An E-type analysis of *tokoro*-relatives

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This paper claims that *tokoro*-relatives in Japanese should be analyzed as involving an E-type pronoun, rather than backward control or movement. The arguments come from (i) quantifier scope, (ii) the maximality effect, (iii) negative quantifiers, (iv) split antecedents, and (v) *tokoro*-relative clauses without an explicit head. It also proposes a compositional semantic analysis of the *tokoro*-relative construction based on Kim's (2004) theory of Head Internal Relative Clauses.

1. Introduction

Tokoro-realtive clauses are exemplified by the sentence in (1) adapted from Harada 1973:184.

(1) keikan-wa [doroboo-ga nigedashita *tokoro*]-o taihoshita.
cop-TOP [thief-NOM began.to.run.away TOKORO]-ACC arrested
'The cop arrested the thief at the time at which he began to run away.'

Syntactically, the *tokoro*-relative construction involves a relative clause modifying the noun *tokoro*, which literally means 'place'. However, *tokoro* itself does not semantically behave as the argument of the embedded or matrix predicate. Rather, the embedded event is interpreted as holding at the time at which the matrix event begins, and usually, one of the DPs in the relative clause (underlined throughout the paper) behaves as the argument of the matrix predicate. Thus, there is a syntax-semantics mismatch in this construction.

In the syntactic literature, there are two major analyses of this construction: the backward-control analysis (Harada 1973; Kuroda 1978) and the movement analysis (Fujii 2004; Narita, to appear). This paper proposes a novel analysis that uses an E-type pronoun and argues that it is empirically superior to the prior analyses. The three approaches are briefly introduced in Section 2. In Section 3, five pieces of evidence for the E-type analysis and at the same time against the previous analyses are provided: namely, (i) quantifier scope, (ii) the maximality effect, (iii) negative quantifiers, (iv) split antecedents, and (v) *tokoro*-relatives without an explicit head. Also, a compositional semantic analysis of *tokoro*-relatives is proposed in Section 4. Section 5 concludes the paper.

2. Three Analyses

2.1 Backward-control analysis

The backward-control analysis posits a null pronominal (PRO) in the matrix clause, which is co-referential to one of the DPs in the relative clause and which acts as the missing argument of the matrix predicate, as (2) illustrates.

(2) [… DP_i … *tokoro*] PRO_i Predicate

There are two variants of this analysis: While Harada (1973) argues that the *tokoro*-relative is base-generated in an adverbial position, Kuroda (1978) claims that the generation site is within the complement of the matrix predicate as if it is modifying PRO as a relative clause and the whole *tokoro*-relative subsequently raises and adjoins to the matrix VP.[1] For either variant, the counter-arguments in Section 3 are fatal.

2.2 Movement analysis

The movement analysis postulates phonologically null movement of one of the embedded DPs to a position in which the relevant relation with the matrix predicate can be established, as schematized below.

(3) [… t_i …*tokoro*] DP_i Predicate

Again, there are two variants which differ in technical details: Fujii (2004) argues that the relevant movement is movement of only a subset of the features comprising the DP, while Narita (to appear), assuming the copy theory of movement, claims that this movement is 'pre-Spell-Out', but the lower copy is pronounced due to some independent requirements. Again, we will see that both variants are inadequate in light of the empirical data in Section 3.

2.3 E-type analysis

The E-type analysis put forward in this paper posits a null E-type pronoun as the missing argument of the matrix predicate.[2]

(4) […DP … *tokoro*] *pro* Predicate
where *pro* is an E-type pronoun

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[1] Both Harada (1973) and Kuroda (1978) argue that PRO is derived via the transformation called *Counter Equi NP Deletion*, but this technical detail is not important here. Also, they only deal with cases where PRO is co-referential with the subject of the embedded clause, but other arguments and even non-arguments in the embedded clause can play this role as well, as we will see below.

[2] It will be argued later that the E-type pronoun is encoded in the meaning of *tokoro*. Also I use the term *E-type pronoun* in a rather loose way, meaning 'definite descriptions with a pragmatically determined implicit description.'

