

# Ambiguity of Reflexives and Case Extension\*

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**Abstract.** It is suggested that the difference between co-referential and bound reflexive pronouns found in many languages can be accounted for by using the notion of the case extension of a type <1> quantifier. Given this proposal the co-referential pronouns get their meaning when the corresponding NP takes nominal case extension first. Bound reflexives are reflexivisers in the sense that they are not case extensions of quantifiers although they also transform binary relations into sets. Examples from Japanese and from Polish are discussed.

**Keywords:** Co-referential and bound reflexives, case extension of a quantifier.

## 1. Introduction

One of well-known distinctions concerning reflexives, and more generally anaphors, is the distinction, introduced in Reinhart (1983), between co-referential and bound reflexives (or anaphors). In English the distinction between co-referential and bound reflexive can be illustrated by the possible ambiguity of the sentence in (1):

(1) Only Leo washed himself.

This sentence can mean, at least theoretically, either (2a), the co-referential reading of reflexive, or (2b), the bound reflexive:

(2a) Only Leo washed Leo.

(2b) Leo is the only person who washed himself.

Obviously (2a) and (2b) are not equivalent: if nobody in addition to Leo washed himself and Leo was washed, in addition to Leo himself, by someone else then (2a) is false and (2b) is true; and if nobody, except Leo himself, washed Leo and some other person, in addition to Leo, washed him/herself that (2a) is true and (2b) is false.

This distinction is related to the distinction between sloppy and strict readings of some pronouns (Dahl 1973) and is illustrated in (3)-(5); the possible interpretation of these sentences is given in the corresponding (b) and (c) sentences:

(3a) Only Leo loves his wife

(3b) Leo is the only person such that that person loves his own wife

(3c) Leo is the only person such that that person loves Leo's wife

(4a) Leo loves his wife and so does Bill

(4b) Leo loves his (own) wife and Bill loves Leo's wife

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- (4c) Leo loves his (own) wife and Bill loves his own wife
- (5a) Leo considers himself competent, and so does Lea
- (5b) Leo considers himself competent and Lea considers Leo competent, too
- (5c) Leo considers himself competent and Lea considers herself competent too

In (a) sentences we have a bound variable reading of the reflexive or possessive pronoun and thus the sloppy identity between the corresponding NPs (those related by the anaphor). In (b) sentences we have the strict identity and co-referential readings of pronouns.

Notice that the ambiguity does not always arise. In (6) we have only sloppy reading:

- (6) Leo criticized himself and so did Bill

This sentence cannot mean that Bill criticized Leo.

In English the distinction between the bound variable reading and the co-referential reading of pronouns is not formally or lexically marked. In many other languages this distinction is more overt and thus it is easier to illustrate it since in those languages different reflexive pronouns can express the corresponding readings. For instance in Polish there are two (at least) reflexive pronouns, the clitic *sie* and the full pronoun *siebie* (Lubowicz 1999). As it will be suggested *siebie* corresponds to co-referential reflexive and *sie* - the anaphoric reflexive. The situation in Polish is, however, more complex since not all transitive verbs can take both reflexive as complements. For instance verbs of "saying" like *criticise* or *blame* or some "psychological" verbs, like *hate* (in Polish) can take only *siebie* as possible direct object complement.

Of course the indicated difference between co-referential and bound reflexive pronouns occurs in many other languages and it has been often studied, in particular in Germanic (Scandinavian, cf. Hellan 1888) and, as indicated above, in some Slavic languages. Various attempts have been made to explain the difference, basically in the framework of binding theory, that is a syntactic theory. In addition the difference can be easily represented in the lambda calculus for instance. In this paper I will analyse the difference between co-referential and bound reflexives from the (formal) semantic point of view. For that purpose I will use some tools from the generalized quantifier theory, and, in particular the notion of the semantic case theory (SCT) and of the case extension of a quantifier, as introduced by Keenan (1987, 1988, 2007).

