Some Extensions of a Choice Function Analysis of Null Arguments

Takeo Kurafuji
Ritsumeikan University, Kyoto, Japan

kurafuji@fc.ritsumei.ac.jp
A semantic analysis of null arguments in Japanese

The Skolemized choice function analysis

Null arguments in contrastive contexts
  +
  Missing antecedent cases
Kurafuji 2019

Partially controlled null subjects
NEW
1. Introduction
   -top  self-gen car-acc  wash-past

b. Erika-mo ø arat-ta.
   -also  wash-past

‘Ken washed (some of) his car(s).

Erika washed \(<\left\{\begin{array}{l}
(some\ of)\ her\ car(s)/
(some\ of)\ his\ car(s)/
a\ car/cars
\end{array}\right\}\ >,\ too.’
Syntactic approaches

(2) VP-ellipsis with V-to-I raising

Ken washed (some of) his car(s).

Erika washed < \{ (some of) her car(s)/ (some of) his car(s) \} >.

Syntactic approaches

(3) LF-copy

LF: Ken washed [DP self’s car]  Erika washed [_________]
    copy and binding


(4) PF-deletion

PF: Ken washed [DP self’s car]  Erika washed [DP self’s car]

In all of these syntactic analyses, the identity relation between null elements and their antecedents is required.

\[
\text{[antecedent } \alpha ] \quad \quad \quad \quad \quad \text{[phonetically null } \alpha ]
\]
Semantic approaches

Hoji 1998 – *pro* in “concept” use

Tomioka 2003 – *pro* as property-anaphora

(5) The Hoji-Tomioka thesis:

Null arguments are indefinite.
CLAIM

(6) The Hoji-Tomioka thesis is basically correct.

Null arguments

↑

Skolemized choice functions
(7) Definition of choice function

\[ \text{CH}(f) \iff \forall P [P \neq \emptyset \rightarrow f(P) \in P] \]

Example

boy' =\{a, b, c\} \quad f(\text{boy'}) = f(\{a, b, c\})

= a \quad \text{or}

= b \quad \text{or}

= c
Syntactic representation of null arguments

(8)

\[ f \] 

\[ FP \ e \]

most salient property in context 

à la Tomioka (2003)

```
Skolemization

\[ f_x \]

\[ FP \ e \]

\[ [NP \emptyset] \]

\[ <\langle e, t, e \rangle, e> \]

\[ <e, t> \]
```
(9) Japanese bare nouns have no singular/plural distinction.

\[ \text{[\text{CAR}]}^M = \]

\[
\begin{array}{cccccc}
\text{a} \oplus \text{b} \oplus \text{c} \oplus \text{d} \\
\text{a} \oplus \text{b} \oplus \text{c} \\
\text{a} \oplus \text{d} \oplus \text{e} \\
\text{a} \oplus \text{b} \\
\text{b} \oplus \text{d} \\
\text{a} \\
\end{array}
\]

\[
\begin{array}{cccccc}
\text{a} \oplus \text{b} \oplus \text{c} \oplus \text{d} \oplus \text{e} \\
\text{a} \oplus \text{b} \oplus \text{c} \oplus \text{e} \\
\text{a} \oplus \text{b} \oplus \text{d} \oplus \text{e} \\
\text{a} \oplus \text{c} \oplus \text{d} \oplus \text{e} \\
\text{b} \oplus \text{c} \oplus \text{d} \oplus \text{e} \\
\end{array}
\]

\[f(\text{CAR}) = \text{a} \text{ or } \text{b} \text{ or } \ldots \text{ or } \text{a} \oplus \text{b} \oplus \text{c} \oplus \text{d} \oplus \text{e}
\]

\[= \text{a car or cars}\]
Representations with choice functions

(1) a. ‘Ken₂ washed (some of) his₂ car(s). b. Erika₃ washed ø, too.’

(10) readings of (1b)

a. [IP Erika₃ f[ø] washed] ~> ∃f[CH(f) ∧ WASH(f(CAR))(erika)]
   “Erika washed (a) car(s).”

b. [IP Erika₃ f₃[ø] washed] ~> ∃f[CH(f) ∧ WASH(f_{erika}(CAR))(erika)]
   “Erika washed (some of) her car(s).”

