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Type-shifting and lexical semantics in the interpretation of Russian conjoined relational nouns^{*}

1. Introduction

Relational nouns can be roughly defined as nouns having more than one argument (DeBruin and Scha 1988, Lander 2000). Sometimes it is difficult to say if a noun belongs to this class or not (cf. *boss, picture*). A noun may have both a relational and a non-relational (**sortal**) reading (cf. Vikner and Jensen 2002: 204-205). However, all the examples I give in this paper are clear examples of relational nouns. Throughout this paper, I will follow Lander (2000) in using the terms **referent** and **correlate** to refer to the two arguments of relational nouns.

This paper is mainly focused on Russian language although many of my claims can easily be extended to cover the data of other languages. To demonstrate the quantificational properties of conjoined relational nouns, I will sometimes also refer to English examples as Russian does not have overt articles.

My general aim is to compare the behavior of relational and sortal nouns in coordination construction. I will try to demonstrate that there is one type of conjunction that occurs only with certain relational nouns and does not occur with sortal nouns at all. This case is illustrated in (1).

(1) *V* romane r'eč idet o muže i žene. In novel_{PRP} discourse go about husband_{PRP} and wife_{PRP} "The novel is about a husband and wife."

The two conjoined relational nouns in (1) refer to two people who are *husband* and wife of each other and cannot refer to, say, speaker's husband and listener's wife. I will refer to such cases as the instantiations of **reciprocal conjunction of relational nouns**.

The existing theories of coordination semantics (Winter 2001, see references therein for the previous proposals and cf. Heycock and Zamparelli 2005) are mainly aimed at analyzing one-place nouns in coordination construction. Therefore the phenomenon that is specific to two-place nouns has been left without attention.

The reciprocal conjunction is not easy to capture within the existing theories of conjunction. The account of Winter (2001) predicts that both arguments of the conjoined semantic predicates should always end up coreferent. This is clearly not

^{*} I would like to thank Barbara Partee for encouraging me to carry out this work and for her extremely useful comments on the first draft of this paper, James Pustejovsky for the discussion of possible qualia structures of relational nouns, Igor Yanovich for his comments on the pragmatics of coordination and Sergey Tatevosov for his valuable comments. I am also grateful to the audience of FDSL 6.5 conference in Nova Gorica and to the anonymous reviewers. The errors remain, of course, my own.

the case in (1) where the referent of the first relational noun is coreferent to the correlate of the second one and vice versa. I will consider this problem in more detail in section 2.3. I will demonstrate that the recently proposed alternatives to Winter (2001, e. g. Heycock and Zamparelli 2005) are generally hard to extend to the case of two-place noun coordination (1).

I will propose a compositional analysis of reciprocal conjunction based on the theories of Winter (2001) and Eschenbach (1993). Finally, I will draw some highlights to formulating the precise lexical restrictions on the reciprocal conjunction.

The rest of the paper is laid out as follows. In section 2, I will argue that we can distinguish between at least three types of conjunction for relational nouns and demonstrate that the reciprocal conjunction is in fact the only one that is problematic. Section 3 presents a compositional analysis of reciprocal conjunction. Section 4 is devoted to formulating the lexical restrictions on reciprocal conjunction and section 5 concludes the paper.

2. Conjunction of relational nouns compared to conjunction of sortal nouns

In this section, I will briefly compare the interpretation of conjoined relational nouns to that of conjoined sortal nouns. I will argue that the two types of interpretation available for sortal nouns in coordination construction are also available for relational nouns. However, there is one more interpretation that is only available to certain relational nouns. As such, this interpretation can not be treated either as a case of intersective conjunction or as a case of group-forming conjunction.

2.1. Intersective conjunction

Winter's (2001) semantics for conjunction (which is a slight modification of Partee and Rooth's (1983) *generalized conjunction* and roughly corresponds to Heycock and Zamparelli's (2005) *joint reading*) traces the meaning of the conjoined phrase down to set intersection. The expected interpretation of coordination is illustrated by the example (2).

(2)	Van'a -	xorošij	skripač	i	krasivyj	mužčina.		
	Vania	good	violinist	and	handsome	man		
	"Vania is a good violinist and a handsome man."							

