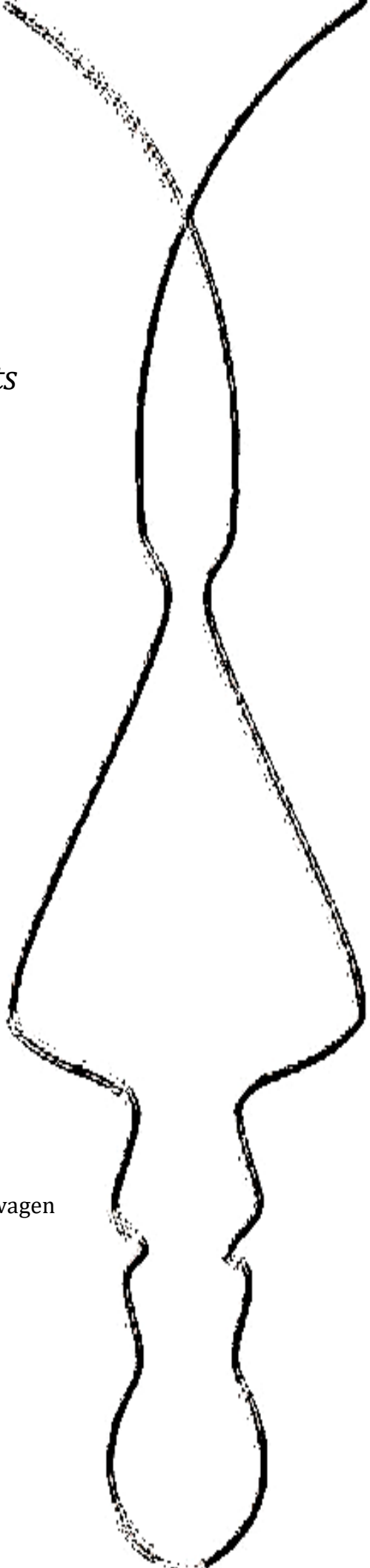
DOES IT TAKE TWO TO TANGO?

On Reciprocal Verbs as Collective Predicate Concepts



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1. Introduction

The notion of reciprocity has received a great deal of attention by philosophers (Derrida, 1992), linguists, anthropologists (Mauss 1923) and biologists (Trivers, 1971, de Waal, 2005). Reciprocity means that an action, behavior or a favor directed from individual or group A to individual or group B is returned from B to A. „If you help me, then I'll help you", or more cruelly: „an eye for an eye."

In languages, specific verbs can express reciprocity. The verbs in sentences (1)-(4) are classified as reciprocal verbs:

(1) Violet and Mark hugged.
(2) Violet and Mark got married.
(3) Violet hugged Mark.
(4) Violet fought against Mark.

Reciprocal verbs are verbs that come in two usages: a *unary* (intransitive) usage and a *binary* usage, with the following properties:

- The unary-intransitive usage appears in sentences like *A and B hug* or *A and B fight*, which can be interpreted as a statement on A and B collectively (as in (1)-(2)).
- The binary usage can be transitive as in *A hugs B* or may involve a preposition, as in *A fights with B* (as in (3)-(4)).
- The unary and the binary usages are semantically related, where the unary usage implies some sort of *reciprocity*: if *A and B hug* then most likely – A hugs B and B hugs A back.

From a semantic point of view, the collective sentences in (1)-(4) are intuitively classified as *reciprocal* (Lakoff & Peters 1969). This thesis aims to shed more light on this reciprocity. What does it exactly mean to say that "Violet and Mark got married"? What is the difference from "Violet married Mark"? The linguistic literature on reciprocity initially assumed that the unary and binary guise of a reciprocal verb were semantically equivalent to each other. However, this assumption is challenged by a simple observation: a binary sentence as "Violet hugged Mark" means something quite different than "Violet and Mark hugged". Many works attempted to explain this difference, relying on the intuitive assumption that a unary reciprocal sentence such as "Violet and Mark hugged" entails that Violet hugged Mark and that Mark hugged Violet.

