

Reciprocal verbs as a probe into lexical and compositional semantics

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1 Introduction

In this work I explore the hypothesis that the domain of events is similar to the domain of individuals in containing elements which are atomic sums. I suggest that reciprocal verbs are predicates of such events and show how essential properties of reciprocal constructions follow once we take this view.

The bulk of the proposal is made with languages such as Hebrew, English, and Russian in mind. These are languages that have been shown to derive reciprocal verbs in the lexicon (Siloni 2001, 2007). The semantics I give should be applicable to reciprocals derived in the syntax as well, however I will not try to account for their distinguishing properties here.

1.1 The basic observations

Reciprocal verbs, which are intransitive predicates, usually have a non-reciprocal transitive counterpart. In the early days, the two structures were believed to be transformationally related. So for example, both *John kissed Mary* and *John and Mary kissed* would be derived by a transformation from one and the same deep structure. This alternation was seen as an instance of the alternation characteristic of (inherently) symmetric stative predicates like *rhyme*, *intersect*, *are similar* etc. The fact that the structures are in fact not equivalent was brought forth with the following example (Dowty (1991) mentions that it is attributed to Chomsky):

- (1) The drunk embraced the lamppost.
 #The drunk and the lamppost embraced.

An entailment relation does exist in the opposite direction, between the reciprocal verb and its transitive counterpart.

- (2) The drunk and the homeless embraced.
 a. The drunk embraced the homeless.
 b. The homeless embraced the drunk.

The meaning of a reciprocal is indeed not equivalent to its non-reciprocal counterpart. Nonetheless, it appears to have a transitive reciprocal counterpart — the *discontinuous reciprocal*. In this construction (which is quite limited in English), one reciprocating party is expressed as a subject and the other is expressed as an object PP. This PP is referred to as a *comitative phrase*. This is the only context in which a reciprocal verb can take a singular subject (that is not a pair, see (7)).

- (3) Russell and Frege corresponded. (*continuous construction*)
 a. Russell corresponded with Frege. (*discontinuous construction*)
 b. Frege corresponded with Russell. ‘

The intuition about continuous reciprocals is that all the participants play a similar role in the reciprocal event. Lexical reciprocals encode **symmetry**. This is why the reciprocal version of (1) is bad: the lamppost cannot embrace the way a person can. On the other hand, reciprocals in the discontinuous construction do not encode symmetry across the board. The participant introduced by the comitative phrase has a special status. It must qualify as a reciprocating party (hence the badness of (4)), but may be understood as non-agentive (5).

- (4) a. #The philosopher and his drawer corresponded.
 b. #The philosopher corresponded with his drawer.

- (5)
- a. #The philosopher and God corresponded.
 - b. ?The philosopher corresponded with God.
 - c. #God corresponded with the philosopher.

Many have noted the subject–object asymmetry in the discontinuous construction, and tests of agentivity have confirmed the intuition that the object is less agentive. Agent–oriented adverbs, for example, target only the subject (compare *John corresponded with his mother in English/privately* with *John and his mother corresponded in English/privately*).

This asymmetry is not limited to reciprocal events, though. It can be observed anytime a comitative phrase is used to specify participants of an event (e.g. cats playing with the mice they prey on). The added participant is quasi agentive (adjunct–agent to use Landman’s term), but does not play a proto–agent role.

Importantly however, a trace of reciprocity is present in the discontinuous construction despite the fact that it may be only partially symmetric. A discontinuous construction cannot be used as a refutation of reciprocity.

- (6)
- Scenario: for many months John has been sending love letters to Mary, who lives overseas. He longs for her reply, but unfortunately that never comes. John’s friend, unaware of the fact that Mary has never written back, meets the neighborhood mailman one day and jokes with him about John’s new pen pal. The mailman, who knows that only John is writing, wants to correct the friend’s impression.
- a. FRIEND: So, what do you think about the fact that Mary and John are corresponding?
 - b. #MAILMAN: That’s not true! It’s just John corresponding with Mary. (She never writes back.)
 - c. MAILMAN: That’s not true! It’s just John writing to Mary. (She never writes back.)

