The syntax and semantics of
Japanese internally- and doubly-headed relatives

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(1)
a. **(Restrictive) IHRC (Internally-Headed Relative Clause)**
Junya-wa [[RC Ayaka-ga **kukkii-o** tsukut-ta]-no]-o tabe-ta.
Junya-TOP Ayaka-NOM cookie-ACC make-PAST-NL-ACC eat-PAST
'Ayaka made cookies$_i$ and Junya ate them$_i$.'

b. **Restrictive DHRC (Doubly-Headed Relative Clause)**
Junya-wa [[RC Ayaka-ga **kukkii-o** tsukut-ta] *sono kukkii*]-o tabe-ta.
Junya-TOP Ayaka-NOM cookie-ACC make-PAST that cookie-ACC eat-PAST
'Ayaka made cookies$_i$ and Junya ate those cookies$_i$.'

c. **Appositive DHRC**
Junya-wa [[RC Ayaka-ga **kukkii-o** tsukut-ta] *ano/kono kukkii*]-o tabe-ta.
Junya-TOP Ayaka-NOM cookie-ACC make-PAST that/this cookie-ACC eat-PAST
'Ayaka made cookies$_i$ and Junya ate those/these cookies$_i$.'

Properties that distinguish IHRCs from DHRCs
Property 1: Integration
(2) **IHRC (integrated)**
Junya-wa [[RC *dare-ga* **kukkii-o** tsukut-ta]-no]-o tabe-ta **no**.
Junya-TOP who-NOM cookie-ACC make-PAST-NL-ACC eat-PAST Q
'Who is such that (s)he made cookies and Junya ate them?'

(3) **Restrictive DHRC (integrated)**
Junya-wa [[RC *dare-ga* **kukkii-o** tsukut-ta] *sono kukkii*]-o tabe-ta **no**
Junya-TOP who-NOM cookie-ACC make-PAST that cookie-ACC eat-PAST Q
'Who is such that (s)he made cookies and Junya ate those cookies?'

(4) **Appositive DHRC (not integrated)**
*Junya-wa [[RC *dare-ga* **kukkii-o** tsukut-ta] *ano/kono kukkii*]-o tabe-ta **no**
Junya-TOP who-NOM cookie-ACC make-PAST that/this cookie-ACC eat-PAST Q
'Who is such that (s)he made cookies and Junya ate those/these cookies?'

(Appositive DHRCs ignored below.)

Property 2: Necessary definiteness
Both IHRCs and DHRCs are necessarily definite.
a. **IHRC**
Junya-wa [[RC Ayaka-ga **kukkii-o** tsukut-ta]-no]-o tabe-ta.
Junya-TOP Ayaka-NOM cookie-ACC make-PAST-NL-ACC eat-PAST
'Ayaka made cookies$_i$ and Junya ate **them**$_i$.'

(=Junya ate *all* of the cookies Ayaka made.)

b. **Restrictive DHRC**
Junya-wa [[RC Ayaka-ga **kukkii-o** tsukut-ta] *sono kukkii*]-o tabe-ta.
Junya-TOP   Ayaka-NOM cookie-ACC make-PAST that   cookie-ACC eat-PAST
'Ayaka made cookies_i and Junya ate that/those cookies_i.'
(=Junya ate *all* of the cookies Ayaka made.)

Property 3: Island (in)sensitivity
(7) **IHRCs are sensitive to islands**
a. *No island (Long Distance ok)*
Mary-wa [[John_i-ga [jibun_i-no gakusei-ga   **juuyouna kasetsu-o**
Mary-TOP   John-NOM   self-GEN student-NOM important hypothesis-ACC
teian-shi-ta   to]   jimanshite-ita]**-no**]-no kekkan]-o shiteki-shi-ta.
propose-do-PAST COMP boasted-had-NL-GEN   defect-ACC point.out-do-PAST
'[John had boasted [that his student proposed *an important hypothesis*]] and Mary pointed out a defect in *it*.'

b. *Complex NP island (*)*
*Mary-wa [[[John-ga **[[/e]_i atarashii kasetsu-o   teianshi-ta]   gakusei_i]**-o
  Mary-TOP John-NOM *gap* new   hypothesis-ACC propose-PAST student-ACC
homete-ita]**-no**]-no kekkan]-o shiteki-shi-ta.
praise-had-NL-GEN   defect-ACC point.out-do-PAST
'John praised [the student [who proposed *a new hypothesis*]] and Mary pointed out a defect in *it*.'