Here, both conjoined properties apply to the same entity. The same interpretation schema can be applied to the quantifier meanings of the NP's in argument position as in (3).

(3) *I saw a soldier and a sailor in the yard.*

In this example, the DP *a soldier* denotes the set of predicates such that there is a soldier for which such predicates hold $(\lambda P \exists x (soldier'(x) \land P(x)))$. Intersecting

this set with an analogous set for *a sailor* allows us to arrive at a right interpretation of (3).

In Russian, which lacks overt determiners, the semantic derivation of similar examples may be problematic¹. However, this is not because Russian coordination is interpreted differently from English coordination. The problem here is how to extend the analysis of English to a language without obligatory overt determiners. This problem goes beyond the scope of the present paper.

What is important for our current purposes is that intersective conjunction can also occur with relational nouns as illustrated in (4).

(4) Van'a - moj drug i kollega.
Vania my friend and colleague
"Vania is my friend and colleague."

In this example, the conjoined relational nouns have both the same referent and the same correlate. If we assume that the denotations of relational nouns are sets of pairs, we immediately get the right interpretation by intersecting the set of pairs $\langle x, y \rangle$ such that x is a friend of y with the set of pairs $\langle u, v \rangle$ such that u is a colleague of v.

2.2. Group-forming conjunction

The intersective conjunction schema can not capture the examples like (5) where the whole conjoined phrase contains just one determiner. In the literature, the terms *split reading* (Heycock and Zamparelli 2005), and *non-boolean conjunction* (Krifka 1990) have also been used to refer to such examples.

(5)	Eti	mužčina	i	ženščina	l'ub'at	drug druga.
	This _{PL}	man	and	woman	love _{3PL}	each other
	"This man and woman love each other."					

Roughly speaking, the problem here is that *man and woman* does not refer to one entity which is both a man and a woman at the same time.

The intersective schema predicts such split readings for DP-conjunctions like *a* sailor and a soldier where the two variables in the denotations of conjoined nouns are existentially bound from the beginning. However, in the Russian example (5) and in its English translation the variables in man'(x) and woman'(x) are not bound and hence the intersective conjunction gives wrong predictions².

There have been several attempts to account for such deviations from the intersective conjunction schema. Krifka (1990) develops the original idea of Link

¹ For example, it might be difficult to tell DP-conjunction and DP-internal conjunction apart (see Heycock and Zamparelli 2005 for a discussion of DP-internal conjunction).

² Another interesting problem is how to explain the difference between, say, English allowing for a singular determiner in the examples like (5) and Russian requiring the determiner to be plural. See King and Dalrymple (2004), Heycock and Zamparelli (2005) for the discussion of determiner agreement with coordinate phrases.

(1983) that in such cases the whole conjunction refers to a group containing the conjuncts. He generalizes Link's \oplus operator to apply to arbitrary types. The assumption that the whole coordinate structure quantifies over groups immediately explains why the conjoined phrase can have just one determiner.

An alternative account has recently been proposed by Heycock and Zamparelli (2005). They attempt to propose a unified meaning for *and* based on the cases like $(5)^3$. However, they give only a very tentative idea of how their account can be generalized to cover the intersective conjunction in case of DP coordination and coordination of other categories. Furthermore and more importantly, there is no simple way to generalize their account to two-place nouns. The semantic operation that they assume to correspond to coordination (**set product**) essentially picks out all the members of the set denotations of the conjuncts and returns a set containing the unions of those members in all possible combinations.

If we assume that relational nouns denote sets of pairs (not sets of individuals as Heycock and Zamparelli assume), the denotation of a phrase like *friend and colleague* should contain, among others, a set of two pairs $\{<x,y>,<u,v>\}$ where x is a friend of y and u is a colleague of v. However, there is no context in which *friend and colleague* can refer to a friend of y and a colleague of v with all the four individuals distinct and it is not clear what might be the mechanism that would filter out the undesired pairs from the denotation of coordinate structure.

Note that the assumption that the relational nouns denote sets of pairs is justified by numerous works on the semantic, pragmatic and morphological behavior of relational nouns (see Asudeh 2005, Lander 2000, Vikner and Jensen 2002, De Bruin and Scha 1988, Partee 1989, Barker 1999 among others).