c. [IP Erika₃ f₂[ø] washed] ~> ∃f[CH(f) ∧ WASH(f_{ken}(CAR))(erika)]
   “Erika washed (some of) Ken’s car(s).”
(11) Quantified antecedent cases (Takahashi 2008: 310)

a. Hanako-ga taitei-no sensei-o sonkeisi-tei-ru.
   -nom most-gen teacher-acc respect-prog-pres

b. Taro-mo ø sonkeisi-tei-ru.
   -also respect-prog-pres

(i) ‘Hanako respects most teachers. Taro respect <them>, too.’
(ii) ‘Hanako respects most teachers. Taro respect <most teachers>, too.’
(12) $\exists f[CH(f) \land RESPECT(f(TEACHER^{1/2}))](taro)]$

(13) $[[ TEACHER^{1/2} ]]^M =$

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2. Evidence for semantic approaches
(14) Implicational bridging

a. [Taitei-no keirinsensyu]_x-wa reesu mae tannenni
   most-gen bike.racer -cont race before carefully
   [zibun]_x-no [zitensya]-o teiresu-ru.
   self-gen bike-acc take.care.of-pres

b. Sikasi, [taitei-no kyooteisensyu]_y-wa
   but most-gen motor.boat.racer-cont
   amari ø teiresi-na-i.
   so.much take.care.of-neg-pres

‘Before races, most bike racers\textsuperscript{x} take care of their\textsuperscript{x} bikes very carefully, but most motor boat racers\textsuperscript{y} do not take care of <their\textsuperscript{y} motor boats> so much.’

(Kurafuji 2019: 14)
Implicational bridging

(15)

(i) If $x$ is a racing bike, then $x$ is racing conveyance.

(ii) If $x$ is racing conveyance, $y$ a boat racer, and $y$ handles $x$, then $x$ is a racing boat.
(16) Implicational bridging

a. [Taitei-no kikon dansei]ₙ-wa [zibunₙ-no tuma]-o
   most-gen married man-cont self-gen wife-acc
   sinraison-tei-ru.
   trust-prog-pres

b. Sikasi, [taitei-no kikon zyosei]ₚ-wa
   but most-gen married woman-cont
   sorehodo ø sinraison-tei-na-i.
   that.much trust-prog-neg-pres

‘Most married menⁿ trust theirⁿ wives, but most married
womenʸ do not trust <theirʸ husbands> very much.’

(Kurafuji 2019: 14)
Implicational bridging

(17)

(i) If y is x’s wife, then y is x’s spouse.

(ii) If y is a woman and x is y’s spouse, then x is y’s husband.
(18) Deep anaphora

[ Watching a boy hitting his arm ]

Hanako-mo yoku ø tatai-te-ru yo.
-also often hit-prog-pres prt

‘Hanako also often hits <her arm>.’

(Kasai 2014: 171)
3. Evidence for the Skolemized choice function approach
(19)
Every professor will rejoice if a student in the syntax class cheats on the exam.

(Ruys 1992: 101)
(20)

a. narrow: every prof > if > a student

\[ \forall x[\text{professor}'(x) \rightarrow [\exists y[\text{student}'(y) \land \text{cheat}'(y)] \rightarrow \text{rejoice}'(x)]] \]

b. super-wide: a student > every prof > if

\[ \exists y[\text{student}'(y) \land \forall x[\text{professor}'(x) \rightarrow [\text{cheat}'(y) \rightarrow \text{rejoice}'(x)]]] \]

c. intermediate: every prof > a student > if

\[ \forall x[\text{professor}'(x) \rightarrow \exists y[\text{student}'(y) \land [\text{cheat}'(y) \rightarrow \text{rejoice}'(x)]]] \]
(21) Representations with choice functions

a. narrow: every prof > if > a student

$$\forall x[\text{professor}'(x) \rightarrow \exists f[\text{CH}(f) \land \text{cheat}'(f(\text{student}')) \rightarrow \text{rejoice}'(x)]]$$

b. super-wide: a student > every prof > if

$$\exists f[\text{CH}(f) \land \forall x[\text{professor}'(x) \rightarrow [\text{cheat}'(f(\text{student}')) \rightarrow \text{rejoice}'(x)]]]$$

c. intermediate: every prof > a student > if

$$\forall x[\text{professor}'(x) \rightarrow \exists f[\text{CH}(f) \land [\text{cheat}'(f(\text{student}')) \rightarrow \text{rejoice}'(x)]]]$$
(22) Variations of intermediate scope representation

a. \((21c)\)
\[
\forall x [\text{professor}'(x) \rightarrow \exists f [\text{CH}(f) \land [\text{cheat}'(f(\text{student}')) \rightarrow \text{rejoice}'(x)]]]
\]

b. with a Skolemized choice function existentially closed
\[
\exists f [\text{CH}(f) \land \forall x [\text{professor}'(x) \rightarrow [\text{cheat}'(f(x)(\text{student}')) \rightarrow \text{rejoice}'(x)]]]
\]