There is no co-indexation or movement involved here unlike in the previous two approaches.

3. Five Pieces of Evidence for the E-type Analysis

3.1 Quantifier scope

When a quantifier in a *tokoro*-relative is interpreted as the missing argument of the matrix verb, it does not show a scope interaction with other scope bearing elements in the matrix clause and takes the narrow scope, as (5) below demonstrates (cf. Fujii 2004).

(5) [hotondono tabemono-ga hakobaretekita tokoro]-o futarino
[most food-NOM was.brought.in TOKORO]-ACC two
hito-ga tabeta.
people-NOM ate
'At the time most of the food was brought in, two people ate them.'
[*most > 2, ^{OK}2 > most]

Nor does it take an exceptional wide scope with respect to other scope bearing elements in the embedded clause, as in (6).

(6) John-wa [futarino hito-ga hotondono tabemono-o
John-TOP [two people-NOM most food-ACC
tabehajimeta tokoro]-o yokodorishita.
began.to.eat TOKORO]-ACC grabbed
'At the time two people began to eat most of the food, John grabbed them.'
[*most > 2, ^{OK}2 > most]

Obviously, the backward-control analysis has a problem in dealing with sentences of this sort, since a covert pronominal in the matrix clause cannot be 'co-referential' with a quantifier in the embedded clause, which is not referential.

Also, the movement analysis makes a wrong prediction: if the quantifier moves to the matrix clause, then the impossible readings in (5) and (6) are expected, contrary to fact. Compare them with simple cases in (7).

(7) a. futarino hito-ga hotondono tabemono-o tabeta.
two people-NOM most food-ACC ate
'Two people ate most of the food.'
[*most > 2, ^{OK}2 > most]

b. hodondono tabemono-o futarino hito-ga *e* tabeta.
most food-ACC two people-NOM ate
'Two people ate most of the food.'
[^{OK}most > 2, ^{OK}2 > most]

Under the movement analysis, (5) is predicted to have a similar configuration as (7b), and likewise (6) is predicted to pattern with (7a), both of which are

empirically incorrect. Being aware of this fallacy of the movement analysis, Fujii (2004) argues that the relevant movement only involves the replacement of a bundle of the theta-feature, categorical feature and the selectional feature of the DP, crucially to the exclusion of the scope feature. However, it is not clear at all how to yield the desired reading without quantifying over the relevant argument position.

Unlike the backward-control and the movement analysis, our E-type analysis correctly predicts the absence of the impossible readings. Since E-type pronouns do not bear scope and since no movement is involved, no scope interaction is expected, while the semantics is correctly captured.

3.2 The maximality effect

When a quantifier in the *tokoro*-relative acts as an argument of the matrix predicate just as in the previous case, that argument is interpreted as the maximal entity denoted by the quantifier, which is often called the *maximality effect*. For example, (8) is interpreted as Mary brought three apples and John ate *all of them*.

(8) John-wa [Mary-ga mittsu ringo-o mottekita tokoro]-o
John-TOP [Mary-NOM three apple-ACC brought TOKORO]-ACC
tabeta.
ate
'At the time Mary brought three apples, John ate *all of them*.'

Again, the backward-control analysis cannot deal with this sentence for the exact same reason as in the previous case.

Also, this interpretive effect is not accounted for at least in a straightforward manner under either variant of the movement analysis. For Narita (to appear), the quantifier just raises to the matrix clause and gets interpreted there and for Fujii (2004), how the whole interpretation is carried out is unclear, as explained above.

By contrast, this semantic effect is in fact expected under the E-type account, because E-type pronouns are disguised definite descriptions, and definite descriptions are assumed to carry the maximality effect.

3.3 Ban on negative quantifiers

As in the previous two cases, the following sentence involves a quantifier as the semantic head of the *tokoro*-relative, namely *nanimo* 'anything', which is an negative polarity item licensed by the clause-mate negation and interpreted as 'nothing'. Crucially, (9) is infelicitous as the translation indicates.