On the contrary to Heycock and Zamparelli, Krifka (1990) generalizes his operator to be applicable to two-place nouns. On his account, two relational nouns conjoined by group-forming schema should have different referents but the same correlate. This is the right interpretation for conjoined relational nouns combined with possessors (6).

(6) Sosed i podruga Vasi prišli k nemu na prazdnik. Neighbor and friend_{FEM} Vasia_{GEN} come_{PL.PST} to him_{DAT} to party_{ACC} "Vasia's (female) friend and (male) neighbor came to his party."

The interpretation derived by Krifka's operator describes *sosed i podruga* as referring to a group of people that has two parts with one being a neighbor of Vasia and the second being a friend of Vasia.

To sum up the discussion of group-forming conjunction, the account of Krifka (1990) captures the occurrences of conjoined relational nouns with a possessor. Several alternatives to Krifka's account have been proposed (see the references in Winter 2001, chapter 2). However, I do not aim to make a motivated choice between those options here as my main concern is the reciprocal interpretation.

³ Winter (2001) tries to generalize the intersective schema to all cases by stipulating wide scope for conjunction in the cases like *every cat and dog*. I agree with the criticism of Winter's approach in Heycock and Zamparelli (2005: 35-37)

2.3. Reciprocal conjunction

The reciprocal conjunction that will be the main focus of the rest of the paper is illustrated in (1) repeated here as (7).

(7)	V	romane	reč	idet	0	muže	i	žene.
	In	novel _{PRP}	discourse	go	about	husband _{PRP}	and	wife _{PRP}
	"T	he novel is a	about a hus	band	and wife	e."		

Interestingly, the reciprocal conjunction is the only type of conjunction interpretation that can not occur with sortal nouns. The very basic semantic properties of reciprocal conjunction require the conjuncts to have two arguments.

In what follows, I will consider the relation between the reciprocal conjunction and other types of conjunction briefly described in the previous sections.

First of all, the reciprocal conjunction can not be captured by the intersective schema. Consider, for example, the pair *brother and sister*. The set of pairs $\langle x, y \rangle$ such that x is a brother of y clearly does not intersect with the set of pairs $\langle u, v \rangle$ such that u is a sister of v. The first members of each pair in the first set are males but the first members of each pair in the second set are females. In other words one person can not be both a sister and a brother to some other person. Therefore the intersective schema can not be applied in this case.

Similar reasoning is valid for *husband and wife, teacher and pupil* and many other examples of reciprocal conjunction. As a preliminary generalization about the relational nouns giving rise to reciprocal conjunction we may formulate the following:

(8) The reciprocal conjunction arises when the sets in the denotations of the two conjoined relational nouns do not intersect.

On the contrary to the examples of reciprocal conjunction, the relational nouns giving rise to intersective conjunction such as *friend* and *colleague*, (4), always have a non-empty intersection.

An empty intersection is not a sufficient condition for two relational nouns to be conjoined reciprocally. For example the sets denoted by the words *copy* and *brother* have an empty intersection. This is due to the fact that both arguments of *copy* must be inanimate while both arguments of *brother* must be animate. However, the phrase *copy and brother* can not get a reciprocal interpretation. Additional restrictions on the reciprocal interpretation will be addressed in section 4.

To sum up, the reciprocal interpretation can not be derived by direct application of the intersective conjunction. In what follows, I will demonstrate that any account of group-forming conjunction can not capture the reciprocal reading either. This becomes clear as we see that the group-forming conjunction can apply to the relational nouns in question to produce examples ambiguous between the reciprocal and the group reading. These examples come from conjoined relational nouns in argument positions.

(9) John invited an uncle and nephew to the party.

 $(9)^4$ is clearly ambiguous between the reciprocal reading on which *uncle* and *nephew* are related to each other but are not *John's* relatives and the group reading on which they are *John's uncle and nephew* (and hence probably a great-uncle and great-nephew of each other). I suggest that the reciprocal reading of (9) is derived by the same mechanism as the reciprocal reading in (7), while the non-reciprocal reading occurs as a result of group-forming conjunction. As the example (9) is clearly ambiguous we obviously need to distinguish between two different interpretations here.