Also sensitive to:
Adverbial islands
Coordinate structures
Left branch islands

(8) **DHRCs are insensitive to islands**
a. *Complex NP island (ok)*
Mary-wa [[[John-ga **[[/e]_i atarashii kasetsu-o   teianshi-ta]   gakusei_i]**-o
Mary-TOP John-NOM *gap* new   hypothesis-ACC propose-PAST student-ACC
homete-ita] *sono atarashii kasetsu*]-no   kekkan]-o shiteki-shi-ta.
praise-had   that new   hypothesis-GEN defect-ACC point.out-do-PAST
'John praised the student who proposed *a new hypothesis* and Mary pointed out a defect in *that new hypothesis*.'

Also insensitive to:
Adverbial islands
Coordinate structures
Left branch islands

Property 4: (In)sensitivity to Kuroda's (1975/76) Relevancy Condition
(9) **Kuroda Relevancy Condition (KRC)**
The eventualities denoted by the relative clause and its matrix need to be construable, *in context*, as parts of a single *natural* eventuality.
(From Landman (2016))

IHRCs are sensitive to the KRC.
DHRCs are not.

(10) **IHRCs are restricted by the KRC**
a. *Satisfies KRC (ok)*
[[Daidokoro-no mado-kara   **shiroi neko-ga**   haitteki-ta]-no]-ga
  kitchen-GEN   window-from   white cat-NOM   come.in-PAST-NL-NOM
ima sakana-o   totte   nige-ta.
now fish-ACC   steal   run.away-PAST
'**A white cat** came in from the kitchen window and *it* now stole a fish and ran away.'

b. *Violates the KRC (?*)*
?*[[Daidokoro-no mado-kara   **shiroi neko-ga** kinoo   deteit-ta]-no]-ga
   kitchen-GEN   window-from white   cat-NOM yesterday go.out-PAST-NL-NOM
ima sakana-o   tabete-i-ru.
now fish-ACC eat-Prog-PRES
'**A white cat** went out of the kitchen window yesterday and *it* is now eating a fish.'

(12) **DHRCs are *not* restricted by Kuroda Relevancy**
a. *Satisfies the KRC (ok)*
[[Daidokoro-no mado-kara   **shiroi neko-ga** haitteki-ta]   *sono shiroi*
  kitchen-GEN   window-from white cat-NOM   come.in-PAST that   white
neko]-ga   ima   sakana-o   totte   nige-ta.
cat-NOM   now   fish-ACC   steal   run.away-PAST
'**A white cat** came in from the kitchen window and *that white cat* now stole a fish and ran away.'

b. *Violates the KRC (ok)*
[[Daidokoro-no mado-kara   **shiroi neko-ga** kinoo   deteit-ta]   *sono*
  kitchen-GEN   window-from white cat-NOM   yesterday go.out-PAST that
shiroi neko]-ga ima sakana-o tabete-i-ru.
white cat-NOM now fish-ACC eat-Prog-PRES
'A white cat went out of the kitchen window yesterday, and *that white cat* is now eating a fish.'

Property 5: (im)possibility of having referential IHs
(13) **IHRCs cannot have referential IHs**

?* Ken-wa [[[Naomi-ga   ofisu-ni {**Lucky-o**/   **sono haiiro-no neko-o**}
  Ken-TOP Naomi-NOM office-DAT Lucky-ACC/that   grey-GEN cat-ACC
tsureteki-ta]-**no**]-no   ke]-o   kat-ta.
bring-PAST-NL-GEN   hair-ACC cut-PAST
'Naomi brought {**Lucky / that gray cat**} to the office and Ken cut **her** hair.'

(14) **DHRCs *can* have referential IHs**
Ken-wa [[[Naomi-ga ofisu-ni {**Lucky-o**/   **kono haiiro-no neko-o**}
Ken-TOP   Naomi-NOM office-DAT Lucky-ACC this   grey-GEN cat-ACC
tsureteki-ta] *sono {Lucky/ kono haiiro-no   neko}*]-no ke]-o   kat-ta.
bring-PAST   that Lucky this   grey-GEN cat-GEN   hair-ACC cut-PAST
'Naomi brought {**Lucky, this grey cat**} to the office and Ken cut *that {Lucky's/ this grey cat's}* hair.'

Analysis of IHRCs:
Prior analysis: Landman (2016)
(15) **IHRC structure:**   σ [CP Op$_n$ [C' [… [XP$_1$ [PP t$_n$ P] [XP$_2$ … IH …]] …]]]
Op$_n$ moves from *t$_n$*. Interpretation: λx$_n$. … x$_n$ …. (Accounts for island effects.)