## 2. Formal preliminaries

SCT is an extension of the generalized quantifiers theory which allows us to treat semantically NPs (which denote type  $\langle 1 \rangle$  quantifiers) when they take non-subject position in the sentence. Subject NPs are functions from sets (denotations of VPs) to sets of sets and thus they denote sets of sets. To interpret NPs on non-subject position one extends the domain of type  $\langle 1 \rangle$  quantifiers: they are treated as reducers of arity of their arguments, that is as functions which when applied to n-ary relations give (n-1)-ary relations. Thus when they apply to binary relations (denotations of transitive VPs) they give sets (considered as unary relations) as result (and sets are denotations of intransitive VPs). This extension of the domain of type  $\langle 1 \rangle$  quantifiers allows us to make precise the notion of a case extension, and in particular the accusative extension of a given type  $\langle 1 \rangle$  quantifier. This is possible because in such a case extension the result of an application of the quantifiers is obtained by taking into account specifically the seconds members of the pairs composing a given binary relation. More formally  $Q_{acc}$  the accusative extension of  $Q$ , is defined in (i) and  $Q_{nom}$  the nominative extension of  $Q$  is defined in (ii):

$$Q_{acc}(R) = \{x: Q(xR) = 1\} \text{ (i)}$$

$$Q_{nom}(R) = \{x: Q(Rx) = 1\} \text{ (ii)}$$

where  $Q$  is a type  $\langle 1 \rangle$  quantifier,  $R$  - a binary relation and  $xR = \{y: xRy\}$ , and  $Rx = \{y: yRx\}$ .

The application of a type  $\langle 1 \rangle$  quantifier to a binary relation results in a (one-place) predicate. The application of the nominal case extension gives of course also a predicate but this predicate corresponds, roughly, to the passive predicate in which the subject NP is the agent.

In addition to quantifiers applying to relations (considered as functions from binary relations to sets) there are other functions from relations to sets: the function REFL, denoted by the standard reflexive pronoun, is one of them. It is defined as follows: for any binary relation R, REFL(R)={x: xRx}.

Given the above definitions the sentence NP<sup>1</sup> NP<sup>2</sup> TVP has two logical forms, (iii) and (iv):

$$Q^1(Q^2_{acc}(R)) \text{ (iii)}$$

$$Q^2(Q^1_{nom}(R)) \text{ (iv)}$$

Logical sentences (iii) and (iv) need not be equivalent: the difference between them often corresponds to the difference between subject wide scope and object wide scope readings of a given transitive sentence with two nominal arguments. When, however, NP<sup>1</sup> or NP<sup>2</sup> is a proper name (iii) and (iv) are (provably) equivalent (cf. Zimmermann 1992).

It might be interesting to illustrate the difference in meaning due to the differences in the case extension of a given quantifier and in particular the result of the application of the nominal case extension to a given relation. Consider the sentence in (7):

(7) Every student knows the same languages

Informally (7) means that there are languages such that both Leo and Lea know them. In other words (7) should be interpreted with the object NP (its appropriate extension) taking wide scope over the subject NP. This fact can be represented precisely with the help of the notion of the case extension. Thus the basic meaning (which should be completed by some existential presuppositions) of (7) is given in (8):

(8) (NO TWO LANGUAGES) (SOME AND NOT EVERY STUDENT)<sub>nom</sub> KNOW

What (7) basically means is that there are no (two) languages which are known by some but not by all students and not that for every student there are two languages such that he/she knows them. Thus in this representation the use of the nominative case extension is essential.

### 3. Analysis

In this paper I want to apply the SCT basically to some reflexive pronouns in Japanese and discuss some of these applications in the context of similar pronouns in Polish. It is generally admitted that Japanese has a very rich system of reflexive pronouns and a powerful machinery which is used during the process of reflexivisation. It is thus interesting to compare it, at least partially, with similar mechanisms in other languages.

Most studies of reflexives in Japanese concern their syntactic properties (see Aikawa 2003 for a review). It has been pointed out in Richards (1997), following an unpublished work of Aikawa, that Japanese pronouns *kare-jishin* and *jibun-jishin* are unambiguously interpreted, respectively, as the co-referential and bound reflexive. So in this talk I investigate, using the SCT, the semantic differences and similarities between Japanese pronouns *jibun-jishin* and *kare-jishin* (and its plural version *karera-jishin*) on the one hand and how this difference is possibly related to the difference between Polish reflexive pronouns *sie* and *siebie* on the other hand. All these pronouns, in Japanese and in Polish, roughly correspond to the English reflexive pronoun *self*.