(9) # John-wa [Mary-ga nanimo tukur-anak-atta tokoro]-o
John-TOP [Mary-NOM anything cook-NEG-PAST TOKORO]-ACC
tabeta.
ate
'#At the time Mary cooked nothing, John ate it/them.'

The backward control analysis again cannot handle this data, since the quantifier is in a position c-commanded by the null pronominal. It is not obvious whether this is the correct kind of infelicity that (9) exhibits, but I assume it is not, since (9) is interpretable although pragmatically infelicitous, rather than uninterpretable, which the backward control analysis would presumably predict.

By contrast, the movement analysis incorrectly predicts a felicitous reading. If the negative quantifier moves to a position where it receives a theta-role from *tabeta* 'ate', the predicted meaning would be 'there is nothing such that at the time Mary cooked it, John ate it', which makes perfect sense.

On the other hand, the E-type analysis correctly rules it out. This anomaly is the same kind of anomaly as the one that the following sentence exhibits (cf. von Fintel 1994; Heim 1982).

(10) Nobody came in. #He was/They were wearing a hat.

That is, since negative quantifiers deny the existence of certain individuals, there is nothing in the following discourse that an E-type pronoun can refer to.

3.4 Split antecedents

The following example shows that the implicit argument of the matrix predicate in the *tokoro*-relative construction does not have to correspond to exactly one DP in the embedded clause, but can correspond to two or more.

(11) gyofu-wa [shigi-ga hamaguri-o tutuiteiru tokoro]-o
fisherman-TOP [snipe-NOM clam-ACC was.poking TOKORO]-ACC
tukamaeta.
caught
'At the time a snipe was poking a clam, the fisherman caught {the snipe/the clam/both of them}.'

As the translation indicates, the object of the matrix predicate is interpreted either as the snipe, the clam or both of them. It is obvious that the third reading cannot be accounted for by the backward-control or movement analysis, at least without further assumptions. By contrast, it is predicted in the E-type analysis without any additional machinery, since an E-type pronoun can denote a plural entity.

A way to save the movement analysis is proposed by Fujii (2006), who argues that in such split-antecedent cases, two or more movements are involved and the moved DPs, being somehow conflated, act as one single DP in the matrix clause. However, this crucially assumes a semantic operation that takes two DPs and creates a new DP which has the mereological sum of the two DP denotations as its meaning, which is too ad hoc and theoretically unmotivated.

3.5 *Tokoro*-relatives without an explicit head

There are instances of *tokoro*-relatives where none of the DPs in the embedded clause is interpreted as the missing argument of the matrix predicate.

(12) John-wa [koori-ga tokehajimeta tokoro]-o tibitibi-nonda.
John-TOP [ice-NOM began.to.melt TOKORO]-ACC sipped
'At the time an ice cube began to melt, John sipped the water into which the ice melted.'

The most salient interpretation is that John sipped the water that the ice cube melted into, rather than the ice cube itself. However, there is no DP denoting water in the embedded clause and thus the backward-control and movement analysis have an obvious difficulty in account for the reading. By contrast, under our E-type analysis, the E-type pronoun can be pragmatically recovered as 'the water into which the ice melted', for example, and the reading is captured.

4. A Compositional Semantic Analysis of *Tokoro*-relatives

As we have seen in the previous section, the *tokoro*-relative construction is best analyzed as involving an E-type pronoun. In this section, I will provide a compositional semantic analysis of the construction, basically following Kim (2004).

4.1 A way to do Head Internal Relative Clauses compositionally

The E-type analysis of *tokoro*-relatives resembles the E-type analysis of Head Internal Relative Clauses (HIRCs) in Japanese and Korean proposed by Hoshi (1995), Kim (2004), Matsuda (2002) and Shimoyama (1999).[3] HIRCs are exemplified by the following sentence, which is minimally different from (1).