While previous works on reciprocity mostly relied on intuitive judgements by authors and their consultants, in this thesis I empirically examine the semantic differences and similarities between the unary and the binary guise of reciprocal verbs, with the aim of determining which factors influence truth-value judgements on sentences with unary reciprocal verbs. My first hypothesis is that, against all previous proposals, the unary guise of a reciprocal verb does not logically entail the binary guise. For instance, if Violet and Mark hugged it does not necessarily follow that Violet hugged Mark. Secondly, I spell out two factors that positively influence the acceptability of unary reciprocal verbs: one factor is *identical participation* – the degree to which a group acts in an identical manner with respect to the action that a verb specifies; a second factor is *collective intentionality* – the degree to which a group has a shared intention and/or shared belief.

This new empirical work is needed to determine under which circumstances speakers accept the use of reciprocal verbs, and which factors influence acceptance rates in truth-value judgements. By that, more insight will be gained in the semantics of reciprocal verbs. After reviewing the relevant literature, I will report on two conducted experiments. The results suggest that unary guise reciprocal verbs do not necessarily entail symmetry. Also, results show support for a positive effect on acceptance rates in truth value judgements of identical participation and collective intentionality. In Section 10 I will discuss the results.

2. Reciprocity: a literature review

As stated in the introduction, reciprocal verbs have two usages: a unary and a binary usage. Lakoff and Peters (1969) suggest a syntactic transformation for treating such reciprocal alternations. They argue that sentences containing binary predicates like *agree with* are derived from sentences with the unary guise of *agree*. For example, (5a) is derived from (5b):

(5a) John agrees with Bill that Harry is an idiot.
(5b) John and Bill agree that Harry is an idiot.

This derivation is obtained by a mapping from an *and*-conjunction as in *John and Bill agree* to a prepositional phrase as in *John agrees with Bill*. Lakoff & Peters (1969) assume that the semantic interpretation of any conjunction is independent of the order of the conjuncts. Thus, (6a) and (6b) are equivalent:

(6a) John and Bill agree.
(6b) Bill and John agree.

The conjunction present in the unary guise of the reciprocal verb is thus symmetric. This explains the observed symmetry of sentences like (6a): a sentence like "John agrees with Bill" can only be true by virtue of (6a)'s truth, which is equivalent to (6b). It follows that the sentence "Bill agrees with John" is true as well.

Lakoff & Peters use the symmetry of conjunction with the unary guise of a reciprocal verb for explaining the symmetry of the "with" construction. A similar approach is adopted for unary adjectives as in "A and B are similar" and the symmetry of a binary construction like "similar to". Symmetry is treated as a logical consequence from the transformational derivation of the binary form from a unary deep structure.

Lakoff & Peters' derivational rule runs into difficulties when we consider (7a) and (7b), an example due to Dong (1971):
(7a) The truck collided with the lamppost.
(7b) * The truck and the lamppost collided.

Using Lakoff & Peters's rule for these sentences would derive (7a) from (7b). Such a derivation would be problematic, as it would not explain the clear difference in felicity between (7a) and (7b). Even when both parts of the derivation are felicitous, as in (8a)-(8b), intuitively they are not equivalent:

(8a) The Volkswagen collided with the Mercedes.
(8b) The Volkswagen and the Mercedes collided.

Gleitman (1965) suggested another route of derivation between the unary and binary guises of reciprocal verbs. The starting point for Gleitman's derivational rule is the transitive construction:

(9a) John and Mary met each other.

Then, the reciprocal argument 'each other' can get deleted, which results in (9b):

(9b) John and Mary met.

Problems for Gleitman's derivation arise when considering sentences as (10):

(10a) John and Mary kissed each other on the cheek.
(10b) *John and Mary kissed on the cheek.

As Dong (1971) observed, 'each other' allows for a locative of specification, while the unary guise of 'to kiss' does not. Another observation by Dong (1971) is that (11a) might be interpreted as a single kiss, while (11b) can only refer to multiple kissing events.