I am concerned with the following problems: sentences (9a) and (9b) are equivalent and both mean (9c). This is not the case for sentences in (10): (10a) has purely reflexive meaning and says that Taro criticized himself and Jiro criticized himself whereas (10b) has a mixed reflexive-reciprocal reading and entails that Taro criticised himself and Jiro and Jiro criticized himself and Taro:

- (9a) Taroo-ga jibun-jishin o hihanshita.
- (9b) Taroo-ga kare-jishin o hihanshita.
- (9c) Taro criticised himself.
- (10a) Taroo to Jiroo ga jibun-jishin o hihanshita.
- (10b) Taroo to Jiroo ga karera-jishin o hihanshita.

So clearly the above examples exhibit the difference we are looking for.

Observe in addition that sentence (11a) means what (12a) means and (11b) means what (12b) means and thus (11a) and (11b) are different in meaning. For instance (11a) is true if Taro was in, addition blamed by Jiro whereas (11b) is false in such situation (cf. Hiraga and Nissenbaum 2006):

- (11a) Taroo dake-ga jibun-jishin o semeta  
 (11b) Taroo dake-ga kare-jishin o semeta.  
 (12a) Only Taro blamed himself.  
 (12b) Only Taro blamed Taro

The above data show that the difference between *kare-jishin* and *jibun-jishin* is clearly related to the difference between the bound anaphora and co-referential anaphora. These facts cannot be easily explained if we just assume that although both pronouns require a local c-commanding antecedent, *kare-jishin* should be interpreted as a co-referential reflexive and *jibun-jishin* as a bound reflexive (Richards 1997). We need in addition a semantic characterisation of various possible antecedents.

Now my proposal is as follows: *jibun-jishin* in Japanese (and *sie* in Polish) always denote REFL (roughly, they are "reflexivisers", that is specific functions from binary relations to sets which are not extensions of quantifiers). Concerning *kare-jishin* and *siebie* they indicate that their antecedent should be interpreted by nominal case extension. Thus, to take only the case of Japanese, sentences of the form (v):

NP KARE(RA)-JISHIN TVP (v)

have as their semantic representation given in (vi):

Q (Q<sub>nom</sub>(R)) (vi)

where NP denotes Q and TVP denotes the relation R. In other words to get the meaning of sentences with JIBUN-JISHIN apply first the function REFL to the (denotation of) the transitive TVP and then apply the (denotation of) the subject (which is also the antecedent NP) to the result of the first operation. In the case of sentences with KARE(RA)-JISHIN apply the nominal extension (of the denotation) of antecedent of KARE(RA)-JISHIN to the TVP and then apply the (denotation of) the antecedent NP (without any case extension) to the result of the first operation.

It can be checked that given this interpretation of reflexives we account for the problems mentioned above.

This is not enough, however. We need some additional tests showing in particular that antecedents of *kare-jishin* and *siebie* are related to nominal case extensions and *jibun-jishin* and *sie* are not. Two types of such tests will be proposed.

First, one observes that questions like *Whom did/does NP V* (as in *Whom does Bill wash/hate*) must be preferably answered by co-referential pronouns. This is the case in Polish, and even if less clear, also in Japanese: the question *Kogo myje Bill* (Whom is washing Bill) cannot be answered by the reflexive pronoun *sie*.