We may conclude that subject and object in the discontinuous construction come with different thematic roles. The object is understood to take conscious part in the activity, but not necessarily the role of an agent. Although the participants fill different roles, the construction nevertheless expresses reciprocity.

1.2 Summary of entailment patterns

i. Entailment to the transitive:

$$A \text{ and } B \text{ RECIP} \Rightarrow A \text{ NON-RECIP } B \wedge B \text{ NON-RECIP } A$$

ii. Reciprocal equivalence:

$$A \text{ and } B \text{ RECIP} \Leftrightarrow B \text{ RECIP with } A \Leftrightarrow A \text{ RECIP with } B$$

iii. Discontinuous exceptions:

$$A \text{ quarreled with } B \not\Rightarrow B \text{ quarreled with } A$$

A semantics for reciprocals should capture these facts.

2 What are reciprocal events?

One crucial property of reciprocal verbs is that they are, by nature, predicates that involve pairs of individuals. Pairs, groups of exactly two individuals, are the basic element that participates in a reciprocal event. This is why a domain of individuals for reciprocal events must contain at least two individuals. Compare the exotic — but grammatical — predication options of reciprocals in (7), in which pairs are provided, to the ungrammatical (8).

- (7)
- a. I corresponded with another Mormon who emphatically said neither the Bible nor the Book of Mormon teach God is a Trinity.
 - b. The couple kissed (each other) on a balcony at Buckingham Palace before an adoring crowd.
 - c. I married last year and have yet to send my thank-you cards.
- (8)
- *John kissed (each other).
 - *The group kissed (each other).

A reciprocal event is an event that encompasses the actions of two participants, each performing non-reciprocally on the other. However, it does more than just combine two non-reciprocal events together.

Rather, it provides some glue that turns them into a cohesive unit, an event that equals more than the sum of the two. Take a reciprocal kissing event for example. If John and Mary kissed, it is true that John kissed Mary and Mary kissed John, but in addition:

- kisses were given on the same part of the bodies
- kissing took place at the same time and location
- kissers shared a mutual goal
- etc.

Therefore, while (9a) is a contradiction, (9b) can be a true description of a recent development in John and Mary's relationship.

- (9) a. #John and Mary had kissed each other several times in the past, but today they kissed each other for the first time.
- b. John and Mary had kissed each other several times in the past, but today they kissed for the first time.

2.1 Distribution to pairs

Reciprocals are distributive predicates. Not surprisingly, they distribute down to pairs.

- (10) a. John, Mary, and Bill corresponded.
- b. The boys corresponded with the girls.
- c. The players hugged at the end of the game.

Exactly what kind of reciprocal relation they encode is an interesting and relevant question, but I will not say much about it today. In one sentence: I believe that reciprocal verbs encode Inclusive Alternative Ordering (IAO), a rather weak irreflexive relation R such that: $|A| \geq 2$ and $\forall x \in A \exists y \in A (x \neq y \wedge (Rxy \vee Ryx))$. I adopt Siloni's proposal that lexical (but not syntactic) reciprocals in addition require R to be symmetric. See Kański (1987) and Dalrymple et al (1998) for extensive discussion of this and other reciprocal relations.

2.2 An analogy to individuals

In an approach initiated by Link (1983), the domain of individuals is understood to be structured as a **part-of structure** ordered by an operation of sum (\sqcup). Plural individuals are interpreted as sums of singular individuals. The relation part-of (\sqsubseteq) is defined based on sum, and it identifies atoms in the structure as those (singular) individuals that have only themselves as parts. Pluralization (with the star operator $*$) corresponds to closure under sum. It defines domains of interpretation for plural nouns and, Landman argues, for distributive event readings.