To sum up, the existing approaches to coordination semantics can not capture the reciprocal conjunction⁵. The next section provides a compositional analysis that derives the reciprocal conjunction without postulating an additional meaning of *and*.

3. Compositional semantics for reciprocal conjunction

A question immediately arises as we look at the data in section 2: do we need to postulate a separate meaning of *and* (and its counterparts in other languages) to capture the reciprocal conjunction? This evident solution is probably not so attractive.

Even if we postulate three different meanings of *and*, we do not get examples that are three-ways ambiguous because the reciprocal reading is in complementary distribution with the intersective reading. This complementary distribution makes it desirable to treat the reciprocal interpretation as a variant of the intersective interpretation. On the other hand, the reciprocally coordinate

⁴ Special thanks are due to Barbara Partee for pointing the English examples of this kind to me. In the analogous Russian examples (i) it is not clear if the English translation should contain two determiners or just one.

⁽i) Vas'a pozval d'ad'u i plem'annika na prazdnik Vasia call_{PST.M} uncle_{ACC} and nephew_{ACC} to party_{ACC} "Vasia called an uncle and a nephew to the party."

See footnote 6 for a discussion of English sentences containing coordination and multiple determiners (*an uncle and a nephew*). I propose to analyze such examples as cases of intersective conjunction.

⁵ An issue that is also worth investigating is how the different theories of implicit arguments (Asudeh 2005, Partee 1989, Dekker 1993 among others) perform when analyzing the reciprocal conjunction and more generally the conjunction of relational nouns. I will not deal with these issues in this paper. It is clear that neither of the mentioned theories of implicit arguments can provide a compositional semantic account of coordination in this case.

structures seem to be better analyzed as referring to groups as they allow for just one article in English⁶.

These dual properties of reciprocal conjunction will receive a straightforward explanation on my analysis. I suggest that the reciprocal reading is derived by a combination of intersective conjunction with a special collectivity operator. On my account the derivation of reciprocal conjunction has three essential steps.

We start from the denotations of the conjoined relational nouns like $\lambda x.\lambda y.R(x)(y)$. First, the denotations of the two relational nouns are adjusted to make the intersective conjunction applicable. Second, the intersective conjunction applies. Third, a special collectivity operator derives the right result.

The intersective conjunction schema (Winter 2001: 23) is defined as follows:

(10)
$$\Box_{\tau(\tau\tau)} = \begin{cases} \wedge_{t(tt)} & \text{if } \tau = t \\ \lambda X_{\tau} \cdot \lambda Y_{\tau} \cdot \lambda Z_{\sigma_1} \cdot X(Z) \Box_{\sigma_2(\sigma_2 \sigma_2)} Y(Z) & \text{if } \tau = \sigma_1 \sigma_2 \end{cases}$$

In the section 2.3, I have argued that this schema can not be directly applied to the two relational nouns like *brother* and *sister* because their denotations have an empty intersection. However, it is important to notice that this schema can be applied to such relational nouns and give a non-empty intersection if the arguments of one of the relational nouns get inversed. On my account, this inversion happens to the second relational noun. The operator responsible for the inversion is defined in a following way:

(11)
$$inv_{(eet)(eet)} \stackrel{def}{=} \lambda Y_{eet} \cdot \lambda u \cdot \lambda v \cdot Y(v)(u)$$

This operator may be viewed as a type-adjustment operator triggered by the fact that the normal intersective conjunction would yield an empty set applied to the two relational nouns in question.