P assigns a second occurrence of a thematic role π assigned within *XP* and identifies the bearer of π with x_n. (Accounts for headedness of IHRC.)

P encodes KRC effects. (Relates KRC to the event denoted by sister of PP.)

σ turns the property-denoting CP into a referring expression. (σ(P) is the sum of the elements in P. Presupposition: that sum itself is in P.)

Illustration (minus KRC effects):

(18) σ [$_{CP}$ Op$_n$ [$_{C'}$ … [$_{VP_1}$ **[$_{PP}$ t$_n$ P]** [$_{VP_2}$*Ayaka-ga kukkii-o tsukut*]]-*ta*]]

(= [$_{IHRC}$ *Ayaka made **cookies***]).

σ (λx$_n$. ∃e [make(e) & Ag(e)=Ayaka & cookies(Th(e)) & **Th(e)=x$_n$**])

This denotes the maximal plural individual that is cookies that Ayaka made.

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KRC Effects under Landman:

P introduces a contextually identified Kuroda Relevancy function **k**, where for all e, e', **k**(e)=e' iff e, e' satisfy the KRC.

In **$k(e)=e'$**, e is the event that *P* thematically relates to.

k and *e'* are free variables whose values are contextually determined.

Identifying e' with the event variable of the matrix event predicate establishes the desired connection between the IHRC event and the matrix event.

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Problems for Landman:

Problem 1: Landman's analysis misidentifies the **IHRC-external event** *e'* that has to satisfy the KRC: *e'* is bindable by any event predicate that c-commands the IHRC. However, accounting for observations requires restriction to only the most local such binding.

(24) [3-part explanation: (a)-(c)]

a. <u>**IHRC that fails to satisfy KRC**</u>

\#[$_{e_1}$[$_{e_2}$Ayaka-ga   **kukkii-o**   tsukut-ta-no]-ga   choko-chippu   kukkii-de aru]

        Ayaka-NOM cookies-ACC make-PAST-NL-NOM chocolate-chip cookies-COP

Intended: 'Ayaka made cookies, and they are chocolate chip cookies.'

There is no Kuroda Relevancy function **k** such that **k**(e_2) = e_1.

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b. <u>**IHRC that satisfies KRC**</u>

[$_{e_3}$ Junya-wa [$_{e_2}$ Ayaka-ga   **kukkii-o**   tsukut-ta-no]-o   tanoshin-da]

   Junya-TOP   Ayaka-NOM cookies-ACC make-PAST-NL-ACC enjoy-PAST

'Ayaka made cookies, and Junya enjoyed them.'

There is a Kuroda Relevancy function **k'** such that **k'**(e_2) = e_3.

Ayaka making cookies and Junya enjoying them constitutes a single natural eventuality.

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c. **Embedding (a) into e$_2$ from (b) fails to salvage it**

\#[$_{e_3}$ Junya-wa [[$_{e_1}$[$_{e_2}$ Ayaka-ga   **kukkii-o**   tsukut-ta-no]-ga   choko-chippu

   Junya-TOP   Ayaka-NOM cookies-ACC make-PAST-NL-NOM chocolate-chip

kukkii-de aru] *oyatsu*]-o   tanoshin-da]

cookies-COP   snack-ACC enjoy-PAST

Intended: 'Ayaka made cookies, and they are chocolate chip cookies; Junya enjoyed the snack.'

There is a Kuroda Relevancy function **k'** such that **k'**(e_2) = e_3.

Ayaka making cookies and Junya enjoying the snack constitutes a single natural eventuality.

Still, the sentence is unacceptable.

Problem 2 for Landman: the analysis makes incorrect predictions about which **IHRC-internal event** needs to satisfy the KRC when the IH is embedded.

For Landman, the KRC is imposed by P:

$$[_{CP} \text{Op}_n [_{C'} [_A \ldots [_{XP_1} [_{PP} t_n P] [_{XP_2} \ldots IH \ldots]] \ldots]]]$$

Prediction: in $\mathbf{k}(e) = e'$, e should be the event of the event predicate that assigns IH a thematic role (= XP_2 above).

Observation: The IHRC-internal event that has to satisfy the KRC is that of the highest event predicate in the IHRC. (= A above)

[2-part explanation: (a)-(b)]

(23) *Misidentification of IHRC-internal event that must satisfy KRC*

a.   **IH non-embedded, KRC satisfied**

[$_{e_1}$ Junya-wa [$_{e_2}$ Ayaka-ga   kesa   **kukkii-o**   tsukut-ta-no]-o

   Junya-TOP Ayaka-NOM this-morning cookies-ACC make-PAST-NL-ACC

sudeni   tabeteshimat-ta]

already eat.up-PAST

'Ayaka made cookies this morning, but Junya already ate them up.'