(11a) John and Mary kissed.
(11b) John and Mary kissed each other.

So far I have shown that the attempts in the 60s to come up with a formal theory of deriving the binary guise from the unary guise or vice versa do not always respect the semantics of these predicates. An underlying assumption in both Lakoff & Peters (1969) and Gleitman (1965) is that

there is one rule for the alternation between the unary and the binary guise applying to all reciprocal predicates. Both Lakoff & Peters and Gleitman assume that there is one homogeneous group of reciprocal predicates, all alternating in a similar way. Another tacit assumption they make is that reciprocal verbs necessarily denote a symmetric event: if John met Mary, then Mary met John as well. Lakoff & Peters assume that the binary and the unary guise of a reciprocal verb share the same deep structure. Sentence pairs like (12a)-(12b) and (13a)-(13b) challenge the latter assumption:

(12a) Violet hugged Mark.
(12b) Violet and Mark hugged.

(13a) Violet was in love with Mark.
(13b) Violet and Mark were in love.

(12a) and (13a) do not entail respectively (12b) and (13b).

Examples (12a)-(12b) and (13a)-(13b) show that the truth conditions of the unary guise of a reciprocal verb can differ from the binary guise. Note that for some reciprocal verbs, semantics of the unary and binary guise are similar, just like Lakoff & Peters and Gleitman observed:

(14a) Violet dated Mark.
(14b) Violet and Mark dated.

If (14a) is true, then (14b) must be true and vice versa. Thus when a reciprocal verb is alternating between the unary and the binary guise, for some verbs its truth conditions remain preserved, while for others they change. It is therefore impossible that the unary and the binary guise of <u>all</u> reciprocal verbs have the same deep structure. This is problematic for the transformational accounts of Gleitman and Lakoff & Peters. Dowty (1991), although not proposing a precise mechanism driving reciprocal alternations, makes some progress in analyzing them. Dowty notes that (14a) requires symmetrical participation: if Violet dated Mark, it must be the case that Mark also dated Violet. Both Violet and Mark have to participate in the act of dating. However for (15), Dowty claims, only Violet has to be active:

(15) Violet hugged Mark.

Mark can be passive, not reciprocating the hug, and (15) will still be true. Another example, pointed out by Dong (1971), also exemplifies the contrast between the unary and the binary guise of reciprocal verbs:

(16a) The rapist fucked his victim five times.
(16b) The rapist and his victim fucked five times.

(16a) is semantically fine, but (16b) sounds odd: it implies, as Dong puts it, that the rapist and the victim became friendly and that the victim, after the rape, agreed with having sex with the rapist again.

Dowty (1991) analyzes the following example, originally mentioned by Dong (1971):

(17a) The truck collided with the lamppost.
(17b) * The truck and the lamppost collided.

Intuitively, we feel that there is something wrong with (17b). However, Dowty (1991) pointed out that (17b) could be well formed in case of a lamppost coming lose and rolling down a hill, crossing paths with a moving truck. The lamppost has to be in motion for (17b) to be acceptable. For (17a), there is no such requirement for the role of the lamppost.

These data suggest that for some reciprocal verbs the meaning of the unary guise, as well as its selectional restrictions, differ from those of the binary guise. Dowty generalizes these observations by distinguishing two classes of reciprocal verbs. The verb *hug* belongs in a class of reciprocal predicates that only requires one volitional agent in the binary guise. This argument is that one that acts volitionally, is sentient or causes an event or change of state in another participant. By contrast, *marry/date* represent a class of reciprocal predicates where both arguments of the binary guise are equally agentive.

An example to clarify the two classes of verbs:

(18a) Violet and Mark embraced.
(18b) Violet embraced the lamppost.
(19a) Violet and Mark got married.
(19b) * Violet married the lamppost.

The verb *embrace* (18a)-(18b) belongs to the class of reciprocal predicates only requiring one volitional agent in the binary guise, while the verb *marry* (19a)-(19b) requires two volitional agents in the binary guise.