The application of *inv* automatically restricts the reciprocal conjunction to pairs of nouns and to nouns having just two arguments. This is the correct result as we have no evidence of more-than-2-place nouns giving rise to the reciprocal

⁶ In fact even a more precise formulation seems to be true: the reciprocal conjunction *requires* just one article. For instance, the sentence in (7) could not get a continuation like "who were not married to each other". Consider on the contrary the amazon.com description of some movie:

⁽i) *A hilarious movie about <u>a</u> husband and <u>a</u> wife who fall in love. Only they are not married to each other.*

The reciprocality in this case becomes a pragmatic matter. As suggested to the author by Barbara Partee (p. c.), such cases in English can be derived by the intersective conjunction of DPs. In this case the relational nouns shift to one-place predicates by existentially quantifying the correlate in order to combine with the ordinary version of the article. The "relational" version of *a* proposed in Partee (1999) would lead to a crash in derivation. To derive the "default" reciprocal meaning of *a husband and a wife* we might appeal to a plausible pragmatic principle that would always require the conjuncts to be somehow related (first suggested to me by Igor Yanovich). We leave the detailed examination of such pragmatic possibilities for future research.

conjunction or of the conjunctions of more than two nouns licensing the reciprocal interpretation⁷.

As noted above, after the application of *inv* the intersective schema can be applied to, say, *brother'(x)(y)* and *sister'(y)(x)*. The successive application of the operators in (11) and (10) gives the result below.

(12) $\lambda x \cdot \lambda y [R_1(x)(y) \wedge R_2(y)(x)]$

This formula is then an input to a special collectivity operator similar to the one deriving the reciprocal meaning for plurals in Eschenbach (1993)⁸. This operator essentially takes a reciprocal relation and returns a pair of entities connected by that relation.

(13)
$$\lambda R \lambda Z \exists x \exists y [Z = x \oplus y \land R(x)(y)]$$

The \oplus in this formula can be viewed as a standard group-forming operator of Link (1983) (see also Krifka 1990). The application of (13) correctly describes the quantificational properties of the reciprocal conjunction. The resulting semantic representation of *brother and sister* is given in (14).

(14) $\lambda Z \exists x \exists y [z = x \oplus y \land brother'(x)(y) \land sister'(y)(x)]$

This formula can roughly be translated as "a pair of individuals x and y such that x is a brother of y and y is a sister of x". My account immediately predicts that brother and sister can be used with just one article and derives the right result when such pairs occur in predicative contexts, (15), given the standard assumptions about the semantics of copula⁹.

(15) Van'a i Maša - brat i sestra.
Vania and Masha brother and sister
"Vania and Masha are brother and sister."

Note, that the derivation proposed above crucially includes the application of intersective conjunction schema. Hence we treat the reciprocal conjunction as a variant of intersective conjunction. We do not postulate a third special meaning of *and* for reciprocal cases. Such an account successfully avoids postulating the

⁷ As first pointed out to me by Segey Tatevosov, we should also seek for additional motivation for this operator from other aspects of behavior of relational nouns. I hope to find such motivation in my future research. One way or another, to derive the reciprocal conjunction we need to invert the arguments at some point although this may be made a constituent part of some other operator.

⁸ This similarity is important because we want to derive the reciprocal meaning for *sisters* and *brother and sister* by similar mechanisms. However, the detailed comparison of reciprocal interpretation in plurals and coordinate structures remains a matter of future research.

⁹ Russian copula has a null form in present tense but surfaces in past tense indicating that the sentences like (15) should indeed be analyzed as having a copula.

redundant ambiguity as intersective conjunction and reciprocal conjunction are in complementary distribution.

A possible alternative to the 3-step derivation proposed above would be to design a single operator that applies to two relations and to integrate the inversion of arguments into this operator¹⁰. However, such an account would have to evoke additional speculations explaining why we do not get the examples that are ambiguous between the three readings of *and*. Furthermore, in the next section it will be argued that the lexical restrictions on reciprocal conjunction mimic the proposed derivation schema.

4. Additional restrictions on reciprocal conjunction

It is clear that not all the pairs of relational nouns give rise to reciprocal interpretation in coordination construction. In section 2.3, I have formulated the following preliminary generalization:

(16) The reciprocal conjunction arises when the sets in the denotations of the two conjoined relational nouns do not intersect.

In this section, I will demonstrate that this generalization should rather be treated as a tendency. I will propose a refined version of the lexical restriction¹¹, based on the observations of Schwarz (2006) and Von Fintel (1999) and show how it is connected to the derivation of reciprocal conjunction.