There is a Kuroda Relevance function $\mathbf{k}$ such that $\mathbf{k}(e_2) = e_1$: Ayaka making cookies and Junya having already eaten them constitutes a single natural event.

b.   **IH embedded, KRC not satisfied**

#[$_{e_1}$ Junya-wa [$_{e_3}$ Taro-ga   [$_{e_2}$ Ayaka-ga   kesa   **kukkii-o**

   Junya-TOP   Taro-NOM   Ayaka-NOM this-morning cookies-ACC

tsukut-ta-to]   (kore-kara) houkoku-su-ru-no]-o   sudeni tabeteshimat-ta]

make-PAST-COMP (this-after) announce-do-PRES-NL-ACC already eat.up-PAST

'Taro will announce (after this) that Ayaka made cookies this morning, but Junya already ate them up.'

There is a Kuroda Relevance function $\mathbf{k}$ such that $\mathbf{k}(e_2) = e_1$: Ayaka making cookies and Junya having already eaten them constitutes a single natural event. This fails to render the sentence acceptable, though.

There is no Kuroda Relevance function $\mathbf{k'}$ such that $\mathbf{k'}(e_3) = e_1$: Taro's future announcement that Ayaka made cookies and Junya's having already eaten them do not constitute a single natural event.

Proposal, Part 1: IHRC syntax

Overall idea:

I: Redistribute the pieces used to interpret IHRCs

	Landman	Us
P	KRC effects thematic role doubling	thematic role doubling (P→θ)
Op	predicate abstraction	[movement triggers predicate abstraction] KRC effects definiteness (from σ)
σ	independent operator	incorporated into Op

II: Derive impossibility of a referential IH in IHRCs from the theta-criterion.

Thematic roles are assigned outside the event predicate (following Chompollion):

[argument [θ [event predicate]]]
(*θ* replaces Landman's *P* as a thematic role assigner. This is how ALL thematic roles are assigned.)

(25) IHRC: __ [$_{CP}$ Op **n** [$_{C'}$ [… **[x$_1$ t$_n$ [θ** [$_{X_2}$ … IH …]]] …]]]-no
Op raises to SpecCP, where it takes two arguments:
    (i)   (the predicate abstraction of) its C' sister,
    (ii) an IHRC-external expression (typically a projection of the matrix V combined with a thematic role assigner, not shown).
Op imposes Kuroda Relevance on the main events contributed by its two arguments.

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Two types of thematic roles:
       Restricting thematic roles introduce indefinites (e.g. Th$_r$)
       Identifying thematic roles introduce definites (e.g. Ag$_i$)

Interpretation of *[cookies [Th$_r$ [make]]]*:
       λf_{vt}. ∃e [make(e) **& cookies(Th(e))** & f(e)]
       (*cookies* gives a ***property*** of the theme but does not identify the theme)

Interpretation of *[Ayaka [Ag$_i$ [cookies [Th$_r$ [make]]]]]*:
       λf_{vt}. ∃e [make(e) **& Ag(e)=ayaka** & cookies(Th(e)) & f(e)]
       (*ayaka **identifies*** the agent)

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Proposal Part 2: IHRC Semantics
(30) *IHRC-internal structure*
      [$_{CP}$ Op [$_Z$ 1 [$_{C'}$… **[t$_1$ [Th$_i$** [$_{TP}$ *Ayaka-ga kukkii-o tsukut-ta*]]]]]]]
⟦Z⟧ = λx_e. λf_{vt}. ∃e [make(e) & <u>cookies(Th(e))</u> & Ag(e)=ayaka **& <u>Th(e)=x</u>** & f(e)]
⟦*Op*⟧ relates ⟦Z⟧ to an external expression.

θ-criterion:
An event domain can contain at most one identifying thematic role and one restricting thematic role of the same kind.

Consequence: Since the trace of *Op* is of type *e*, the associated thematic role has to be identifying. The θ-criterion then prohibits the overt IH from receiving an identifying thematic role.

This accounts for the impossibility of referential IHs in IHRCs.

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(32) *IHRC-external structure:*
    [IHRC [θ$_i$ H*]]

    IHRC is the main semantic function of the structure in (32).
    Op is the semantic head of IHRC.
    Op imposes Kuroda Relevance on the main RC and H* events.