All accounts discussed so far (Gleitman 1965, Lakoff & Peters 1969, Dowty 1991) agree on the idea that the unary guise of reciprocal verbs entails two sub events:

(20a) Violet and Mark hugged.

(20a) is assumed to entail (20b) and (20c):

(20b) Violet hugged Mark.
(20c) Mark hugged Violet.

Later accounts (Carlson 1998, Dimitriadis 2008, Siloni 2002, 2008) also postulated the presence of this entailment. Carlson (1998) explores the interpretation of the unary guise of reciprocal verbs using event semantics. He proposes that an event has at most one entity playing a given thematic role (Carlson 1998:40). If two distinct entities play the same role, as in (21), then there are two events:

(21) John ate the hot dog and Betty ate the apple.

Sentences containing group arguments have either a distributive or a group reading. Consider (22):

(22) Five boys carried a piano up the stairs.

On the group reading, the five boys carried the piano together, resulting in one event. The group, being one entity, carried the piano. The distributive reading is such that each of the five boys

carried a piano up the stairs, so there would be five events. For the unary guise of some reciprocals, there is no distributive reading possible:

(23) Tom and Sue met.

(23) describes one event, the event in which Tom and Sue, as one entity, met. The only possible reading is the group reading. Carlson (1998) argues that Tom and Sue act as a group, not as separate entities. If Tom and Sue were separate entities, there would be two events, one in which Tom met Sue and one in which Sue met Tom. Carlson (1998) thus claims that the arguments of (23) – Tom and Sue – together form a group that as a group acts in a certain way. He argues that a verb as *meet* is a group level predicate, assigning only one thematic role to the whole group. Many reciprocals however do allow for a distributive reading. Consider for instance *kiss*:

(24) John and Mary kissed.

Under the group reading, (24) is interpreted as if John and Mary kissed each other, while under the distributive reading (24) means that John and Mary each kissed someone, but not each other. The group reading of (24) counts as one event, while the distributive reading leads to two events.

Siloni (2002) and Dimitriadis (2008) follow Carlson and argue that 'symmetric events' can only be counted once. A symmetric event is an event in which whatever A does to B, B does to A as well, with respect to the giving binary relation. If there is an event of John meeting Bill, then that event also contains Bill meeting John. Compare the following sentences:

(25a) John and Mary kissed five times.
(25b) John and Mary kissed each other five times.

As Siloni and Dimitriadis state, (25a) has to be interpreted as five mutual kissing events. (25b), on the other hand, can be interpreted as (1) five mutual kissing events or (2) ten kissing events: five by John and five by Mary. Interestingly, the presence of the reciprocal argument 'each other' may result in a series of non-symmetric events: for (25b), it could be the case that John kissed Mary five times on her hand and Mary did the same to John, but for (25a) such an interpretation is not possible. Dimitriadis (2008) argues that in case of (25a) we count symmetric events and therefore

we can count them only once. If there is a symmetric event of John kissing Mary, then in the same event Mary kisses John as well. This means that the arguments of symmetric events have to be both agent and patient. In the case of (25a), John and Mary both have to kiss and receive a kiss. In a binary sentence, this is not the case. For 'John kissed Mary', 'John' can be just agent and 'Mary' can be just patient. Another way to show that a unary reciprocal sentence without 'each other' denotes one event is to look at embedded sentences (examples by Carlson 1998):

(26a) Bill and Mary thought that they had kissed.
(26b) Bill and Mary thought that they had kissed each other.

(26a) can according to Carlson (1998) and Siloni (2012) only be interpreted as that Bill and Mary thought they engaged in a mutual kissing activity. (26b) can be interpreted like (26a), but it could also mean that Bill thought he kissed Mary and Mary thought she kissed Bill.

Dimitriadis (2008), Siloni (2002, 2012) and Carlson (1998) use event semantics to account for their assumption that the unary guise of reciprocal verbs is interpreted symmetrically.