In the second test I propose to use constructions with conjunctions in which non-standard constituents occur or constructions with a conjunction of a pronoun with a full NP. In (13) we have a sentence with a non-standard constituent:

- (13) Leo hates Sue and Bill himself

One observes that in the corresponding sentences in Japanese and in Polish preferably co-referential pronouns should be used at the place of *himself*. Thus in Polish (14a) is grammatical and the corresponding sentence (14b) with the pronoun *sie* is not:

- (14a) Leo nienawidzi Sue a Bill siebie  
 (14b) \*Leo nienawidzi Sue a Bill sie

The following examples illustrate the constraint on possible conjunctions. The English sentence (15a) must be translated in Polish by (15b), where the pronoun *siebie* occurs and cannot be translated by (15c) which is not acceptable:

- (15a) Leo is washing Sue and himself  
 (15b) Leo myje Sue i siebie  
 (15c) \*Leo myje Sue i sie

The fact that *jibun-jishin* and *sie* are not related to case extensions is just the formal consequence of the definition of the function REFL (cf. Keenan 2007). Keenan shows that the function REFL, even if it is denoted by a kind of a NP, cannot be a case extension (neither nominal not accusative) of any type <1> quantifier.

Finally we observe that reflexive pronouns occurring in sentences with plural subjects sometimes get reciprocal interpretation. Such an interpretation is not possible, however, with co-referential reflexive pronouns. The Polish sentence (16b) (with the pronoun *siebie*) corresponding to English (16a) cannot mean (17a) whereas in the sentence (17b), where the pronoun *sie* occurs the pronoun can get the reciprocal meaning:

- (16a) Leo and Lea are washing themselves  
 (16b) Leo i Lea myja siebie  
 (17a) Leo and Lea are washing each other  
 (17b) Leo i Lea myja sie

Notice, in passing, that the English sentence (16a) cannot get the reciprocal interpretation either.

#### 4. Conclusions

I have proposed to use the notion of the nominal case extension to describe the meaning of reflexive pronouns corresponding, in some languages, to co-referential anaphora. Such anaphors are usually opposed to bound variable anaphors. My proposal has been illustrated by some examples from Japanese and Polish, which have been used to show some interesting differences between reflexives in Japanese and in Polish. In particular some arguments have been given to show that the Japanese pronoun *kare-jishin* and Polish pronoun *siebie* correspond to the co-referential anaphors and as such are not reflexivisers. Their meaning is obtained by replacing them by their antecedent taken in the nominal case extension. Similarly with the Polish pronoun *siebie* which also has to be taken in the co-referential interpretation.

The proposal made here explains some specific behaviour of certain reflexive pronouns, in particular the fact that co-referential anaphors cannot get reciprocal interpretations. It also shows how possible scope differences can be explained by the machinery of the case extension.

Concerning possible differences it has been observed that Polish bound-variable pronoun *sie* must be basically used with active transitive verbs and not with psychological verbs or verbs of saying. This fact is to be related to the observation that complex sentences with VP anaphors which often give rise to the ambiguity between bound and co-referential readings have only one reading, the bound variable reading, in sentences containing the psychological verbs or verbs of saying (cf. example (6) above).

From the theoretical point of view the proposal dispenses with the use of often cumbersome indices whose theoretical status is not very clear, as far as I can tell. Of course the proposal applies also to specific reflexives in other languages and, in particular, as I hope, to some other types of anaphora (to *same/different* anaphors, as indicated above and to reciprocals).

Notice finally that the proposal made here has some other applications. Concerning Japanese it explains for instance the "asymmetric" ambiguity of the negations of (5). Similarly the proposal applies to sentences in (8) since by fixing one NP (Jiroo) one can consider that *hanasu* (to talk (about)) denotes a binary relation. It also explains the sloppy vs strict readings to which reflexives give rise (cf. the difference between (9a) and (9b)):

- (8a) Taroo-ga Jiroo ni jibun-jishin nituite hanashita  
 (Taro talked to Jiro about him(self))  
 (8b) Taroo-ga Jiroo ni kare-jishin nituite hanashita  
 (9a) Taroo-ga kare-jisin-o semeta, (soshite) Jiroo-mo semeta.  
 (Taro criticized himself (then) Jiro also criticized)  
 (9b) Taroo-ga jibun-jisin-o semeta, (soshite) Jiroo-mo semeta.

For many speakers in (9b) we have only a sloppy reading whereas in (9a) both a strict and a sloppy readings are possible.

Of course many things remain to be done concerning the meaning of pronouns and their typology (cf. Kiparsky 2002).

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