Formal analysis:
(33) **Kuroda Relevance relation (KR):**
    KR(e,e') is true iff e and e' are parts of a single natural eventuality.

[IHRC [θ$_i$ H*]] = [[$_{CP}$ Op [$_X$ 1 [$_{C'}$…]]] [θ$_i$ H*]]

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$[\![Op]\!] = \lambda P_{\langle e,\langle vt,t\rangle\rangle}.\ \lambda Q_{\langle e,\langle vt,t\rangle\rangle}.\ \lambda f_{vt}.$

$\quad \exists e_1,e_2\ [Q\ (\sigma(\lambda x_e.\ P(x)(\lambda e_v.\ e=e_1)\ \&\ KR(e_1,e_2)))\ (\lambda e_v.\ e=e_2\ \&\ f(e))]$

(The *P* argument is *X* and the *Q* argument is *[θ_i H*]*.)

$[\![Op]\!] = \lambda P_{\langle e,\langle vt,t\rangle\rangle}.\ \lambda Q_{\langle e,\langle vt,t\rangle\rangle}.\ \lambda f_{vt}.$

$\quad \exists e_1,e_2\ [Q\ (\sigma(\lambda x_e.\ P(x)(\lambda e_v.\ e=e_1)\ \&\ KR(e_1,e_2)))\ (\lambda e_v.\ e=e_2\ \&\ f(e))]$

Landman's σ-operator makes the argument of *Q* definite. This argument can be thought of as the intuitive reference of the IHRC.

Note 1: Kuroda Relevance is a presupposition: σ only generates a reference when the KR relation is satisfied by the pair of events it operates on.

Note 2: The IHRC-internal event required to stand in the KR relation is the main event of the *P* argument, i.e. the highest event internal to the IHRC.

Note 3: The IHRC-external event required to stand in the KR relation is the main event of the *Q* argument, i.e. the event of the predicate intuitively selecting the IHRC as argument.

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Illustration

(36) Junya-wa [Ayaka-ga **kukkii-o** tsukut-ta-no]-o tabe-ta.

Junya-TOP Ayaka-NOM cookies-ACC make-PAST-NL-ACC eat-PAST

'Ayaka made cookies, and Junya ate them.'

$= \exists e_1,e_2\ [\exists e'\ [\,eat(e')\ \&$

$\qquad Th(e')=\sigma(\lambda x_e.\ \exists e\ [make(e)\ \&\ cookies(Th(e))\ \&\ Ag(e)=ayaka\ \&\ Th(e)=x\ \&\ e=e_1]$

$\qquad\qquad \&\ KR(e_1,e_2))\ \&$

$\qquad e'=e_2\ \&\ Ag(e')=junya]]$

This is true iff there are two events, e_1 and e_2, such that e_1 is a making of cookies by Ayaka, and e_2 is an eating by Junya of the cookies involved in e_1, on the presupposition that e_1 and e_2 satisfy Kuroda Relevance.

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Explanations

Integration: IHRC constructions are functionally composed and so constitute a single illocutionary unit.

Necessary Definiteness: from σ operator in the interpretation of *Op*.

Island sensitivity: *Op* is generated as sister to a thematicized event quantifier whose main event is thematically related to IH, and raises to SpecCP of the IHRC.

KRC effects: requirement that two events in the semantics of *Op* satisfy the KR relation. The identity of the KR-related events is fixed semantically by the arguments of *Op*. (Overcomes problems for Landman)

Ban on referential IHs: *Op* requires an identifying thematic role, adding a conjunct of the form $\theta(e)=x$ to an event quantifier. The θ-criterion blocks this when the event quantifier already has a conjunct of that form.

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DHRCs

(52) [[[Ayaka-ga **kukkii-o** tsukut-ta] [*so-no kukkii*]]

Ayaka-NOM cookies-ACC make-PAST *so*-GEN cookies

'Ayaka made cookies: those cookies'

Examined above:

Property 1:   Integrated and non-integrated versions

Property 2:   Necessarily definite

Property 3:   Island insensitive

Property 4:   No KRC effects
Property 5:   IH can be referential
(Property 2 is shared with IHRCs, but the others are not.)