c. with a contextually given Skolemized choice function
\[
\forall x [\text{professor}'(x) \rightarrow [\text{cheat}'(f(x)(\text{student}')) \rightarrow \text{rejoice}'(x)]]
\]

\[\Rightarrow \text{Kratzer (1998)}\]
(23) Intermediate readings of null arguments

a. Taitei-no zyosei kyaku-wa, dezaato-ga
   most-gen female customer-top dessert-nom
   oisi-kereba, yorokob-u.
   delicious-cond be.pleased-pres

b. Taitei-no dansei kyaku-wa,
   most-gen male customer-top
   ø maamaa-nara manzokusu-ru.
   so.so-cond be.satisfied-pres

‘Most female customers will be happy if a dessert is delicious.
Most male customers will be satisfied if <a dessert> is so-so.’

(Kurafuji 2019: 9)
(24) The intermediate reading of (23b)

a. Most$_x$[male-customer'(x)]
   \[\exists f[\text{CH}(f) \land [\text{so-so}'(f(dessert')) \rightarrow \text{be-satisfied}'(x)]]\]

b. \(\exists f[\text{CH}(f) \land \text{Most}_x[\text{male-customer}'(x)] \land [\text{so-so}'(f_x(dessert')) \rightarrow \text{be-satisfied}'(x)]]\]

c. Most$_x$[male-customer'(x)][so-so'(f$_x$(dessert')) \rightarrow be-satisfied'(x)]]
(25) Support for Skolemization

a. Sono paatii-ni Ann-wa ryouri-o motteki-ta.
   that party-to -cont dish-acc bring-past

b. Sikasi, Erika2-wa ø motteko-nakat-ta.
   but -cont bring-neg-past

‘To that party, Ann brought a dish, but Erika didn’t bring <a dish>.’

(Kurafuji 2019: 10)
(26) ‘Erika didn’t bring <a dish>’ = (25b)

a. \( \neg \exists f[\text{CH}(f) \land \text{bring}(f(dish))(\text{erika})] \)

b. \( \exists f[\text{CH}(f) \land \neg \text{bring}(f_{\text{erika}}(\text{dish}))(\text{erika})] \)

b’. \( \neg \text{bring}(f_{\text{erika}}(\text{dish}))(\text{erika}) \)

(27) Context for (26b/b’)

Ann, Brenda, Cindy, and Erika were expected to bring something to eat to the party. Before the party, they discussed what to bring, and agreed that pizza, pasta, salad, and sandwiches were definitely indispensable. They decided who would bring which dish, and each of them was assigned a specific dish to bring. To that party, Ann brought a dish, but Erika didn’t bring <a dish>. It was pasta.
(28) Deep anaphora

(Kurafuji 2019: 12)

Uti-no kurasu-no taitei-no gakusei-wa, my-gen class-gen most-gen student-top

[ ø yomi-yasukat-tara], totemo yorokobu-darou naa. read-easy-cond very be.pleased-will prt

‘Most of the students in my class will be very happy if <a book> is easy to read.’
Andy will be very happy if the syntax book is easy to read.

Billy will be very happy if the phonology book is easy to read.

Cindy won’t be very happy if any of these five books are easy to read.

\[ \text{MOST}_x[\text{student'}(x)[\text{if } f_x(\text{BOOK}) \text{ is easy to read, } x \text{ will be very happy}]] \]
4. Extension: Partial control
(30)  *John assembled in the hall.
(31)  John expects PRO to assemble in the hall.
     PRO = John + someone else
(32)  Partial control predicates: glad, sad, regret, remember_{PC}, like, dislike, hate, loath, surprised, shocked, sorry, enjoy, imagine, deny, want, prefer, yearn, arrange, hope, afraid, refuse, agree, plan, aspire, decide, mean, intend, resolve, strive, demand, promise, choose, offer, eager, ready, wonder, ask, find out, interrogate, inquire, contemplate, deliberate, guess, grasp, understand, know, unclear, expect, vote, advise, recommend

(Pearson 2016: 693)
(33) Japanese control constructions
(Uchibori 2000, Fujii 2006, Akuzawa 2017 a.o.)

a. Soori daizin2-wa [ø2/*3 zininsu-ru koto]-o kessinsi-ta.
prime minister-top resign-pres thing-acc decide-past

‘Prime Minster decided to resign.’

b. Soori daizin2-wa [ø2/*3 zininsi-yoo to] omot-ta.
prime minister-top resign-exhortative comp think-past

