Reciprocal Phrases in Serbo-Croatian*

Chris LaTerza and Ivana Mitrović
University of Maryland, College Park and Stony Brook University

In this paper we investigate singular and plural reciprocal expressions that appear in argument positions in Serbo-Croatian (SC). In the first section, we will show how the number morphology on reciprocals may signify the “strength” of the reciprocal event being described, as well as suggest how the semantics associated with both types of reciprocals can be represented formally. Section 2 will be devoted to the syntactic behavior of these singular and plural reciprocals, in particular how antecedence works with each type of reciprocal. Section 3 will summarize our findings and bring up questions for future research.

1. Strength of Reciprocity

That the distribution of certain reciprocal expressions is dependent on contextual factors has been noticed as far back as Fiengo and Lasnik (1973). We see this in SC as the number morphology that appears on phrasal reciprocals is dependent on the reciprocal event being described. Singular reciprocals (1a) seem to be associated with what is classically known as Strong Reciprocity, where every individual of the set denoted by the antecedent (or subsets of that set: (1c)) is both the Agent and Patient of the relation with every other member in their set.¹

(1) a. Studenti su izudarali jedan drugog.
students AUX hit one.MSG.NOM other.MSG.ACC
‘The students hit each other.’

* We would like to thank John Bailyn, Wayles Browne, Miloje Despić, Dan Finer, Norbert Hornstein, Howard Lasnik, Roumyana Pancheva, Paul Pietroski, the audiences at FASL 18 and Belgrade University, and four anonymous reviewers for very helpful comments and suggestions. We would especially like to thank Richard Larson for not only his insightful comments, but also for sparking our interest in reciprocity.

¹ The names and logical definitions for types of reciprocity used in this paper are taken from Fiengo and Lasnik (1973) and Langendoen (1978).
d. Strong Reciprocity: $|A| \geq 2$ and $\forall x, y \in A \ (x \neq y \rightarrow R_{xy})$

e. Partitioned Strong Reciprocity: There is a partition $A_1, \ldots, A_n$ of $A$ such that all $i, |A_i| \geq 2$ and $\forall x, y \in A_i \ (x \neq y \rightarrow R_{xy})$

On the other hand, plural reciprocals seem to be associated with Weak Reciprocity: reciprocal events that can have non-symmetric relations, as well as outliers (members of the set denoted by the antecedent that do not participate in the event). This type of situation is shown in the diagram (2b).

(2)  

a. Studenti su izudarali jedni druge.  
    students AUX hit one.M.PL.NOM other.M.PL.ACC  
    ‘The students hit each other.’

b.  

c. Weak Reciprocity:  
    $\forall x \in A, \exists y, z \in A \ (x \neq y \land x \neq z \land R_{xy} \land R_{zx})$

It should be noted that plural reciprocals, which can be used to describe an event such as that in (2b), can also be used to describe the events in (1). However, singular reciprocals cannot be used to describe situations such as that in (2b). That plural reciprocals can be used to describe stronger reciprocal relations follows from the logical definition
given in (2c), which subsumes the cases that would make a stronger form of reciprocity true. ²

Based on what we have seen in (1) and (2), we can make a first pass claim about the semantics of reciprocals in SC: singular reciprocals denote Strong (or Partitioned-Strong) Reciprocity, and plural reciprocals denote Weak Reciprocity. The examples in (3) and (4) suggest that this treatment is on the right track.

(3) Članovi porodice su poštovali jedan drugog/ jedni druge members family AUX respect one other.SG/ one other.PL

i odali su poštu #jedan drugom/ jedni drugima
and paid AUX respect one other.SG/ one other.PL

na svojim sahranama.

at their funerals

'The family members respected each other and paid their respects at each others’ funerals.'

[based on an example from Schein (2003)]

(4) “Kapetan!” vikuše pirati zureći #jedan u drugog/

“Captain!” yelled pirates staring one at other.SG/

jedni u druge.

one at other.PL

‘The captain!’ said the pirates, staring at each other.’

[based on an example from Dalrymple et al. (1998), originally from J.M. Barrie’s Peter Pan]

Both of these examples describe situations where it is impossible for Strong Reciprocity to hold. As such, we would expect singular reciprocals to be disallowed in such context. This expectation is borne

² See example (5), (6) and (10a) for cases where plural reciprocals cannot be used, even though these cases conform to the logical definition in (2c).
out, as native speakers find use of singular reciprocals in both (3) and (4) to be infelicitous.