(13) Keikan-wa[doroboo-ga nigedashita *no*]-o taihoshita.
cop-TOP [thief-NOM began.to.run.way NO]-ACC arrested
'The cop arrested the thief while he began to run away.'

HIRCs are syntactically almost identical to *tokoro*-relatives except for that they involve *no* in place of *tokoro*. In particular, they exhibit exactly the same kind of syntax-semantics mismatch as *tokoro*-relatives in that the semantic argument of the matrix predicate is not *no* itself, but usually one of the embedded DPs, although not necessarily (see Kim 2004 and Shimoyama 1999 for details).

Kim (2004) proposes a compositional semantic account of this construction, and by rather straightforwardly extending her analysis, I will show a way to give a compositional analysis of *tokoro*-relatives.

Firstly, Kim proposes that the meaning of *no* is (14).

(14) $[\![\text{no}]\!] = \lambda e.\iota x.[R(x)(e)]$

[3] In fact, it has been suggested elsewhere that *tokoro*-relatives and HIRCs be treated in a similar way (Kuroda 1999; Fujii 2006).

Here, *R* is a free variable over relations between individuals and events.[4] Thus, an E-type pronoun is directly encoded in the meaning of *no*. I propose exactly the same semantics for *tokoro*.

(15) ⟦tokoro⟧ = $\lambda e.\iota x.[R(x)(e)]$

Thus, *tokoro* and *no* are semantically identical.

However, the two constructions are semantically different. Namely, they differ in how the embedded and matrix eventualities are related. Kim argues that there are two types of HIRCs in terms of the way in which the two eventualities are related, and the choice depends on the event type of the embedded eventuality, the details of which I will not go into here. Just as HIRCs, the *tokoro*-relative construction relates the matrix and embedded eventualities, but in a semantically different way from either type of HIRC. Specifically, in *tokoro*-relatives, the starting time of the matrix eventuality is interpreted as included in the running time of the embedded eventuality.

From this meaning, it is rather naturally expected that both the matrix and embedded eventualities have to be temporally bounded, which is illustrated by the following examples.

(16) a. *M(atrix): T(emporally)B(ounded); E(embedded): TB*
keikan-wa [doroboo-ga nigedashita tokoro]-o
cop-TOP [thief-NOM began.to.run.away TOKORO]-ACC
taihoshita.
arrested
'The cop arrested the thief at the time he began to run away.'

b. *#M: T(emporally)U(nbounded); E:TB*
keikan-wa [doroboo-ga nigedashita tokoro]-o
cop-TOP [thief-NOM began.to.run.away TOKORO]-ACC
sitteiru.
know
'#The cop knows the thief at the time he began to run away.'

c. *#M: TB; E:TU*
keikan-wa [doroboo-ga kashikoi tokoro]-o taihoshita.
cop-TOP [thief-NOM smart TOKORO]-ACC arrested
'#The cop arrested the thief at the time he was smart.'

d. *#M: TU; E: TU*
keikan-wa [doroboo-ga kashikoi tokoro]-o shitteiru.
cop-TOP [thief-NOM smart TOKORO]-ACC know
'#The cop knows the thief at the time he was smart.'

Both the matrix and embedded eventuality can be durative or punctual. When the embedded eventuality is punctual as in (1), the matrix eventuality is

[4] Kim further assumes that the value of *R* must be one of the thematic roles participating in the eventuality, but it seems that covering all the cases she mentions requires either to extend the notion of 'thematic role' as she herself suggests, or to just let pragmatics determine everything. I take the latter to keep the discussion minimum.

interpreted as just beginning at that very moment at which the embedded eventuality happened.