‘Prime Minster thought that he would resign.’
(34) Plural predicate with singular-denoting anaphora

*Dono daizin\textsubscript{2}-mo zibun\textsubscript{2}-no situmusitu-ni atumat-ta.
which minister-\forall self-gen office-in gather-past

‘*Every minister\textsubscript{2} gathered in his\textsubscript{2} office.’

cf. Dono daizin\textsubscript{2}-mo atumat-ta.
which minister-\forall gather-past

‘Every minister /All ministers gathered.’
(35) Partial control in Japanese

a. Dono daizin2-mo [ø zibun2-no situmusitu-ni atumar-u koto]-o kessinsi-ta.
   which minister-∀ self-gen office-in gather-pre thing-acc decide-past

   ‘Every minister decided to gather in his office.’

b. Dono daizin2-mo [ø zibun2-no situmusitu-ni atumar-oo to] omot-ta.
   which minister-∀ self-gen office-in gather-exhortative comp think-past

   ‘Every minister decided/hoped to gather in his office.’
(35) Partial control in Japanese

a. Dono daizin2-mo [ø zibun2-no situmusitu-ni atumar-u koto]-o kessinsi-ta.

which minister-∀ self-gen office-in gather-pres thing-acc decide-past

‘Every minister decided to gather in his office.’

Question: In which world are they?
(35) a. ‘Every minister decided to gather in his office.’

(36) A *de dicto* reading context for (35a)

Every minister decided to invite and talk to senators who supported his policies in his office, but unfortunately there were no such senators.

They exist in the attitude holders’ decision worlds
(35) a. ‘Every minister decided to gather in his office.’

(37) An intermediate reading context for (35a)

Ministers A, B, and C had appointments with her local advocates, CEOs from foreign companies, and some activists, respectively. Their meetings were all confidential. So they decided to gather in their own offices.

They exist in the world of evaluation (“the real world”).
(35) a. ‘Every minister decided to gather in his office.’

(38) A mixed reading context for (35a)

Minister A decided to meet her local advocates in her office, Minister B decided to invite ambassadors of EU countries, and Minister C decided to invite anyone who endorsed his policies, though there were no such people.

every minister > implicit plural subject > attitude predicate
attitude predicate > implicit plural subject

in the real world

\{ \text{de dicto} \}
(35) a. ‘Every minister decided to gather in his office.’

(36) A *de dicto* reading context for (35a)

Every minister decided to invite and talk to senators who supported his policies in his office, but unfortunately there were no such senators.

```
  every minister > attitude predicate > implicit plural subject
```

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  every minister > implicit plural subject > attitude predicate
  attitude predicate > implicit plural subject
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Pearson’s (2017) centered worlds

(39) Licensing partial control (Pearson 2017: 719)
A control predicate C is a partial control predicate iff:
(i) it is a canonical attitude predicate and
(ii) it licenses non-simultaneous interpretations.

(40) a. *John pretended to live together.
b. John pretended to be living together.
c. John pretended to have lived together. (Pearson 2017: 714)
Pearson’s (2017) centered worlds analysis

(41)  
\[
\lambda t \lambda w \forall <w', t', y> [<w', t', y> \in \text{Expect}_{\text{John}, w, t} \rightarrow \exists <w'', t'', z> [<w'', t'', z> \text{ is an extension of } <w', t', y> \& z \text{ assembles in the hall in } w'' \text{ at } t'']]
\]
(42) *Expect*-alternatives

\[ \text{Expect}_{x, w, t} = \{<w', t', y>: \text{it is compatible with what } x \text{ expects in } w \text{ at } t \]
for \( x \) to be \( y \) in \( w' \) and for \( t \) to be \( t' \} \]

(43) Extension

For any pair of world-time-individual triples \(<w, t, x>\) and \(<w', t', y>\),
\(<w', t', y>\) is an extension of \(<w, t, x>\) iff for every \( \alpha, \beta \) such that \( \alpha \) is a
coordinate of \(<w, t, x>\) and \( \beta \) is a coordinate of \(<w', t', y>\) of the same
type as \( \alpha \), either

(i) \( \alpha \leq \beta \),   (ii) \( \alpha < \text{precedes } \beta \) or   (iii) \( \beta < \text{precedes } \alpha \)
(44) John expects PRO to assemble in the hall.

centered worlds: \(<w_1', t_1', j'>, <w_2', t_2', j'>, <w_3', t_3', j'>, ...\)

extensions: \(<w_1'', t_1'', j \oplus \alpha >, <w_2'', t_2'', j \oplus \alpha >, <w_3'', t_3'', j \oplus \alpha >, ...\)

John+\(\alpha\) assemble in \(w_1''\) at \(t_1''\)
John+\(\alpha\) assemble in \(w_2''\) at \(t_2''\)
John+\(\alpha\) assemble in \(w_3''\) at \(t_3''\)

John’s expectation in \(w\) at \(t\)
Pearson’s analysis with extension predicts that when \( \alpha \) is indefinite, only *de dict* readings are possible.
Pearson’s semantics is weak. *De re*, intermediate, and mixed readings of plural PROs such as (37) and (38) cannot be captured.

