Continuations for Head-Internal Relative Clauses in Japanese

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Workshop on Relative Clauses: Relatives in East Asia and Beyond – 11/14/2015

Overview

Reanalyze the E-type pronoun account of Japanese IHRs (Shimoyama 1999) with **continuations** (Barker and Shan 2008; 2014)

- Continuation-based analyses not yet proposed for IHRs
  - Assign *-no* a complex type which allows embedded QP to bind pronoun
  - Capture obligatory high scope of matrix QPs without QR, LF, or contextual variable assignment

Head-Internal Relative Clauses in Japanese

Surface scope usually determines interpretation in Japanese
But: QPs in EHRs scope over matrix clause (1), QPs in IHRs do not (2)

(1) Head External (object shifted)

Taro-ga ***t*** siken-maeni dasita dono **syukudai-mo** Hotondo-no
Taro-Nom *e* exam-before gave every homework most-Gen

gakusei-ga teisyutusita.
student-Nom turned_in

'Every homework Taro assigned before the exam, most students turned in.'
(i) ∀ > most (ii) *most > ∀

(2) Head Internal (object shifted)

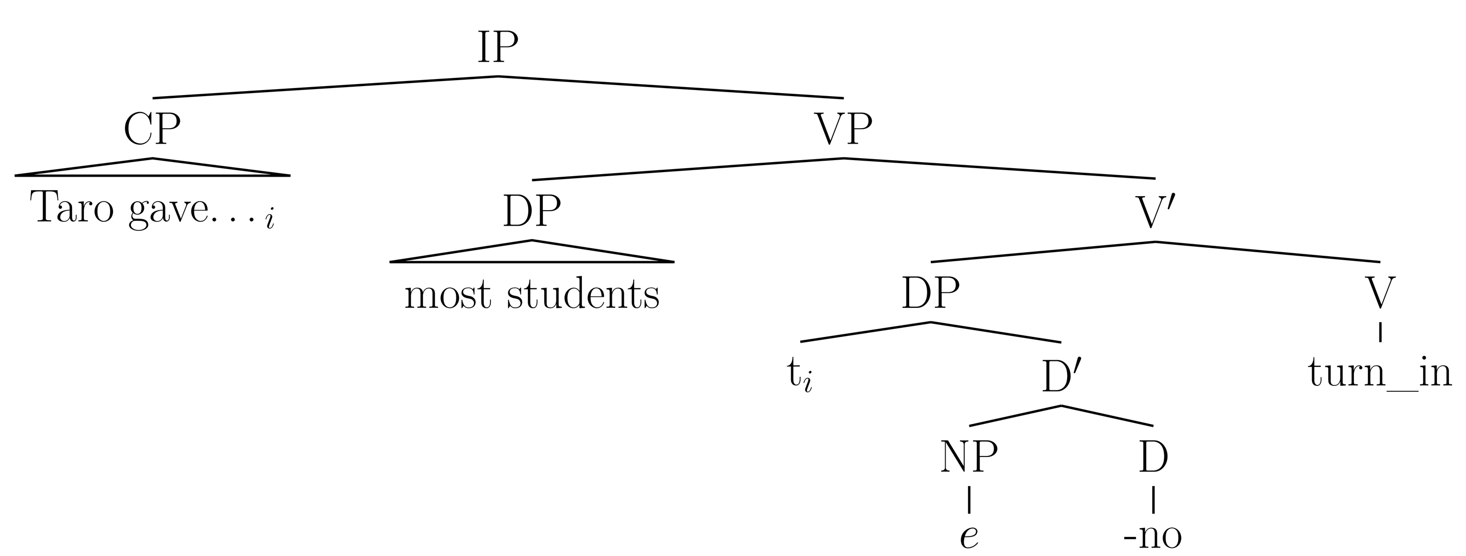
Taro-ga dono **syukudai-mo** siken-maeni dasita no-o hotondo-no
Taro-Nom every homework exam-before gave NM-Acc most-Gen

gakusei-ga teisyutusita.
student-Nom turned_in

'Most students turned every homework Taro assigned before the exam in.'
(i) *∀ > most (ii) most > ∀

