Hagstrom, 1998- Chapter 5

A semantics for single questions and indefinites

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I. Introduction

Aim of the paper

To assign a consistent semantic contribution to the *-ka* morpheme which participates both in the semantics of indefinites and questions.

(1) a. John-ga nani-**ka**-o kaimasita.
John-NOM what-**Q**-ACC bought
'John bought something.'

b. John-ga nani-o kaimasita **ka**?
John-NOM what-ACC bought **Q**
'What did John buy?'

Background

1. Questions as sets of propositions

- Questions do not have a truth value but they require a response of a certain kind; namely, they are request for a true statement.

Postulates (Hamblin, 1958: 162)

I. An answer to a question is a statement.
II. Knowing what counts as an answer is equivalent to knowing question.

Postulate I suggests that fragment answers should be elliptical for the complete statement.
Postulate II suggests that a question serves to specify the set of "possible answers".

- Possible answer must be a statement in the form *x broke the toaster* for the question *who broke the toaster*.
- Hamblin (1973): The semantic value of a question is the set of its possible answers.

2. Some basic assumptions about semantic composition

- The semantic interpretation is derived compositionally from the syntactic structure.
- Following Heim and Kratzer (1998) in that QR is for repairing the semantic mismatch.
- Movement relations of this kind cause λ-abstraction.
- Semantic type of propositions: <st> (the characteristic function of a set of possible worlds). It will be abbreviated as <p>.

II. *-ka* as existential quantification over choice functions I: indefinites

Aim

The preliminary semantics for indefinites like *dare-ka* 'someone' which is composed of a wh-word and the question marker *-ka*.

Step 1

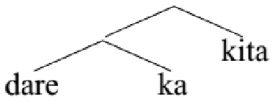
(2)

a. dare-ka-ga kita.
who-Q-NOM came
'Someone came.'

b. There is a person *x* such that *x* came.

- First, there is the existential statement 'there is an *x* (such that P(*x*)).
- Second, there is an additional restriction that *x* be a person.
- The domain of restriction on the values of *x* is a property of the wh-word component.
- If *dare* contributes the restriction set, *-ka* is responsible for the variable which *dare* restricts.

(3)



dare: the extensional property of being human, type <et>
ka: function which yields an individual with that property, type <et,e>

Choice function:
(4) A function *f* is a *choice function* if it applies to a (non-empty) set and yields a member of that set.

-ka contributes a choice function which takes *dare* as its argument and returns an individual, which in turn becomes an argument to the verb *kita*.

- The meaning we are seeking: '*x* came, where *x* is the individual chosen by the choice function *f* from the set of people.'
- The meaning of (3): 'some choice function *f* can be found such that the person chosen by *f* came.'

We have to explain the existential force of *dareka*, and we are seeking the following meaning:
(5) $\exists f . \text{came}'(f([\![\textit{dare}]\!]))$

Step 2

Possibility: Existential closure- If *-ka* represents a choice function variable, existential closure over that variable would yield the meaning in (5). Below, we will see that the existential closure is not the source of ∃ in (5).

In (6), the indefinites are interpreted as variables without quantificational force of their own. *Everything* has inherent quantificational force. The QR is necessary in (7) as opposed to (6).

(6)

a. If someone$_i$ falls from the fifth floor, he$_i$ *very rarely* survives.
b. If something$_i$ is published in LI, John *usually* reads it$_i$.

(7)
* If everything$_i$ (submitted) is published in LI, John (usually) reads it$_i$.

The important point here is that quantificational variability if a property of simple variables.

In Japanese, bare nouns are like indefinites in English, so they are also variables in the same sense, but not the indefinites formed with wh-word + *-ka*. (9) is ill-formed on the reading where *sore* 'it' meant to refer to *nanika*, which does not introduce a simple variable. (*nanika* patterns with *nanimo* 'everything' in that sense).

(8)

a. MIT Press-ga ronbun$_i$-o syuppansureba John-ga *taitei* sore$_i$-o yomu.
MIT P.-NOM article-ACC published-if John-NOM *usually* it-ACC read
'If MIT Press publishes an article$_i$, John usually reads it$_i$.'
='Most articles published by MIT Press are such that John reads them.'
(Shigeru Miyagawa, Hidekazu Tanaka, Junko Shimoyama, p.c)

b. Hon$_i$-o saigo-made yonda hito-wa *taitei* sore$_i$-o utte simatta.
book-ACC end-to read person-TOP *usually* it sold ended
'A person who read a book$_i$ to the end usually ended up selling it$_i$.'
='Most books read to the end are sold (by the reader)'
(Nishigauchi 1990:142)

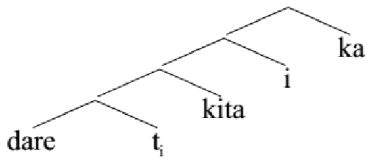
(9)
* MIT Press-ga nanika$_i$-o syuppansureba
MIT P.-NOM something-ACC published-if
John-ga *taitei* sore$_i$-o yomu.
John-NOM *usually* it-ACC read
('If something$_i$ is published by MIT Press, John usually reads it$_i$.')
(='Most things published by MIT Press are such that John reads them.')
(Shigeru Miyagawa, p.c.)