However, there are certain situations that do not meet the definition of Strong Reciprocity, yet singular reciprocals can be used felicitously. Examples (5) and (6) show these exceptional cases.

(5) Stubovi su udaljeni 5m jedan od drugog/
poles AUX distanced 5m one from other.SG/

#jedni od drugih.
#one from other.PL
‘The poles are distanced 5m from each other.’

(6) Studenti su pratili jedan drugog/
students AUX followed one from other.PL

#jedni drugih/
#one other.SG/ one other.PL
‘The students followed each other.’

The data in (5)-(6) suggest that the strong/weak distinction may not be the best way to characterize the behavior of singular and plural reciprocals in SC. However, it seems like the strength of the reciprocal relation is not completely irrelevant in determining the number.

---

3 The examples in (5)-(6) all involve a type of ‘connectedness’. Technically, every pair of individuals in the antecedent sets in these sentences is related by the transitive closure of the relation in each sentence. It is unclear why the plural reciprocal is disallowed in such contexts, but it is important to note that if the contexts involved groups of poles, and these groups were 5 meters from each other group, then the plural reciprocal becomes the appropriate choice.
morphology on the reciprocal. It seems we must find a way to capture reciprocal “strength” by not directly appealing to it. In the next subsection, we will review Filip and Carlson’s (2001) work on Czech reciprocals that bears directly on this issue.

1.1. Strengthening and weakening reciprocal descriptions in Czech

Reciprocity in Czech is generally expressed by the anaphoric clitic –se, which can be used to describe any reciprocal relation. However, when this clitic is used with verbs that have been modified by either a distributive (po-) or collective (na-) prefix (prefixes that can be used independent of anaphora) we find a distribution surprisingly similar to that of phrasal reciprocals in SC. For example, when the distributive prefix po- is used in a reciprocal sentence, it necessarily triggers strong reciprocity, similar to the use of singular reciprocals in SC. The sentence in (7) can be used to describe a situation like that in (1b). The necessarily strong reading explains why it sounds awkward to continue (7) with a sentence like (8).

(7) Členové delegace se PO-objímali

‘The members of the delegation embraced each other.’ [successively]

(8) ??..., ale Nikita se neobjal s Maem.

‘...but Nikita and Mao did not embrace.’

On the other hand, the collective prefix na-, when used in conjunction with the reciprocal clitic, prefers the reading of weak reciprocity, just like plural reciprocals in SC. The sentence in (9), and not the one in (7), can be felicitously used to describe the situation shown in (2b).

(9) To se ti delegace ale před fotografy

‘...but these delegates in front of photographers’
‘Boy, did the delegates embrace a lot in front of the cameras.’
[examples taken from Filip & Carlson (2001)]

Czech is also like SC in that if the set denoted by the antecedent contains only two individuals then the plural reciprocal in SC (10a) and a collective prefix appearing with an anaphoric clitic in Czech (10b) sounds degraded⁴.

(10) a. Kain i Avelj su ubili jedan drugog/
Cain and Abel AUX killed one other.SG/

*Jedni druge.
one other.PL
‘Cain and Abel killed each other.’

b. ?Kain a Abel se navzájem sebe NA-zabijeli²
Cain and Abel REC.ACC each.other EMPH ACM-kil
‘Cain and Abel killed each other a lot.’
[example taken from Filip & Carlson (2001)]

Based on the similarities between SC’s singular and plural reciprocals and Czech’s anaphoric clitic plus distributive or collectivizing verbal prefixes, we believe that the proper treatment of reciprocals in SC will have to make reference to distributivity and collectivity. Specifically, we suggest that singular reciprocals signal distributive readings, while plural reciprocals are associated with collective readings.

1.2. Capturing distributive/collective effects of SC reciprocals

In this section we review the semantics of distributive and collective construals of plural noun phrases and outline how SC reciprocals can fit

⁴ It is important to point out that the degree of unacceptability between the SC and Czech sentences in (10) are different. Furthermore, a sentence like (10b) in Czech can be saved if we change the verb from ‘killed’ to ‘hugged’, as ‘hugged’ facilitates a reading of multiple instances of the same event. However, using a plural reciprocal in SC with an antecedent that denotes a two-membered set sounds infelicitous regardless of the verb.
into such a theory. But first, let us look at an example that illustrates the basic distributive/collective phenomenon.

(11) Five men carried a piano up the stairs.