4.1. Does the empty intersection requirement really hold?

In section 2.3, I have noted that the generalization (16) can only be viewed as a necessary requirement that two relational nouns must fulfill in order to give rise to reciprocal interpretation in coordination construction. It is not a sufficient requirement, that is there are pairs of relational nouns that satisfy (16) but do not give rise to reciprocal interpretation.

One of such pairs is *brother* and *copy*. The two relational nouns arguably have an empty intersection because brothers are animate but copies are not. However the conjoined phrase *a brother and copy* does not seem to have a reading like 'a brother and his copy'.

One might try to maintain the initial generalization (16) by arguing that *brother'* and *copy'* in fact do have a non-empty intersection as the example (17) suggest.

(17) Bill is a brother and copy of John.

¹⁰ This idea was first suggested to me by Barbara Partee.

¹¹ An alternative possibility that I will not treat here in detail was first noted by Barbara Partee. Instead of formulating the fixed lexical restrictions we might say that the reciprocal interpretation is available for all the pairs of relational nouns, but in some cases it is filtered out by some pragmatic mechanism. Intuitively, this is less plausible because the amount of pairs of relational nouns usually giving rise to reciprocal conjunction is rather small compared to the amount of all possible relational noun pairs. Furthermore, it seems unclear what might be the pragmatic principle ruling out the reciprocal interpretation for *friend and colleague*.

A more detailed analysis of this example would probably say that the noun *copy* undergoes some kind of lexical shift here. However, even if we accept that all the pairs of relational nouns giving rise to reciprocal interpretation have disjoint denotations, there is still a problem with the requirement (16), namely that it is not sufficient.

The relational nouns *uncle* and *nephew* clearly give rise to reciprocal interpretation but there are situations where these nouns have a non-empty intersection.



Assume that in model M John's uncle Harry marries his aunt¹² (see the genealogical tree in (18). Then it will be possible to refer to Harry as both *John's uncle* and *John's nephew*. In this model *uncle'* and *nephew'* clearly have the pair <Harry, John> in their intersection.

The nouns *uncle* and *nephew* constitute a clear counterexample to (16). Because of this counterexample and the example above, we reject (16) as a formulation of lexical restrictions on reciprocal conjunction. However, the fact that most of the pairs of relational nouns giving rise to the reciprocal interpretation have disjoint denotations remains an interesting observation to be explained.

4.2. Strawson-inverseness

Intuitively, what makes the reciprocal interpretation in coordination construction possible for the nouns *uncle* and *nephew* is the inverseness of the two nouns. I will call two relations R_1 and R_2 inverse if their denotations consist of inverse pairs and the inference in (19) holds.

(19)
$$R_1(x)(y) \rightarrow R_2(y)(x)$$

Generalizing this case we might say that two nouns should denote inverse relations to give rise to the reciprocal interpretation in coordination construction.

The inverseness requirement can not be true as it stands because, for instance, *brother* is not inverse to *sister*. Schwarz (2006) proposes a way to loosen an analogous requirement for the case of restrictions on reciprocal plural relational nouns like *sisters*. He suggests that a relational noun should be Strawson-symmetric to give rise to a reciprocal plural interpretation. The notion of

(18)

¹² I am grateful to an anonymous reviewer for this counterexample to my empty intersection generalization.

Strawson-symmetry is derived from the notion of Strawson-entailment that has been argued by Von Fintel (1999) to be relevant for NPI licensing. The definition of Strawson-entailment is given in (20) below.

(20) A Strawson-entails B iff the conjunction of A and the presuppositions of B entails B.

I will use the symbol \rightarrow for Strawson-entailment. Assuming that a relation R is symmetric whenever $R(x)(y) \rightarrow R(y)(x)$, the only thing that we need to do to get Strawson-symmetry is to replace the entailment with Strawson-entailment in this formula. This operation is proposed by Schwarz (2006) and he argues that, although for instance *sister'* is not a symmetric relation, it is Strawson-symmetric.

In fact the gender information carried by *sister* does not seem to be lost under negation, *perhaps* or questions. All of the examples in (21) convey that Kim is a female.

(21) a. Kim isn't his sisterb. Perhaps Kim is his sister.c. Is Kim his sister?