Nanika seems to have an existential quantificational force.

Remember that our attempt was to discover where the existential quantificational force comes from in (5).

Existential force must be an inherent part of the semantic value of *-ka* and the existential quantifier must be realized outside the predicate via QR mechanism.

(10)



-ka: a higher type, a quantifier over choice functions, type <ct, p> abbreviating the type of choice functions <et,e> as <c>. It is a function from sets of choice functions to propositions.

It QRs leaving a trace of type <c>. The result of lambda abstraction is a function from choice functions to propositions of type <cp>. It is an *unsaturated proposition* which requires a choice function to become a proposition.

(11)

a. $[\![\textit{dare}]\!] = \lambda x.\text{human}'(x)$ <et>

b. $[\![\textit{-ka}]\!] = \lambda p_c \lambda w \exists f.p_c(f)(w)$ <cp,p>

(12)

$\lambda x.\text{human}'(x) = \text{WHO}$	<et>
$\lambda P.f(P)$	<c> = <et,e>
$f(\text{WHO})$	<e>
$\lambda x \lambda w.\text{came}'(x)(w)$	<ep> = <e,st>
$\lambda w.\text{came}'(f(\text{WHO}))(w)$	<p>
$\lambda f \lambda w.\text{came}'(f(\text{WHO}))(w)$	<cp>
$\lambda p_c \lambda w \exists f.p_c(f)(w)$	<cp,p>
$\lambda w \exists f.\text{came}'(f(\text{WHO}))(w)$	<p>

III. *-ka* as existential quantification over choice functions II: questions

Aim

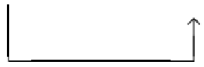
To explain how this proposal also accounts for questions.

(13)

dare-ga hon-o kaimasita **ka**?
who-NOM book-ACC bought **Q**
'Who bought books?'

(14)

dare t_i … kaimasita-**ka**?



Adopting Hamblin/Karttunen-style semantics, what semantic value we expect the question in (13) to have, characterizing the sets of propositions of the form *x bought books*:

(15)

$\lambda p \exists x.p = \lambda w.\text{bought}'(x, \text{books}')(w)$

But this is not what we want; the answers should be restricted to cases in which *x* takes on a value from the set of human individuals.

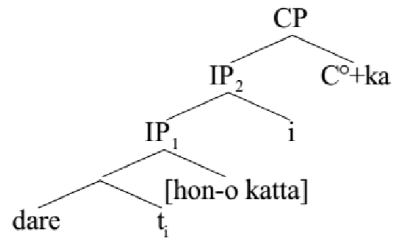
We need to replace *x* with the choice function variable *f(WHO).* (WHO is referring to set of human individuals.)

The set of propositions characterized by (16) contains the propositions of the form *x bought books* for all the values of *x* that can be chosen from the set of WHO.

(16)

$\lambda p \exists f.p = \lambda w.\text{bought}'(f(\text{WHO}),\text{books}')(w)$

(17)



The sister of C after the movement of *-ka* will be the proposition abstracted over choice functions. The semantic value of the complex C head:

(18)

$[\![[C°+\text{-}ka]]\!] = \lambda p_c \lambda p \exists f.p=p_c(f)$ <cp,pt>

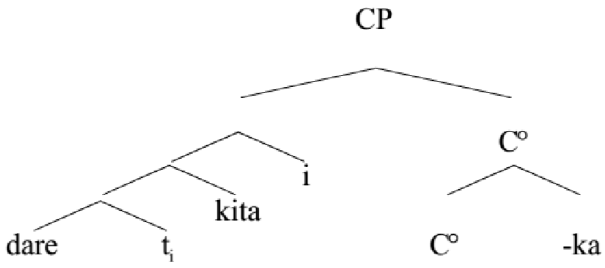
What the complex C does is to take the unsaturated proposition which requires a choice function, hence has type <cp> as argument and turn it into set of propositions of type <pt>.

The interrogative C takes *-ka* as its argument and returns (18).

- *-ka* is of type <cp,p>, a function from unsaturated propositions to propositions and C+*-ka* is of type <cp, pt>, a function from unsaturated propositions to sets of propositions.