If the English sentence in (11) is construed distributively, there are five events, each of which has a (probably very strong) man carrying a piano up some stairs. However, if the sentence is construed collectively, there is a single event of five men working together to carry a single piano up the stairs. In the collective construal, not all the men have to be doing some carrying; for example, there might be one man directing the others as to how to carry the piano.

Research on the semantics of plurals, such as Link’s (1983) seminal work, captures the distributive/collective readings by suggesting that distributive predicates are predicates true of atomic individuals, while collective predicates are true of sets of individuals. We will not go into specific details as to how this works, and which reading is basic (if either of them is). What is important is that collective predicates, which are true of sets, can allow for outliers as long as a large enough portion of the set denoted by the plural noun phrase participates in the event being described. This is precisely what we see in the SC examples with plural reciprocals (such as (2)). Distributive predicates, on the other hand, disallow outliers since the predicate is ‘distributed down’ to each atomic individual in the set denoted by the plural noun phrase, akin to the strong reciprocity we see with SC singular reciprocals.

There are however some problems with this basic account of distributive/collective phenomena. An important one for us is that this theory has no way to account for cases that appear to exhibit ‘partial distributivity’, where the predicate is not distributed down to each atomic individual, but rather to a subplurality of the larger set. The English sentence in (12) represents an example of this.

(12) John and Mary and Bill and Sue hate each other.

---

5 See Brisson (1998) for a thorough discussion of the nonmaximality property associated with such construals; i.e, the property of allowing for outliers. Filip and Carlson (2001) discuss this property for Czech reciprocal sentences with the collective prefix.
The relevant reading for us is the one where each couple, construed as a unit, hates the other. Under the classic analysis, the sentence can either mean that there is a lot of hating happening in the set denoted by the subject (the collective reading), or that each individual in that set has the property of ‘hating each other’ (the distributive reading), which is nonsense. In fact, no reciprocal sentence can be construed as distributed down to each atomic individual, as it is well known that a reciprocal expression being predicated of a singular individual is wildly infelicitous cross-linguistically. Due to this limitation of the classic account, we have to build into the theory of plurals a way to capture partial distributivity.

Work by Higginbotham (1981), Gillon (1987), and especially Schwarzchild (1996) provide a way to handle partial distributivity by making use of contextually determined Covers. A Cover is a division of a group of individuals into subsets that need not be disjoint. A formal definition, taken from Gillon (1987), is repeated below as (13)

\[(13) \text{ A covers B iff } A \subseteq P(B) \land \bigcup (A) = B \land \emptyset \in A.\]

We will follow Schwarzchild (1996) in assuming that Covers manifest themselves in the semantics as phonetically null variables that receive their values from the discourse. Below are three possible Covers of the set denoted by the subject in (12).

\[(14) \quad \text{a. } A = \{\{j\}, \{m\}, \{b\}, \{s\}\} \]
\[\text{b. } B = \{\{j, m\}, \{b, s\}\} \]
\[\text{c. } C = \{j, m, b, s\}\]

Cover A represents a classic distributive reading. However, assigning this Cover as the value of the Cover variable in (12) will result in nonsense since the predicate is a reciprocal one, which cannot be predicated of atomic individuals. Cover C represents a classic collective

\[\text{See McCloskey (2005) for some possible exceptions}\]
\[\text{Although not directly relevant here, it is a nontrivial point as to whether Covers represent divisions of the denotations of plural noun phrases or more generally a division of the domain of discourse. Schwarzchild (1996) presents convincing arguments in favor of the latter approach.}\]
reading. Cover B is comprised of two disjoint subsets, and this is the
Cover one must use to fill the value of the variable in (12) to give the
desired reading.

Returning to SC, we can see now how a theory of plurality making
use of Cover variables can help give the desired results for the many
different meanings that can be associated with SC singular and plural
reciprocal expressions. Let us start with plural reciprocals. A case of
classic Weak Reciprocity like that in (2) can easily be accounted for by
choosing a collective Cover similar to that in (14c). This type of Cover
allows for outliers as long as enough of the larger set of students has the
property of ‘hitting each other’, where what counts as enough is
contextually determined. Covers also give us a way to explain sentences
with singular reciprocals like that in (1a) being used to describe
situations of Strong Reciprocity like that in (1b). These can be
accounted for by assigning the Cover in (15) as the value of the Cover
variable.