Additional properties of DHRCs:
Property 6: DHRCs with externally anaphoric EH are non-integrated
(43) *Referential ambiguity with quantificational IH*
[Context: Ayaka-ga   kukkii-o   20-mai tsukut-ta.*]*
          Ayaka-NOM cookies-ACC 20-CL   make-PAST
          'Ayaka made 20 cookies.'
Junya-wa [[Yoko-ga   kore-kara **hotondo-no   kukkii-o**   reezooko-ni
Junya-TOP   Yoko-NOM this-after   almost-all-GEN cookies-ACC fridge-DAT
ire-ru]   *sono kukkii*]-o   zenbu paatii-ni   motteik-u tsumori   da.
put-in-PRES those cookies-ACC all   party-DAT   bring-PRES intention COP
'After this, Yoko will put most of the cookies into the fridge, and Junya intends to bring those cookies to the party.'
Reading 1: all 20 cookies
Reading 2: all the cookies placed in the fridge

(45) *Reading 2 is integrated; Reading 1 is not.*
[Context: Ayaka-ga   kukkii-o   20-mai tsukut-ta.*]*
          Ayaka-NOM cookies-ACC 20-CL   make-PAST
          Ayaka made 20 cookies.
Junya-wa [[**dare-ga**   kore-kara hotondo-no   kukkii-o   reezooko-ni
Junya-TOP   who-NOM this-after almost-all-GEN cookies-ACC   fridge-DAT
ire-ru]   *sono kukkii*]-o   zenbu paatii-ni   motteik-u tsumori   na **no**?
put-in-PRES those cookies-ACC all   party-DAT   bring-PRES intention COP Q
'After this, who will put most of the cookies into the fridge such that Junya will bring those cookies to the party?'

Reading 1 (all 20 cookies): unavailable
Reading 2 (all the cookies placed in the fridge): ok

Property 7: Pseudo-DHRCs can lack an overt IH
(46) *Pseudo-DHRC*
Junya-wa [[sakana-ga yake-ta]   *sono nioi*]-ga   kininat-ta.
Junya-TOP   fish-NOM get-broiled-PAST that   smell-NOM worry.about-PAST
'A fish got broiled, and Junya worried about that smell.'

Property 8: IH and EH can be mismatched
(47) *Adverb vs. Noun*
Junya-wa [[Ayaka-ga   **tegiwayoku** kukkii-o   tsukut-ta] *sono tegiwayosa*]-o
Junya-TOP Ayaka-NOM with-finesse cookie-ACC make-PAST that   finesse-ACC
home-ta.
praise-PAST
'Ayaka made cookies with finesse, and Junya praised that finesse.'

(48) *Sub-kind vs. Super-kind*
Junya-wa [[John-ga   **san-ko-no   nashi**-o kat-te Mary-ga   **ni-ko-no**
Junya-TOP   John-NOM three-CL-GEN pear-ACC buy-and Mary-NOM two-CL-GEN
ringo-o   kat-ta]   *sono kudamono*]-o tabe-ta.
apple-ACC buy-PAST that   fruit-ACC   eat-PAST

'John bought three pears and Mary bought two apples and Junya ate that fruit (= the 3 pears and the 2 apples).'

Conclusion: The EH of a DHRC is not a simple syntactic copy of the IH.

Restrictive DHRC Analysis: Assumptions

DHRCs have an overt E(xternal)H(ead). (Like EHRCs but unlike IHRCs)

The denotation of a restrictive DHRC is recovered from an event. (Like E-type anaphora, unlike EHRCs and IHRCs)

The event from which a restrictive DHRC recovers its reference lies in its RC. (Unlike E-type anaphora)

The EH of a restrictive DHRC has to be a *so*-expression:
      sono NP (*that NP*), **sore** (*that*), **sorera** (*those*), **soitsu** (*that guy*), **soitsura** (*those guys*),
      soko (*there*), **sou** (*that way*), **socchi** (*there*), **sochira** (*there*), **sonna** (*that kind of*)

Structure: [$_{DHRC}$ RC [*sono* NP]]

DHRC semantics
The RC of a DHRC is a normal clause, of type $\langle vt,t \rangle$.

(51) *Interpretation of DHRC* so:
      $[\![so\text{-}]\!] = \lambda N_{et}.\ \lambda V_{\langle vt,t \rangle}.\ \sigma(\lambda x_e.\ N(x)\ \&\ \exists e'\ [V(\lambda e_v.\ e=e')\ \&\ x\text{ is a participant of }e'])$
N: from the NP in *sono NP*
V: from the RC in *[$_{DHRC}$ RC [sono NP]]*

[$_{DHRC}$ RC [sono NP]]] refers to the maximal individual *x* in the NP denotation that participates in the main RC event.