The derivation of *dare-ga kita-no?* 'who came?':

(19)



$\lambda Q \lambda p_c \lambda p[Q(\lambda g[p=p_c(g)])]$	<<cp,p>,<cp,pt>>
$\lambda p_c \lambda w \exists f.p_c(f)(w)$	<cp,p>
$\lambda p_c \lambda p \exists f[p=p_c(f)]$	<cp,pt>
$\lambda f \lambda w.came'(f(\text{WHO}))(w)$	<cp>
$\lambda p \exists f.p=\lambda w.came'(f(\text{WHO}))(w)$	<pt>

The fundamental point

The semantics of *-ka* in questions is the same as it was for indefinites, an existential quantifier quantifying over choice functions.

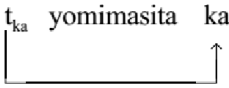
IV. *Wh*-words in islands and flexible functional application

Wh-words in complex noun phrases and adjuncts

(20)

kimi-wa [**dare**-ga kai-ta hon-o] yomi-masi-ta **ka**?
you-TOP **who**-NOM wrote book-ACC read.POL **Q**
'Who did you read books that t wrote?' (Nishigauchi 1990:40)

kimi-wa [dare-ga kaita hon-o] t_{ka} yomimasita ka?



New issues

- The trace of *-ka* is a choice function variable as we showed in the previous section.
- In (20), the choice function variable is outside of the entire proposition and it takes that proposition as its argument.
- If choice function chooses a member from a set, where is this set in (20)?
- The choice functions discussed previously were choice functions from sets of individuals to individuals. What semantic type are the members of the set in (20)?

Let us first work out the compositional semantics of an island, leaving aside these issues for a while.

Relative clause modification is the intersection of the properties expressed by the head noun and by the relative clause:

(21)

$[\![[[\text{dare-ga kaita }] \text{ hon-o}]]\!] =$

$[\![\text{hon}]\!] \cap [\![\text{dare kaita}]\!] =$

$\lambda x.\text{book}'(x) \cap \lambda x.\text{wrote}'(\text{WHO}, x) =$

$\lambda x.[\text{book}'(x) \,\&\, \text{wrote}'(\text{WHO}, x)]$

WHO is the set of human individuals and the verb 'wrote' is a two-place predicate with arguments of individuals. Type mismatch!

How to compose a property of individuals and a set of individuals?

- We perform the composition with each of the individuals in the set of individuals and we collect the results in a set, getting set of properties (already proposed by Hamblin, 1973).
- If we assume that WHO consists of {A, B, C}:

(22)

$\lambda x[book'(x) \& \{wrote'(A, x), wrote'(B, x), wrote'(C, x), \ldots\}] =$

$\{ \lambda x[book'(x) \& wrote'(A,x)], \lambda x[book'(x) \& wrote'(B,x)], \ldots \} =$

$\{ P: \exists y \in \text{WHO}: P = \lambda x[book'(x) \& wrote'(y,x)] \}$

When predicate receives a set of arguments instead of a single argument, we create a set of results of applying the predicate to each of the arguments in the set of arguments. This is called ***flexible functional application***.

(23)

FLEXIBLE FUNCTIONAL APPLICATION

$[\![f\ a]\!] =$ (where f and a are sisters)

(i) $f(a)$

(ii) $\lambda m \exists x.[m=f(x) \wedge a(x)]$

(iii) $\lambda m \exists g.[m=g(a) \wedge f(g)]$

(iv) $\lambda m \exists g \exists x.[m=g(x) \wedge f(g) \wedge a(x)]$

whichever is defined.

Going back to our issues

- The island in (20) will be represented as a set of properties.
- The set which the choice function introduced by *-ka* takes as argument is (22) and it is a set of properties.
- The choice function is a truly *general* choice function- not a choice function restricted only to choosing from sets of individuals- with the type $<\alpha t,\alpha>$.

If we continue through the derivation of (20), we get the following:

(24)

$[\![C^{o}+ka]\!] \exists x.\text{you-read}'((f(A))(x)) =$

where $A = \{ P: \exists y \in \text{WHO}: P = \lambda x[book'(x) \& wrote'(y,x)] \}$

$\lambda p \exists f.p = \exists x.\text{you-read}'((f(A))(x))$

"$\exists x$" comes from the existential closure over the indefinite object and *A* is standing in for the set of properties in (22). The function in (24) characterizes the set we want as our answer set for (20):

(25)

{you read a book A wrote, you read a book B wrote, you read a book C wrote, …}

where WHO = {A, B, C, …}

The fundamental point

When *-ka* is launched from a place where it takes a constituent larger than a wh-word as its argument, the semantics will still work out if we use *flexible functional application* by which we allow sets to propagate through the semantics.

V. Conclusion

- The semantic value of a wh-word is a set of individuals and the basic semantic value of *-ka* is that of an existential quantification over choice functions.
- The trace of *-ka* introduces a choice function variable.
- With these assumptions both indefinites and single wh-questions can be accounted at the same time.
- The island case can also be accounted for if we adopt *flexible functional application*.

Reference

Hagstrom, P. A. 1998. Decomposing Questions. Ph.D. thesis. MIT.