lambda w'_s, -\text{buy}_{w'} (mary, x))))
\end{align*}
\]

Figure 2: Predicate logic derivation of matrix scope reading for (15)
References