Landman (2000) proposes that distributivity should be analyzed as semantic plurality, collectivity as semantic singularity. Plural predication applies a plural predicate distributively to sums. Singular predication applies to singular things: individuals or groups. He adds to the model two operations: group formation (\uparrow) and group specification (\downarrow), that mediate between plural and singular individuals.

(11) John and bill carried the piano upstairs.

- a. $\uparrow(j \sqcup b) \in CARRY$
- b. $j \sqcup b \in *CARRY$

“Restriction with a bunch predicate turns a sum into a group” (Landman 2000:163). I suggest the following analogy with reciprocal verbs:

- the appositive AS A GROUP for nouns: *the boys, as a group*.
- the appositive RECIPROCALLY for verbs: *kissed each other, reciprocally*.

I think that reciprocal verbs make a good case for having groups of events in addition to groups of individuals. The group that is relevant for reciprocals is the **pair**: a group formed by applying \uparrow to sums of exactly two atoms (individuals & events).

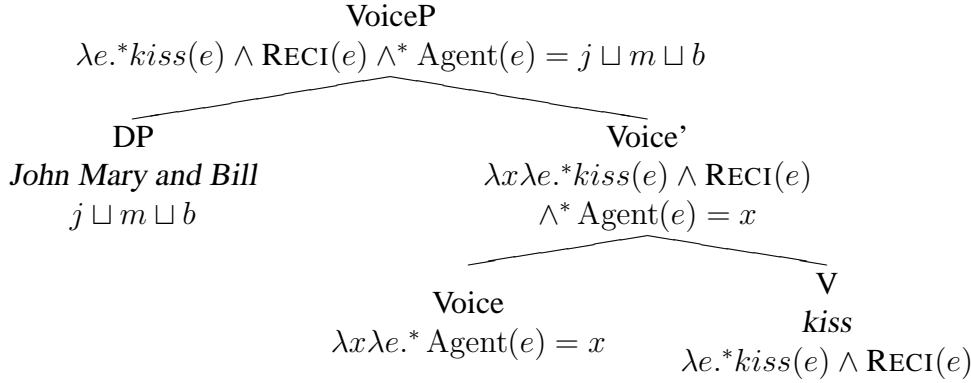
3 Proposal

- (12) a. Groups are formed in the domain of individuals and in the domain of events.
 b. Reciprocal verbs are predicates of pair events, $E_{recip} \subseteq E_{pair} \subseteq E$.
 c. The **Thematic Reciprocity** condition states that reciprocals distribute down to pair individuals¹:
 If $e \in E_{recip}$ and $ROLE(e) \neq \perp$ then $ROLE(e) \in D_{pair}$.
 d. The group event of a reciprocal is based on two non-reciprocal events. The participants in these events are required to be the same²:
 If $e \in E_{recip}$, $\exists e_1, e_2 \in E$ s.t. $e = \uparrow(e_1 \sqcup e_2)$, then $|ROLE(e_1)| = |ROLE(e_2)| = 2$ and $participants(e) = \uparrow(\sqcup(participants(e_1), participants(e_2)))$.
- (13) The operation of reciprocalization $R: D_{\langle e, \langle s, t \rangle \rangle} \rightarrow D_{\langle s, t \rangle}$:
 $R(V) = \lambda s. *V(s) \wedge RECI(s)$, where RECI defines a dependency relation between individuals in $ATOM(\downarrow(ROLE(s)))$ for every thematic role such that $ROLE(s) \neq \perp$.

- Assuming that the theme is the only lexically specified argument of a transitive verb, reciprocalization amounts to theme-reduction plus a demand for reciprocity.
- RECI in (13) still needs to be worked out. It does not straightforwardly deliver the result that in a discontinuous reciprocal the reciprocating pairs are not made up of the subject, but are mixed subject-object (see (15) below).

¹This condition tightens Landman's general Thematic Role Requirement by which thematic roles are only defined for atomic events, not for sums (*ibid* p. 182). $ROLE$ is a metavariable that ranges over thematic roles (Agent, Theme and so forth).

² $participant$ is a function from events to sets of individuals. It relates events to their participants (across all thematic roles).