In parallel to the proposal of Schwarz (2006), I would like to argue that Strawson-inverseness is relevant for the availability of reciprocal interpretation in case of conjoined relational nouns.

(22) R_1 and R_2 are Strawson-inverse relations iff $R_1(x)(y) \rightarrow R_2(y)(x)$

The restriction on reciprocal conjunction is formulated as follows:

(23) The reciprocal interpretation of two relational nouns in coordination construction is available iff these relational nouns denote Strawson-inverse relations.

All relations that are inverse are Strawson-inverse. However, because the Strawson-inverseness is a weaker requirement than inverseness it enables us to capture the pairs like *brother* and *sister* or *mother* and *daughter*. Notice, that Strawson-inverseness, as formulated in (22), and Schwarz's (2006) Strawson-symmetry requirement on the very similar interpretation in plural relational nouns can be reduced to one restriction. In fact the definition of Strawson-inverseness becomes the definition of Strawson-symmetry if we replace R_1 and R_2 with the same relation R. Hence adopting (23) seems promising if we want to analyze the similar interpretations of *sisters* and *brother and sister* similarly.

To explain the case of *brother and copy* we need to make one further refinement to the notion of Strawson-entailment. It may be argued on the basis of examples similar to the ones in (21) that the inanimacy requirement is also a

presupposition carried by the word *copy*. But then the conjunction of brother(x)(y) and *inanimate(y)* would be false and hence would entail everything.

To avoid such vacuous entailment it should be added to (20) that the inference from A and the presupposition of B to B should be checked only when the conjunction of A and the presupposition of B is true. This is a plausible amendment because otherwise whenever A contradicts the presupposition of B A would be predicted to Strawson-entail B.

Let us now consider the connection between the proposed lexical restrictions on reciprocal interpretation and our derivation of reciprocal conjunction. It turns out that the pairs of relational nouns that take part in the derivation of reciprocal conjunction always have Strawson-inverse denotations. Somewhat loosely, we may say that the only difference between those nouns can be avoided by applying *inv* to one of the nouns. If we forget about presuppositions for a moment, for two relations conjoined reciprocally $R_1(x)(y)$ is equivalent to $R_2(y)(x)$. Therefore our schema predicts that the whole conjunction like *brother and sister* ends up meaning a pair of people connected by the relation that is common to both nouns.

Inv can be viewed as an operator that adjusts two relational nouns to make the relation they have in common explicit. The whole derivation of reciprocal conjunction is triggered by the fact that the meanings of relational nouns in question are nearly inverse. In other words, the lexical restrictions on reciprocal interpretation motivate *inv* as a special kind of adjustment operator.

Furthermore, the interpretation outlined above ('a pair of people connected by the relation that is common to both nouns') is very close to what Eschenbach (1993) proposes for reciprocal plural relational nouns like *sisters, colleagues* etc. She argues that such expressions denote sets of people connected by relations in question. Krifka (1991) proposes a similar analysis of strongly reciprocal verbs like *meet*.

It is also worth noticing that Strawson-inverseness is predictable on the basis of lexical properties of relational nouns that has been argued to be relevant for the realization of their arguments in possessive construction.

Barker and Dowty (1993) suggest that the properties of nominal arguments that are responsible for their realization as either referents or correlates of relational nouns can be formulated in terms of nominal proto-roles. The nominal proto-roles they propose are **proto-part** and **proto-whole**. The nominal argument that is closer to proto-part is predicted to be realized as the referent and the argument that is closer to proto-whole is predicted to be realized as the correlate. Proto-part and proto-whole are defined as follows:

- (24) a. Proto-part entailments:
 - located at or defines a boundary of the other relatum
 - is a property of the other relatum
 - b. Proto-whole entailments:
 - entirely contains the other relatum as a proper part
 - is a concrete entity

In addition to predictions about nominal arguments realization, the theory of Barker and Dowty also makes certain predictions about the organization of the lexicon in the sphere of relational nouns. Barker and Dowty claim that if two places of a relation R are asymmetric in terms of proto-roles this relation is likely to be lexicalized as one relational noun. However, if none of the arguments of relation R has more proto-part/proto-whole properties, such a relation is predicted to be lexicalized as two relational nouns that differ only in the order of arguments.