(37) An intermediate reading context for ‘Every minister decided to gather in his office.’

Ministers A, B, and C had appointments with her local advocates, CEOs from foreign companies, and some activists, respectively. Their meetings were all confidential. So they decided to gather in their own offices.

(38) A mixed reading context for ‘Every minister decided to gather in his office.’

Minister A decided to meet her local advocates in her office, Minister B decided to invite ambassadors of EU countries, and Minister C decided to invite anyone who endorsed his policies, though there were no such people.
Proposal

Skolemized Choice Function Analysis

(45) Intensionalized Skolemized Choice Function

\[ FP(e) \]

\[ f_{w,x} \quad [\text{NP } \emptyset]_w \]

\[ <s, <e, <<s, <e, i>>, e>>, <s, <e, i>> \]

Skolemized Choice Function Analysis

(46) a. de dicto
\[ \forall x[\text{minister}'_w(x) \rightarrow [\forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \\
\exists t''[t' < t'' \land f_{w', x}(\text{PERSON}_w) \text{ gather}_w \text{ in } x's \text{ office at } t'']]]) \]

b. intermediate
\[ \forall x[\text{minister}'_w(x) \rightarrow [\forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \\
\exists t''[t' < t'' \land f_{w, x}(\text{PERSON}_w) \text{ gather}_w \text{ in } x's \text{ office at } t'']]]) \]

c. mixed
\[ \forall x[\text{minister}'_w(x) \rightarrow [\forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \\
\exists t''[t' < t'' \land f_{w, x}(\text{PERSON}_w) \text{ gather}_w \text{ in } x's \text{ office at } t''] \\
\lor \exists t''[t' < t'' \land f_{w, x}(\text{PERSON}_w) \text{ gather}_w \text{ in } x's \text{ office at } t’’ ]]] \]
Skolemized Choice Function Analysis

(47) generalized

\[ \forall x[\text{minister'}_w(x) \rightarrow [\forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \exists t''[t' < t'' \land f_{w|w', x'}(\text{PERSON}_{w|w'}) \text{gather}_{w'} \text{in } x \text{'s office at } t'']]], \]

where \( w|w' \) stands for ‘\( w \) or \( w' \).’
(48) ‘Every minister decided PRO to gather in his office.’

LF: \( \lambda w[\text{every minister}_2 \ x_2 \ \text{decided} [\lambda x' \lambda w' [ f_{w|w'}(\text{PERSON}_{w|w'}) \ \text{to gather in his}_2 \ \text{office}]]] \)

truth conditions = (46):

\[ \forall x[\text{minister}'_w(x) \rightarrow [\forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \exists t''[t' < t'' \wedge f_{w|w'}(\text{PERSON}_{w|w'}) \ \text{gather}_w \ \text{in x’s office at t'']}]], \)

where \( w|w' \) stands for ‘\( w \) or \( w' \).’

(49) lexical entry of \textit{koto-taking} \textit{kessins} ‘decide’

\[
[[ \textit{kessins} ]] = \lambda P \lambda x \lambda t \lambda w \forall <w', t', x'>[<w', t', x'> \in \text{Decision}_{x, w, t} \rightarrow \exists t''[t' < t'' \wedge P(x')(t'')(w')]]
\]

\( \text{Decision}_{x, w, t} = \{<w', t', x'>: \text{it is compatible with what x decides in w at t} \)
for x to be x' in w' and for t to be t'\}
Summary

• Interpretive variabilities of null arguments can be best captured by Skolemized choice functions.
• Partially controlled PROs exhibit intermediate scope readings.
• Pearson’s (2017) extension-based approach cannot account for this fact.
• Intensionalized Skolemized choice functions can provide the scope ambiguity of partially controlled PROs.
References


Tanaka, Hideazu and George Tsoulas. 2006. Ellipsis and negative polarity, manuscript, University of York, Available at http://www-users.york.ac.uk/~ht6/NPI.pdf.