I am assuming Landman’s definition of plural thematic roles as in (14) (*ibid* p. 183), but I think it should be slightly modified for the case at hand so as to deliver “flat” sums instead of sums of pairs.

$$(14) \quad \llbracket *R \rrbracket^{M,g} = \lambda e. \sqcup (\{ \llbracket R \rrbracket^{M,g}(a) : a \in AT(e) \}) \text{ if } R \text{ is defined for all } a \in AT(e) \\
 \perp \text{ otherwise.}$$

Some preliminary results:

- We derive the restriction on the size of the domain: $|D_e| \geq 2$, since pair domains are undefined if the underlying domain of individuals contains fewer than two atoms.
- The fact that reciprocal relations are irreflexive follows from the semantics of pairs.
- Entailments! Don’t forget entailments!

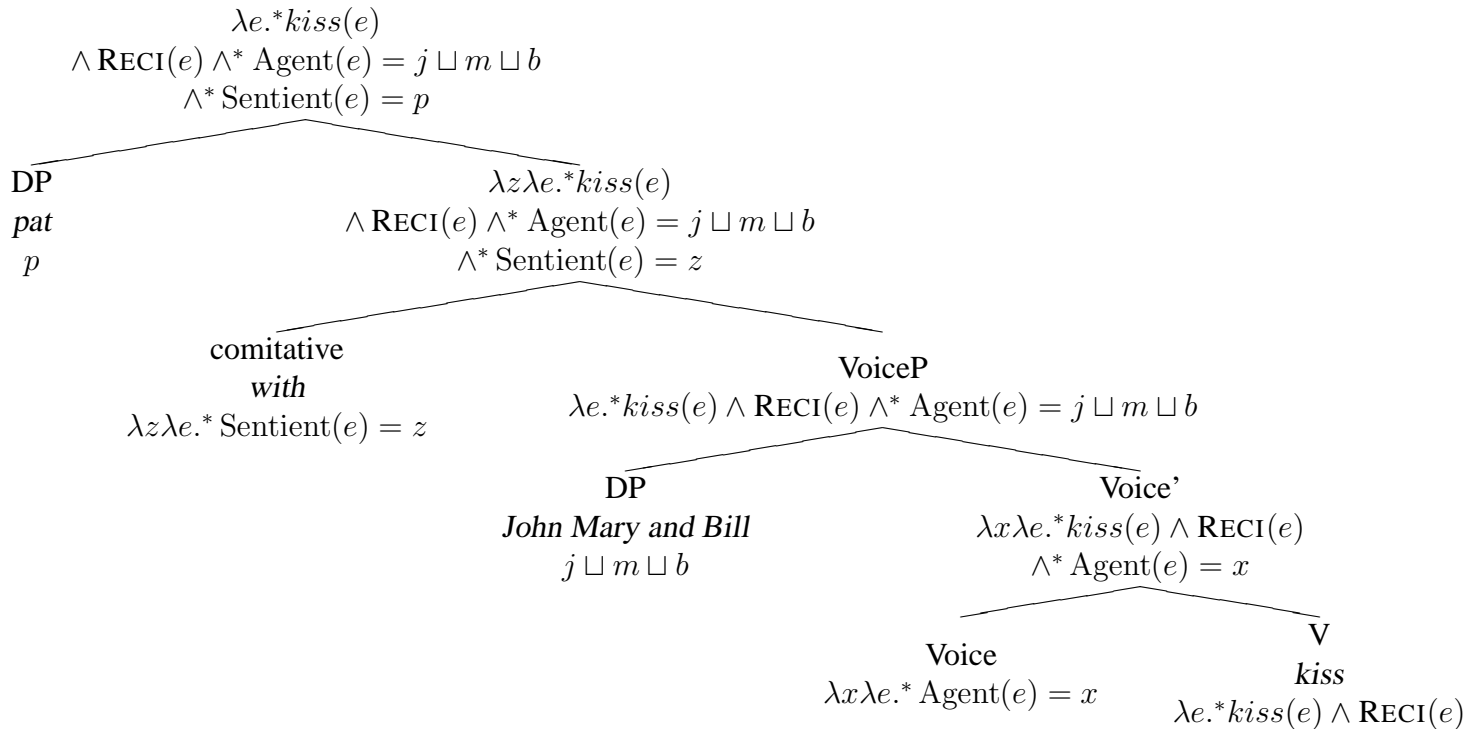
3.1 The comitative phrase and the discontinuous construction