(15) \[ D = \{\{a,b\}, \{a,c\}, \{a,d\}, \{a,e\}, \{a,f\}, \{b,c\}, \{b,d\}, \ldots\} \]

Recall that Covers need not involve disjoint subsets, and as such we
can account for cases of Strong Reciprocity by creating Covers
corresponding \( A \times A \), where \( A \) is the set denoted by the reciprocals
antecedent.

As for cases of partial distributivity, it is interesting to note that the
SC equivalent to the English (12) on the intended reading allows only the
plural reciprocal.

(16) Jovan i Marija i Marko i Milica mrze
Jovan and Marija and Marko and Milica hate

\#jedan drugog/ jedni druge.
\textit{one other.SG/ one other.PL}
‘Jovan and Marija and Marko and Milica hate each other.’

---

It is not important here whether the resulting pairs of the Cartesian product are ordered
or not.
The reasons for this restriction is unclear to us, however we believe that this example as well as the point made in footnote 3 in section 1.1 suggest that when the participants in a reciprocal event are plural individuals as opposed to atomic individuals (for (12) and (16), couples as opposed to the individuals that make up the couples), only the plural reciprocal can be used.

We now are in a position to make a claim as to the semantic content of singular and plural reciprocals which is quite different from our first pass semantics based on reciprocal strength. In particular, we claim that plural reciprocals involve Cover variables that can take any Cover as a value so long as that Cover is consistent with the meaning of the lexical predicate and the context of utterance. The choice of Cover directly affects whether the reciprocal sentence is construed as collective, fully distributive, or partially distributive. However, we still leave unexplained why plural reciprocals are disallowed in describing the “connected” situations like that in (5) and (6), and also cases where the set denoted by the antecedent contains only two members (10). As for singular reciprocals, one would have to stipulate that the value of the Cover variable must be the most distributive Cover possible; not distributed down to atomic individuals, but perhaps a Cover with non-disjoint subsets, each with a cardinality of two (see (15) for an example of this). The strength of reciprocity effects seen in 1.1 falls out from this Cover analysis of SC reciprocals.

2. Syntactic antecedents of singular and plural reciprocals

Besides their semantic differences, singular and plural reciprocals in SC also behave differently in how their antecedents are determined in sentences with multiple potential antecedents. In brief, singular reciprocals can have at most one antecedent, while plural reciprocals allow for split antecedents. This section is devoted to the licensing of reciprocals in SC and to constructions involving reciprocals and multiple

---

9 There were some discrepancies among our informants as to the degree of acceptability with some sentences involving multiple potential antecedents. However, despite these, there was unanimous agreement that singular reciprocals has a unique antecedent property and that plural reciprocals allow for split antecedents.
potential antecedents: specifically, indirect questions, embedded argument positions, and objects in ditransitives.

Looking at reciprocals appearing in indirect questions; i.e., reciprocals appearing in an embedded SpecCP, we can clearly see that singular reciprocals (17a) can only have a single antecedent which may be either the matrix or embedded subject. Plural reciprocals (17b) in such positions can have both the readings that (17a) can have, though it also allows a reading in which both matrix and embedded subjects act as antecedents.

(17)  
a. Studenti se pitaju koje slike jedan drugog
      students AUX wonder which pictures one other.SG
      profesori vole.
      professors like

   b. Studenti se pitaju koje slike jedni drugih
      students AUX wonder which pictures one other.PL
      profesori vole.
      professors like
   ‘The students wonder which pictures of each other the professors like.’

The examples in (18), which have reciprocals in the embedded object position, show that there is a locality restriction on how the antecedents of both singular and plural reciprocals are determined.

(18)  
a. Studenti misle da profesori vole jedan drugog.
      students think that professors like one other.SG

   b. Studenti misle da profesori vole jedni druge.
      students think that professors like one other.PL
   ‘The students think that the professors like each other.’

We can explain the locality restriction on SC reciprocals in terms of standard phase theory as presented by Chomsky (2000, 2001). If the reciprocal is contained in the complement of a phase head (for sake of
discussion, assume that C is the relevant phase head) at the point of Transfer, then the denotation of the reciprocal becomes fixed and cannot be updated with information introduced in higher phases. This is what we see in (17). In (18) on the other hand, the reciprocal is located in the embedded SpecCP, the ‘escape hatch’, at the point of Transfer, and the phrase containing the reciprocal can remain active for further operations such as being bound by an antecedent introduced in the matrix cycle.