Assumptions:
      no in *sono* is semantically vacuous.
      so is ambiguous between DHRC *so* and simple *so*.
      With simple *so*, *sono NP* is referential, and any RC preceding *sono NP* can only be appositive.
         (Parallel to *ano/kono*. Analysis not given here.)
      If x is directly or indirectly thematically related to e, x is a **participant** of e.

$[\![so\text{-}]\!] = \lambda N_{et}.\ \lambda V_{\langle vt,t \rangle}.\ \sigma(\lambda x_e.\ N(x)\ \&\ \exists e'\ [V(\lambda e_v.\ e=e')\ \&\ x\text{ is a participant of }e'])$

(52)   [[[Ayaka-ga   **kukkii-o**   tsukut-ta] [*so-no   kukkii*]]
         Ayaka-NOM   cookies-ACC make-PAST *so*-GEN cookies
      'Ayaka made cookies: those cookies'

      [[*[[Ayaka-ga kukkii-o tsukut-ta] [so-no kukkii]]*]]
         = $\sigma(\lambda x_e.\ cookies(x)\ \&\ \exists e\ [make(e)\ \&\ cookies(Th(e))\ \&\ Ag(e)=ayaka$
               $\&\ x\text{ is a participant of }e])$
         = the sum of cookies that are participants in an event of Ayaka making cookies

Explanations
1: Integration:
Restrictive DHRCs use *DHRC so* and are functionally composed, so they constitute a single illocutionary unit.
Appositive DHRCs use simple *so, a* or *ko. sono/ano/kono NP*, of type *e*, cannot functionally compose with a relative clause, of type ⟨*vt,t*⟩, leaving the RC non-integrated.

(Below, we only consider restrictive DHRCs.)
*2: **Necessary Definiteness:***
Follows from inclusion of Landman's σ-operator in the interpretation of *so*.

*3: **Island insensitivity:***
The EH is related to the IH via the *participation* relation. This relation is transitive: if *x* participates in *e* and *e* participates in *e'*, then *x* participates in *e'*. The connection between *x* and the events *x* participates in is independent of movement.

<div align="right">39</div>

*4: **Lack of KRC effects:***
Unlike *Op*, *so* does not incorporate KR into its semantics.

*5: **Possibility of referential IHs:***
so only relates to individuals that are independently part of the semantics of the RC. It does not add any new thematic relations, so use of *so* does not create θ-criterion violations regardless of whether the IH is referential.

<div align="right">40</div>

*6: **DHRCs with externally anaphoric EH are non-integrated***
These use simple *so*, not DHRS *so*. (See 1)

*7: **Pseudo-DHRCs can lack an overt IH***
Not all event participants need to be overtly identified within the RC. E.g. if an event of cooking causes an odor to be produced, that odor is a participant of the cooking event.

*8: **IH and EH can be mismatched***
RC sono kudamono (that fruit) refers to all of the fruit participants in the RC, regardless of how they are specified.

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(55) ⟦*hotondo*⟧
$= \lambda N_{et}. \lambda \theta_{\langle e,\langle\langle vt,t\rangle,\langle vt,t\rangle\rangle\rangle}. \lambda P_{\langle vt,t\rangle}. \lambda f_{vt}. \exists z\ [z \sqsubseteq D\ \&\ N(z)\ \&\ |z| \gg |D-z|\ \&\ \theta(z)(P)(f)]$

(56) *Integrated DHRC interpretation*

⟦*Yoko-ga kore-kara hotondo-no kukkii-o reezooko-ni ire-ru so-no kukkii*⟧

$= \sigma(\lambda x_e.\ \text{cookies}(x)\ \&\ \exists e'\ [\exists z\ [\text{cookies}(D)\ \&\ z \sqsubseteq D\ \&\ |z| \gg |D-z|\ \&\ \text{put}(e')\ \&\ \text{Ag}(e')=\text{yoko}\ \&\ \text{Th}(e')=z$
$\&\ \text{Goal}(e')=\text{the.fridge}]\ \&\ x \text{ is a participant of } e'])$

This denotes the cookies that are participants of some event of Yoko putting cookies into the fridge.

A witness for *z* is directly thematically related to *e'* in the final line, making that witness a participant of *e'*.

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D, the domain of cookies, only serves to place restrictions on *z*. It is not thematically related to *e'* either directly or indirectly and does not count as an independent participant of *e'* in any other way.

Conclusion
IHRCs:
    [i] Syntactically, IHRCs are CPs without a null EH.

    [ii] Kuroda Relevancy targets only eventualities expressed by hierarchically adjacent constituents: the main event of the IHRC itself, and that of the predicate that selects it.