Minimally, the comitative phrase can be viewed as an indirect object that specifies a participant in an event described by a verb. We know that it can relate to many kinds of events, reciprocal and non-reciprocal alike, so we might start out by giving it just the semantics of an argument introducer. We should pick for it a thematic role that is a quasi agent³.

³The choice of Sentient is inspired by the theory of thematic roles developed by Reinhart (2002), but does not depend on that particular implementation. Reinhart decomposes roles into features: ‘mental state is relevant’, ‘cause change’. Sentient has in common with Agent its specification for the feature ‘mental state’. Sentient is [+m] whereas a full-fledged Agent is [+c,+m].

with: $\lambda z \lambda e. * \text{Sentient}(e) = z$

(15) The discontinuous construction, a first attempt:



As an introducer of non-core arguments, the comitative would qualify as an **applicative**. Specifically, it would be a *high applicative*: a head that relates an individual to an event (not to another individual), like instrumentals, benefactives, malefactives, or locatives (Pylkkänen 2002:Ch. 2). The comitative and its argument could attach before or after Voice, which has essentially the same semantics (Kratzer 1996).

Siloni (2001, 2007) entertains the possibility that the discontinuous construction simply utilizes the comitative phrase. However, she retreats from this idea because:

- Run-of-the-mill comitative phrases, not in discontinuous reciprocals, can be freely dropped. To the extent that they can be dropped in discontinuous reciprocals, the existence of an additional participant is inferred.
- Regular comitative phrases, not in discontinuous reciprocals, receive a vague interpretation.
- Usually comitative phrases are adjuncts, but in discontinuous reciprocals they are arguments (this has been shown by Dimitriadis (2004) and Komlósy (1994), among others).

I believe that the semantics I have given reciprocals may allow us to hold on to comitatives as an explanation of discontinuous reciprocals. In effect, the unique properties of the comitative in reciprocal constructions are really a reflex of the properties of the reciprocal, not of the comitative. The reciprocal comes *built-in* with reciprocity and quantification over pairs, and the comitative does nothing more than to specify additional participants as needed.

The tricky part is to make the reciprocating parties in a discontinuous construction subject–object pairs, and to avoid forming pairs of individuals from the subject alone. This is not a trivial task, since in the continuous construction subject–subject pairs are precisely what we need.

To summarize, the semantics of the discontinuous construction gives us exactly what we were after: participants play different roles in the event, but the construction nevertheless expresses reciprocity.

And what about the entailments?

4 More evidence for group events

In this paper I have suggested that group events matter for reciprocals. The claim was made boldly, but in fact the analysis only depends on the existence of one layer of groups, namely the layer of pairs. In the nominal domain, on the other hand, higher layers of the plurality/group structure are accessed each time a DP like *the boys* gets a collective interpretation.

Questions: Do we need the full power of group formation for the domain of events? Are there other natural language phenomena that require group events?

Artstein (1997) answers both of these questions in the affirmative. He uses group events to account for collectivity effects of predicate conjunction, that he claims cannot be otherwise captured through the domain of individuals.

- (16) a. John and Mary went to the store and bought ice cream.
b. What did John and Mary go to the store and buy?

5 Conclusion, or: My To–Do list

- The entailments!
- Reciprocals in syntax languages: the absence of the discontinuous construction.
- Lexical semantics of the class of reciprocals: why is *histaxsex* ‘quarrel’ a reciprocal verb, but *eat–RECI or *play–RECI not?

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