The last construction we will look at to help us develop a descriptively adequate account of how reciprocals in SC are licensed are ditransitives. The sentences in (19) show that both singular and plural reciprocals appearing as indirect objects can take either the subject or the direct object as an antecedent. The examples in (19) reflect what we have already seen in (17), namely that singular reciprocals can only have a single antecedent, while plural reciprocals also allow for split antecedents. The sentences in (20) show that reciprocals in direct object position, whether singular or plural, can take only the subject as an antecedent and not the indirect object.

(19) a. Studenti su rekli profesorima jedan o drugom.
   students AUX said professors one about other.SG

   b. Studenti su rekli profesorima jedni o drugima.
   students AUX said professors one about other.PL
   ‘The students told the professors about each other.’

(20) a. Studenti su rekli jedan drugom o profesorima.
   students AUX said one other.SG about professors

   b. Studenti su rekli jedni drugima o profesorima.
   students AUX said one other.PL about professors
   ‘The students told each other about the professors.’

The ditransitive examples in both (20a) and (20b) show us that both singular and plural reciprocals’ antecedents must be c-commanding. We adopt the standard claim, argued for by authors such as Larson (1988), that the position for direct objects is structurally higher than that of indirect objects, which accounts for why indirect objects cannot act as antecedents to reciprocals in direct object position and also why direct
objects can act as antecedents for reciprocals in indirect object position. If we are right about the c-command requirement on reciprocals in SC, then these examples provide evidence for the type of VP structure advocated by Larson.

From the three constructions in (17)-(20), we have the following descriptive generalizations about reciprocals in SC:

(i) Singular reciprocals have a unique antecedent property, while plural reciprocals allow for split antecedents
(ii) Both singular and plural reciprocals must be locally licensed
(iii) The antecedents of both singular and plural reciprocals must c-command the reciprocal at some point in the derivation

We have already given generalization (ii) a phase theoretic explanation, and generalization (iii) is a standard principle of anaphora licensing. That leaves us with generalization (i).

To help explain this generalization, we will take a brief detour into the semantic composition of reciprocal sentences. A very popular way to analyze reciprocals is as polyadic quantifiers. As such, a reciprocal is a type $<1,2>$ quantifier in Generalized Quantifier Theory; that is, the reciprocal phrase is a quantifier that takes as its internal argument a set of individuals and as its external argument a binary relation (for a helpful overview of polyadic quantifiers in logic and language, see Peters and Westerståhl (2008)).

Returning now to generalization (i) with the polyadic quantifier analysis in mind, we claim that the differences in antecedent properties between singular and plural reciprocals is dependent on the type of syntactic object that acts as the reciprocal’s internal argument. To explain the unique antecedent property of singular reciprocals, we will appeal to Hornstein’s (2001) movement theory of anaphora. Under this view, the reciprocal’s antecedent is actually the head of an A-movement chain, whose tail is a copy located in the complement/internal-argument position of the reciprocal. The unique antecedent property follows from this if we take the standard view that chains can have at most one head. Furthermore, viewing anaphora as A-movement also accounts for the locality restrictions we saw in (18) as A-movement is taken to be clause bounded. Additionally, if we adopt the plausible assumption that movement always targets the top of the tree (Chomsky’s (1993) Extension Condition), the c-command facts we saw in (19) and (20) also follow from the movement theory of anaphora. As for the possibility of
split antecedents that we see with plural reciprocals, we claim that this comes about because the internal argument of the reciprocal is not a copy, but rather a phonetically null bound variable pronoun which must be locally licensed. Keeping with the phase theoretic account that we discussed earlier, we believe that the value of this pronoun remains open until it undergoes Transfer.

3. Conclusion

In this paper we have presented an overview of both the semantic and syntactic aspects of singular and plural reciprocal phrases in SC. As for the semantics, we have argued that what differentiates singular and plural reciprocals is what types of Covers are available to each. Singular reciprocals only allow for very distributive Covers, while plural reciprocals are much more flexible and allow for many different types of Covers. On the syntactic side, we have argued that the unique antecedent property of singular reciprocals follows quite naturally from the movement analysis of anaphora. Plural reciprocals on the other hand seem not to involve movement because of the possibility of split antecedents, so we suggested that these involve a null variable pronoun that is able to be multiply licensed, though the antecedent(s) doing the licensing must be local and c-commanding at some point of the derivation. Though many questions still remain, we believe the most pertinent to be the following: are the semantic and syntactic properties associated with both singular and plural reciprocals arbitrary, or does it reflect something deep about what it is to be singular or plural? We will leave this question, as well as several smaller ones, for future research.

References