For instance, as the two siblings are not asymmetric in terms of protopart/proto-whole, the siblinghood relation is predicted to be realized by two relational nouns denoting the inverse relations. Barker and Dowty assume that the nouns *brother* and *sister* confirm this prediction. They notice that the two nouns are not, strictly speaking, inverse but claim that they are *nearly inverse*.

Our findings can easily be correlated with the findings of Barker in Dowty. First, the lexical properties of relational nouns responsible for argument realization seem to predict which pairs of nouns will be Strawson-inverse. Second, our use of Strawson-inverseness can be used to make the claim of Barker and Dowty about nearly inverse relations more precise. In fact, nearly inverse relations are always Strawson-inverse.

By now we have seen that the lexical restrictions on reciprocal interpretation can be formulated in terms of Strawson-inverseness. The inverseness of relational nouns triggers the derivation of reciprocal conjunction. Furthermore, I have argued that the important and independently needed properties of relational nouns such as the properties of their arguments with respect to nominal proto-roles predict the Strawson-inverseness. Strawson-inverseness in it's turn is a more precise formulation of the intuitions of Barker and Dowty about near inverseness.

One more issue that I would like to address here is connected with the status of reciprocal and intersective conjunction. In model M depicted in (18) the sentence (9) repeated here as (25) can be even three-ways ambiguous.

(25) John invited an uncle and nephew to the party.

Uncle and nephew here can mean two people who are uncle and nephew of each other, two people who are John's uncle and nephew and one person who is both John's uncle and John's nephew.

However, such situations are marginal and I do not think they undermine my claim that the reciprocal conjunction is a variant of intersective conjunction. It is just that in some rare cases both variants can apply.

Furthermore, I think the fact that reciprocal conjunction and intersective conjunction are nearly in complementary distribution is motivated by the economy principle. To be more precise, the economy principle explains why most of the pairs of relational nouns denoting inverse (more precisely Strawson-inverse) relations have disjoint denotations. The situation (18) is anomalous because in this situation one person can be named both *uncle* and *nephew* of John. But the economy principle disfavors using two words for two places of an absolutely symmetric or nearly symmetric relation. Hence for most of the inverse

relational nouns in natural language we are expecting not to encounter such situations as (18) violating the economy principle.

5. Conclusion

I have analyzed the semantics of relational nouns in coordination construction in Russian and English and compared it to the semantic behavior of sortal nouns. I have demonstrated that there is one kind of conjunction that is specific to relational nouns, namely the reciprocal conjunction. I propose to derive the reciprocal interpretation in 3 steps essentially including the intersective conjunction schema.

The proposed derivation is in fact triggered by the lexical properties of nouns that can be conjoined reciprocally. Those nouns are Strawson-inverse and hence they need only a tiny adjustment to make the reciprocal meaning available.

The lexical restrictions I formulate are predictable from the properties of the arguments of relational nouns in terms of proto-roles (Barker and Dowty 1993). Finally, the lexical restrictions on the reciprocal interpretation together with the economy principle explain the tendency for reciprocally conjoined pairs of relational nouns to have disjoint denotations (and not to be able to be conjoined intersectively).

The presence of reciprocal interpretation has some important consequences for the theories of coordination semantics. In section 2, I have argued that the ambiguity of examples like (9) (repeated above as (25) seems to disfavor the unified treatments of *and* as having just one meaning. The unified analysis of Winter (2001) does not handle the cases of split reading. The unified approach of Heycock and Zamparelli (2005) cannot be straightforwardly generalized to cover relational nouns. However, additional work is needed to establish the claim that *and* has universally two meanings.

There are several other directions in which the results of this work can be developed. First of all, a more detailed comparison of reciprocal interpretation in conjoined relational nouns and plural relational nouns (Eschenbach 1993) suggests itself. Another case that has not been analyzed so far to my knowledge is the reciprocal comitative like *muž s ženoj* (literally *husband with wife*, in English rather *husband with his wife*). Possibly, my analysis can be also extended to the case of verbal reciprocals like Russian morpheme -s'a. All these extensions will be a good topic of future research.

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