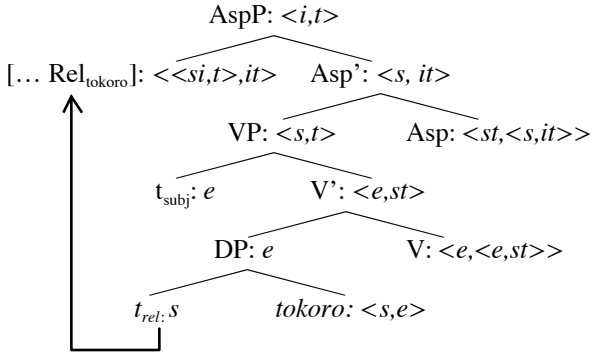
Coming back to Kim's analysis, she proposes that in HIRCs, the relative morpheme, which is null in Japanese but pronounced in Korean, plays the role of semantically bridging the two eventualities. I again follow her and propose the following semantics of the relative morpheme involved in the *tokoro*-relative construction, which is also phonologically null.[5]

(17) $[\![\text{Rel}_{\text{tokoro}}]\!] = \lambda K.\, \lambda L.\lambda t.\exists e,e'[K(e)(t)\&L(e')(t)\&\text{onset}(e')\in\tau(e)]$

Here, K and L are of type $<s,<i,t>>$ and t is of type i, where s and i are the type of eventualities and that of temporal intervals, respectively. Also, e and e' range over temporally bounded eventualities, which is ensured by a presupposition not specified here. In the third conjunct, *onset(e)* stands for $\iota t[at(e,t)\&\forall t'[at(e,t')\Rightarrow t\trianglelefteq t']]$ and $\tau(e)$ denotes $\{t:at(e,t)\}$. The same part of the denotation requires that the matrix event e' begin during the embedded event e is happening.

In order for the interpretation to proceed, one more assumption is in need to resolve the type-mismatch, just as in Kim's analysis of HIRCs. Namely, Quantifier Raising (QR) of the embedded clause together with the relative morpheme to AspP, which leaves a trace of type s.

(18)



4.2 Further data

For the rest of this section, it is shown that the present compositional analysis can capture further data reported in the literature.

4.2.1 Ban on nominative

Shimoyama (1999:174) observes that *tokoro*-relatives cannot appear bearing the nominative case.

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[5] It seems that Korean does not have the *tokoro*-relative construction, but HIRCs. This cross-linguistic difference is left open here for future research.

(19) * [daidokoro-no mado-kara siroi neko-ga haittekita *tokoro*]
[kitchen-GEN window-from white cat-NOM came.in TOKORO]
-ga Taro-ni tukamatta.
-NOM Taro-by was.caught
'A white cat was caught by Taro at the time it came in from the kitchen window.'

This is expected given the obligatory covert QR of *tokoro*-relatives to AspP, together with the assumption that Japanese subjects are overtly in [Spec,TP] (cf. Nemoto 1993).[6]

4.2.2 Long-distance tokoro*-relatives*

Our analysis of *tokoro*-relatives does not impose any syntactic restrictions on the referent of the E-type pronoun apart from that it has a contextually salient relation to the embedded eventuality. Thus, it is expected that the referent can be introduced in a subordinate clause inside of the *tokoro*-relative, which is true. The following example is directly taken from Fujii (2006:212).

(20) yakuza-wa [terorisuto-ga [hitoziti-ga kega-o
yakuza-TOP [terrorists-NOM [hostage-NOM injury-ACC
si-tei-na-i] koto]-o kakuninsita *tokoro*]-o
do-ASP-NEG-PRS] C]-ACC made.sure TOKORO]-ACC
kyuusyutusita.
saved
'The terrorist made sure that the hostages were not injured, and then the yakuzas saved them.'

4.2.3 Case Concord

Lastly, Kuroda (1978:231f) observes that *tokoro* in the *tokoro*-relative construction acts as an ordinary noun with respect to the morphological case (see also Hale and Kitagawa 1976/77), as the following examples demonstrate.

(21) a. Taroo-wa [Hanako-ga nigeteiku *tokoro*]-**o/*ni**
Taroo-TOP [Hanako-NOM flee TOKORO]-ACC/*DAT
caught
tukamaeta.
'Taroo caught Hanako at the time Hanako was fleeing.'
b. Taroo-wa [Hanako-ga nigeteiku *tokoro*]-***o/ni**
Taroo-TOP [Hanako-NOM flee TOKORO]-*ACC/DAT
butukatta.
bumped
'Taroo bumped into Hanako at the time Hanako was fleeing.'