The E-Type Pronoun Analysis

- Interpretation via an **E-type pronoun** in DP headed by *-no*, embedded clause moves at LF: (Hoshi 1995, Shimoyama 1999)



- **Problem:** Context analysis over- and undergenerates possible antecedents, problems with implicature (Grosu and Landman 2008)

Continuations and Type-Shifting Operations

Barker and Shan (2008; 2014): Scope analysed via LIFTed semantic types

$\frac{B\,|\,B}{A}$ *expression* $\frac{f[\,]}{x}$ $\overset{\text{LIFT}}{\Rightarrow}$ $\frac{C\,|\,C}{\frac{B\,|\,B}{A}}$ *expression* $\frac{[\,]}{\frac{f[\,]}{x}}$	$\frac{B\,|\,B}{A}$ *expression* $\frac{f[\,]}{x}$ $\overset{\text{LIFT}}{\Rightarrow}$ $\frac{B\,|\,B}{\frac{C\,|\,C}{A}}$ *expression* $\frac{f[\,]}{\frac{[\,]}{x}}$
$\frac{A\,|\,S}{S}$ *expression* $\frac{f[\,]}{x}$ $\overset{\text{LOWER}}{\Rightarrow}$ A *expression* $f(x)$	$\frac{A\,|\,B}{DP}$ *expression* $\frac{f[\,]}{x}$ $\overset{\text{BIND}}{\Rightarrow}$ $\frac{A\,|\,DP \rhd B}{DP}$ *expression* $\frac{f[\,]x}{x}$

Apply BIND to a DP to control value of a subsequent pronoun

$\frac{S\,|\,S}{DP}$ *everyone* $\frac{\forall x.[\,]}{x}$ $\overset{\text{BIND}}{\Rightarrow}$ $\frac{S\,|\,\mathbf{DP \rhd S}}{DP}$ *everyone* $\frac{\forall x.[\,]\mathbf{x}}{x}$

E-type pronouns lexically specified for dependence on an entity

$\frac{DP \rhd S\,|\,S}{DP}$ *he/her/it/e* $\frac{\lambda y.[\,]}{y}$

E-Type Anaphora with Continuations

- Analysed quantificationally (Barker and Shan 2008; 2014)
- Binding interpreted via linear precedence and lifted types, not C-Command

If a farmer$_i$ owns a donkey$_j$, he$_i$ beats it$_j$.

If	a farmer owns a donkey	he beats it
$\frac{S\,|\,S}{\frac{S\,|\,S}{(S/S)/S}}$	$\frac{S\,|\,DP \rhd S}{\frac{S\,|\,DP \rhd S}{S}}$	$\frac{DP \rhd S\,|\,S}{\frac{DP \rhd S\,|\,S}{S}}$
$\frac{\neg[\,]}{\frac{[\,]}{\lambda p \lambda q.\ p \wedge \neg q}}$	$\frac{\exists x.(\text{farmer } x) \wedge ([\,]x)}{\frac{\exists y.(\text{donkey } y) \wedge ([\,]y)}{\text{owns } x\ y}}$	$\frac{\lambda z.[\,]}{\frac{\lambda w.[\,]}{\text{beats } w\ z}}$

$\frac{S\,|\,S}{\frac{S\,|\,S}{S}}$

If a farmer owns a donkey he beats it

$\frac{\neg \exists x.(\text{farmer } x) \wedge (\lambda z.[\,]x)}{\frac{\exists y.(\text{donkey } y) \wedge (\lambda w.[\,]y)}{\text{owns } x\ y \wedge \neg \text{beats } w\ z}}$

$\neg \exists x.(\text{farmer } x) \wedge \exists y.(\text{donkey } y) \wedge (\text{owns } y\ x) \wedge \neg(\text{beats } y\ x)$
$\equiv \neg \exists x \exists y.\ (\text{farmer } x) \wedge (\text{donkey } y) \wedge (\text{owns } y\ x) \wedge \neg(\text{beats } y\ x)$
$\equiv \forall x \exists y.(\text{farmer } x) \wedge (\text{donkey } y) \wedge (\text{owns } y\ x) \rightarrow (\text{beats } y\ x)$

Proposed Semantics for *-no*

Lexically-specified to match embedded DP with *e*

- Locally combines two clauses (via implication)
- Left-to-right composition forces matrix QP to take wide scope via ordered LIFT operations
  - Captures quantifier restriction in (2)
- **No need for contextual variable assignment**