Rákosi's theory (2008) demonstrates how the meaning of the unary guise evolves from the binary guise. Rákosi's theory is mostly based on Hungarian data. In Hungarian, the binary guise of a reciprocal verb can take the following form:

(27) Péter csókol-óz-ott Anná-val
Peter kiss-RECP-PST Anna-with
'Peter was involved in a mutual kissing activity with Anna'.

Rákosi (2008) argues that the first argument, in (27) that would be Peter, carries the agent role, while the second argument – Anna in (27) – carries a so-called partner role. The partner role resembles the agent role, but whereas volitional involvement, sentience and initiative are entailed for the agent role, for the partner role these are only optional. The unary guise of the reciprocal is derived from the binary guise through a process of argument unification: both the arguments, agent and partner, get unified. Then one argument slot gets removed, resulting in the unary guise, which has one argument, carrying a combined agent-partner role. What would Rákosi make of the

problematic alternation of 'to collide', as we have seen earlier?

(28a) The truck collided with the lamppost.
(28b) * The truck and the lamppost collided.

Rákosi's theory states that in (28a) 'the lamppost' carries the partner role. Since there are no strict requirements for the partner role, there are no objections here: the lamppost can serve as a 'partner'. The truck', perhaps personified, carries the agent role. In (28b) 'the truck and the lamppost' carry the joint agent-partner role, which is where the alternation runs into problems. 'the lamppost' now has to carry agent features[1], which is impossible without a proper context. Rákosi's theory thus explains the unacceptability of (28b). A drawback of Rákosi's theory is that the analysis only applies to the alternation between a unary guise and a binary guise with a comitative construction. Rákosi does not talk about extending this analysis to the alternation as (29a)-(29b):

(29a) John hugged Mary.
(29b) John and Mary hugged.

The second argument of (29a), Mary, carries the patient role. However, since 'partner' is underspecified, one could argue that 'Mary' carries the partner role. The theory is thus not very detailed on the requirements for 'partner'. The unification of arguments might work differently if the primitive argument is more patient like than partner, but this is pure speculation since Rákosi does not mention these examples. Rákosi's theory is thus difficult to apply to other languages than Hungarian, an issue that has also been noted by Milicevic (2009).

To sum up the discussion of thematic roles and events in connection to reciprocal verbs; Dowty (1991) proposed, based on the number of volitional agents involved for the binary guise, a division of reciprocal predicates. Carlson (1998), Siloni (2002,2012) and Dimitriadis (2008) propose that symmetric events can only be counted once, and since the unary guise of reciprocal verbs can only be counted once, argue that they denote symmetric events. Carlson then states that the arguments of a unary guise together form a group, and the group as a whole has a certain thematic role. Rákosi agrees with this idea, and states that the thematic role of the argument cluster of the unary guise of

[1] For 'to collide' the notion of volition is not relevant. What volition is for to hug/embrace/kiss etc., is motion for 'to collide'. See for instance 'the balls collided'.

a reciprocal verb is the 'agent-partner role'. Dimitriadis views the arguments of the unary guise as separate entities that behave in a similar way. Rákosi also proposes a theory of alternation between the unary and the binary guise, but this theory is difficult to apply to English. Note that also Carlson (1998), Dimitriadis (2008) and Rákosi (2008) do not doubt and even argue in favor of the symmetrical interpretation of the unary guise of reciprocal verbs. So far, all literature I have reviewed is theoretical and based on logical reasoning and intuitions. But how do language users themselves interpret reciprocal predicates? In the next section, I will discuss an experimental study carried out by Gleitman et al. (1996).

Gleitman et al. (1996) were interested in whether language users interpret reciprocal predicates as 'symmetrical' or not. In their first experiment, they asked subjects to rate the symmetry of a number of predicates on a scale from 1 to 5. Gleitman et al. (1996) classified the 20 predicates with the highest ranking as symmetrical predicates and the lower-ranking 20 as non-symmetrical. The predicate 'to compare' (ranking 2.88) is categorized as symmetrical, while 'to love' (ranking 2.44) belongs to the non-symmetrical class. A grey area of continuous data thus received a categorical treatment. Although this is not uncommon, it is dubious from a methodological point of view, especially if one assigns different logical definitions to the two different categories, as is done by Gleitman et al. In their second experiment Gleitman et al. asked participants to indicate the semantic closeness between a sentence like 'John and Mary kissed' and 'John and Mary kissed each other'. Participants graded the difference on a scale between 1 ("do mean the same") and 5 ("do not mean the same"). They found that predicates that were in experiment 1 judged as 'symmetrical' yielded a mean score of 2.59. The predicates that were judged to be non-symmetrical, yielded a mean score of 4.75.