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[6] HIRCs do appear in nominative positions and thus Kim's analysis is problematic for such cases, if this assumption is correct. Shimoyama suggests, incidentally, that HIRCs in nominative positions should be treated in a different way. I will leave this issue open here.

This state of affairs is expected under our analysis, since *tokoro* is indeed the object of the matrix predicate, both syntactically and semantically.

5. Conclusion and Further Issues

In this paper, it was shown that *tokoro*-relatives are best analyzed as involving an E-type pronoun rather than backward control or movement. Also, following Kim's (2004) analysis of HIRCs, a compositional semantic analysis of *tokoro*-relatives was proposed. It was further shown that our E-type analysis covers empirical data well. However, there are further problems to capture and some of them are addressed below.

5.1 Ban on genitive

Shimoyama (1999:174) observes that *tokoro*-relatives in the genitive position are ungrammatical.

(25) * John-wa [[Kathy-ga ofisu-ni yagi-o 2-too turetekita
John-TOP [[Kathy-NOM office-to goat-ACC 2-CL brought
tokoro] -no atama]-o nadeta.
TOKORO] -GEN head]-ACC patted
'John patted the heads of the two goats as Kathy brought them to the office.'

A possible account of this prohibition is to assume that as is well known, the genitive construction involves an implicit relation between individuals, typically the possession relation, and crucially that this is not a semantically right kind of eventuality for the *tokoro*-relative morpheme to modify.

5.2 Event taking predicates

When the matrix predicate is the kind of predicate that can be predicated of an event such as 'to see' and 'to photograph', the *tokoro*-relative construction receives an interpretation where the E-type pronoun is an event.

(26) John-wa [Bill-ga koronda tokoro]-o mita/satsueishita.
John-TOP [Bill-NOM toppled.over TOKORO]-ACC saw/photographed
'John saw/photographed Bill toppling over.'

Hale and Kitagawa (1976/77) propose to treat such cases completely differently, which is likely given that such *tokoro* relatives can appear in the nominative and genitive positions. However, it does not explain the fact that HIRCs have similar usage too, which suggests that this reading is somehow

interwoven in the E-type semantics of these two head-internal relative constructions.[7]

5.3 Intransitive cases

As observed by Harada (1973) and Kuroda (1978), *tokoro*-relatives can appear even if the matrix predicate is intransitive, as the following examples adapted from Harada 1973:194f illustrate.

(27) a. sono doroboo-wa [nigeteiku tokoro]-o keisatu-ni
that thief-TOP [run.away TOKORO]-ACC police-by
tukamatta.
be.caught
'That thief was caught by the police at that time he was running away.'

b. Taroo-wa [kanningu-o shiteiru tokoro]-o
Taroo-TOP [cheating-ACC doing TOKORO]-ACC
sensei-ni mitsukatta.
teacher-by be.found
'Taroo was found by the teacher cheating (in the exam).'

c. Taroo-wa [sini-sooni natta tokoro]-o tasukatta.
Taroo-TOP [die-almost became TOKORO]-ACC recovered
Taroo almost died but he recovered.'

However, not all intransitive predicates are licensed.

(29) a. * Taroo-wa [Hanako-ga mata koronda tokoro]-o tameikiotuita.
Taroo-TOP [Hanako-NOM again toppled.over TOKORO]-ACC sighed

b. * Taroo-wa [Hanako-ga kaettekita tokoro]-o nemutta.
Taroo-TOP [Hanako-NOM came.home TOKORO]-ACC slept

The analysis presented in Section 4 cannot straightforwardly account for these cases and this problem is left open for future research.

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[7] Kim (2004) puts forward a treatment of such cases of HIRCs, in which the E-type pronoun refers to the embedded eventuality itself, rather than to an individual participating in it. However, extending this to *tokoro* relatives cannot account for the lack of the distributional restrictions.

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