$\frac{DP \rhd S\,|\,DP \rhd S}{S\backslash(S/S)}$ *-no* $\frac{\lambda x[\,]x}{\lambda p \lambda q.px \rightarrow qx}$

Partial Derivation

[Taro every homework gave]-*no* [most students *e* turned_in]

Taro every HW gave	-no	most students	e turned_in
$\frac{S\,|\,DP \rhd S}{S}$	$\frac{DP \rhd S\,|\,DP \rhd S}{S\backslash(S/S)}$	$\frac{S\,|\,S}{DP}$	$\frac{DP \rhd S\,|\,S}{DP\backslash S}$
$\frac{\forall x.(\text{homework } x) \wedge [\,]x}{\text{give } t\ x}$	$\frac{\lambda x[\,]x}{\lambda p \lambda q.p\ x \rightarrow q\ x}$	$\frac{\text{M}z.(\text{student } z) \wedge [\,]z}{z}$	$\frac{\lambda y.[\,]}{\lambda x.\text{turn\_in } x\ y}$

Taro every HW gave	-no	most students	e turned_in
$\frac{\mathbf{S\,|\,S}}{\frac{S\,|\,DP \rhd S}{S}}$	$\frac{\mathbf{S\,|\,S}}{\frac{DP \rhd S\,|\,DP \rhd S}{S\backslash(S/S)}}$	$\frac{S\,|\,S}{\frac{\mathbf{DP \rhd S\,|\,DP \rhd S}}{DP}}$	$\frac{\mathbf{S\,|\,S}}{\frac{DP \rhd S\,|\,S}{DP\backslash S}}$
$\frac{[\,]}{\frac{\forall x.(\text{homework } x) \wedge [\,]x}{\text{give } t\ x}}$	$\frac{[\,]}{\frac{\lambda x[\,]x}{\lambda p \lambda q.p\ x \rightarrow q\ x}}$	$\frac{\text{M}z.(\text{student } z) \wedge [\,]z}{\frac{[\,]}{z}}$	$\frac{[\,]}{\frac{\lambda y.[\,]}{\lambda x.\text{turn\_in } x\ y}}$

Taro every HW gave *no*	most students *e* turned_in
$\frac{S\,|\,S}{\frac{S\,|\,DP \rhd S}{S/S}}$	$\frac{S\,|\,S}{\frac{DP \rhd S\,|\,S}{S}}$
$\frac{[\,]}{\frac{\forall x.(\text{homework } x) \wedge [\,]x}{\lambda q.\text{give } t\ x \rightarrow q\ x}}$	$\frac{\text{M}z.(\text{student } z) \wedge [\,]z}{\frac{\lambda y.[\,]}{\text{turn\_in } z\ y}}$

$\frac{S\,|\,S}{\frac{S\,|\,S}{S}}$

Taro every HW gave *no* most students *e* turned_in

$\frac{\text{M}z.(\text{student } z) \wedge [\,]z}{\frac{\forall x.(\text{homework } x) \wedge [\,]x}{\text{give } t\ x \rightarrow \text{turn\_in } z\ x}}$

Taro every HW gave *no* most students *e* turned_in

$\text{M}z.((\text{student } z) \wedge ((\forall x.(\text{homework } x) \wedge (\text{give } t\ x)) \rightarrow (\text{turn\_in } z\ x))$

'For most z, if z is a student and if for all x that is a homework, Taro assigned x, then z turned in x.'

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References

Barker, C. and Shan, C. (2008). Donkey anaphora is in-scope binding. *Semantics and Pragmatics*, 1:1–1. Barker, C. and Shan, C. (2014). *Continuations and natural language*, volume 53. Oxford University Press. Grosu, A. and Landman, F. (2008). Internally headed relative clauses in Japanese. *Ms., Tel Aviv University*. Hoshi, K. (1995). *Structural and interpretive aspects of head-internal and head-external relative clauses*. dissertation, University of Rochester. Shimoyama, J. (1999). Internally headed relative clauses in Japanese and E-type anaphora. *Journal of East Asian Linguistics*, 8(2):147–182.