    [iii] Based on an independent mechanism of thematic role assignment and a stipulated *Op*.

    [iv] Island sensitivity is accounted for by the raising of a Null Operator (*Op*).

    [v] The semantics of *Op* accounts for
        integration
        necessary definiteness
        KRC only restricting hierarchically adjacent eventualities
        Lack of referring IHs (blocked by the θ-criterion)

DHRCs:
    [i] Syntactically, DHRCs are NPs with an overt EH headed by DHRC *so*.

    [ii] EH is related to IH through the (pragmatic) *participant* relation.

    [iii] The semantics of DHRC *so* accounts for
        integration
        necessary definiteness
        lack of island effects
        lack of KRC effects
        lack of restrictions on IH
        existence of Pseudo-DHRCs
        possible mismatch between EH and IH

Thank you!

Change IHRCs

(57) Bill-wa [[Mary-ga   ringo-o   shibottekure-ta]-no]-o non-da.
    Bill-TOP Mary-NOM apple-ACC squeeze-PAST-NL-ACC drink-da
    'Mary squeezed apples and Mary drank (the resulting juice).'

Op does not double up an already assigned thematic role.

Op relates to a separate thematic role, the role introduced by *juusu-ni* in:
    Mary-ga   ringo-o   juusu-ni   shibottekure-ta
    Mary-NOM apple-ACC juice-DAT squeeze-PAST
    'Mary squeezed an apple into juice.'

(39)
a. #[Ayaka-ga   **kukkii-o**   tsukut-ta-no]-ga   chokochippu kukkii da.
   Ayaka-NOM cookies-ACC make-PAST-NL-NOM chocolate.chip cookie COP
  'Ayaka made cookies, and they are chocolate chip cookies.'

b. [[Ayaka-ga **kukkii-o** tsukut-ta-no]-no   shurui]-ga chokochippu
    Ayaka-NOM cookies-ACC make-PAST-NL-GEN kind-NOM chocolate-GEN
  kukkii da.
  cookie COP
  'Ayaka made cookies, and their kind is chocolate chip cookies.'

c. [[Ayaka-ga *[e]* tsukut-ta] kukkii]-ga   chokochippu   kukkii da.
    Ayaka-NOM *gap* make-PAST cookies-NOM chocolate-GEN cookie COP
  'The cookies Ayaka made are chocolate chip cookies.'

<div align="right">48</div>

*embedded IHRCs with IHs in the same clause:

*Junya-wa [[[Ayaka-ga [[[**kodomo-ga *kukkii-o***   oishisoo-ni
 Junya-nom Ayaka-nom child-nom   cookie-acc delicious-lookingly

tabe-ta]-no]-no   egao]-ni   totemo kandoosi-ta]-no]-no   aji]-o
eat-past-nl-gen   smile-dat very   be-touched-past-nl-gen taste-acc

well remember-pres
yoku oboetei-ru.

Intended: 'Their child deliciously ate some cookies, and Ayaka was touched by his/her smile, and Junya well remembers their taste.'

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ok: embedded DHRCs with IHs in the same clause:

Junya-wa [[[Ayaka-ga [[[**kodomo-ga *kukkii-o***   oishisoo-ni
Junya-nom Ayaka-nom child-nom   cookie-acc delicious-lookingly

tabe-ta] **sono kodomo**]-no egao]-ni   totemo kandoosi-ta]   ***sono***
eat-past   that cookie-gen   smile-dat very   be.touched-past that

kukkii]-no aji]-o   well   remember-pres
cookie-gen taste-acc yoku   oboetei-ru.

'Their child deliciously ate some cookies, and Ayaka was touched by his/her smile, and Junya well remembers their taste.'

<div align="right">50</div>

ok: DHRC and IHRC with the same IH:
[Junya-ga [[RC Ayaka-ga kukkii-o   tsukut-ta]-no-no   hanbun]-o tabe-ta
 Junya-nom   Ayaka-nom cookie-acc make-past-nl-gen half-acc   eat-past

sono kukkii]-ga   20-mai-no chokochippu   kukkii   dat-ta
that cookie-nom 20-cl-gen chocolate.chip cookie   cop-past

'Ayaka made cookies_i and Junya ate half of them_i, and those cookies were 20 chocolate chip cookies.'

True in both Situations 1 and 2:

Situation 1: Ayaka made 20 cookies, and Junya ate 10 of them.
(IH for DHRC = IH for IHRC.)

Situation 2: Ayaka made 40 cookies, and Junya ate 20 of them.
(IH for DHRC = IHRC)

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