Gleitman's et al. conclusion from their experiments is that symmetry is a graded notion. They note that, while it is possible to think of different interpretations for 'John and Mary kissed' and 'John and Mary kissed each other', this become progressively harder when the predicates become more symmetrical. This is relevant for my purposes because so far 'symmetry' has been interpreted as a logical black-and-white notion. While in logic and semantics it might be useful to see verbs either as requiring symmetrical participation or not, in the minds of actual language users interpretations are not that clear cut. While not having attested this particular matter experimentally, also Gleitman et al. conclude that the unary guise of reciprocal verbs requires two active agents.

As we see, the positions in the literature regarding the semantics of reciprocal predicates, and the relevant notion of symmetry, are quite diverse. However, for the purposes of this thesis, it is important to note previous works are in agreement with respect to the symmetry of reciprocal-unary entries of verbs: all relevant literature (Gleitman 1965, Gleitman et al. 1996, Lakoff & Peters 1969, Dowty 1991, Carlson 1998, Siloni 2002, 2008, 2012, Dimitriadis 2008, Rákosi 2008[2]) assumes that the unary guise of reciprocal verbs entails two conjoined subevents: 'Bob and Sue hugged' entails 'Bob hugged Sue' and 'Sue hugged Bob'.

[2] Rákosi does not treat transitives, but since he assumes symmetrical participation for A&B hug/ 'A hugs *with* B' alternations he would assume symmetrical participation for A&B hug as well.

3. Current Proposal

The dominant view in the literature is that a unary guise reciprocal sentence entails two conjoined subevents, meaning that "the girl and the boy hugged" entails "the girl hugged the boy" and "the boy hugged the girl". In the literature so far symmetrical participation is thus seen not just as a contributing factor, but as a necessity. In this thesis, I will take a step back from this assumption. I establish empirically which factors contribute to the acceptance of unary reciprocal verbs. Factors that might influence acceptance of reciprocity are symmetric participation and collective intentionality. Collective intentionality refers to a group of at least two people having a shared intention, shared belief and/or shared emotion. As Searle (1990) put it: collective intentionality is not to be reduced to a sum of individual intentionalities, but it is irreducibly collective and therefore the property of a group. Tomasello (2009) argues that the human capacity to have a joint intention is a prerequisite for the development for human communication and language.

I hypothesize that symmetric participation has a positive effect on the acceptance of reciprocal verbs. A sentence like *Mark and Violet hugged* may be accepted in situations where only one of the participants hugged the other, but I predict that more people will accept the sentence if both participants hugged one another. Despite the positive effect on acceptance boosted by symmetric participation, I predict that a significant percentage of participants will nevertheless accept a reciprocal sentence to describe a situation without symmetric participation. The second hypothesis I put forward is that collective intentionality has a positive effect on the acceptability of the unary guise of reciprocal sentences. Since reciprocity seems to be a way to express collectivity, I hypothesize that the presence of collective intentionality enhances the acceptance of unary reciprocal sentences describing events in which there is no symmetrical participation. On a theoretical level, I hypothesize that there is no logical entailment between a unary guise reciprocal verb and its two binary subevents.

By means of two experiments it was tested whether:

- there is a substantial percentage of participants that accepts a unary guise reciprocal sentence describing a situation where there is no symmetrical participation;

- participants are significantly more likely to accept a reciprocal situation with no symmetrical participation when there is collective intentionality.

Each of the two experiments that were conducted was designed so that it tests both hypotheses. The rationale behind the two experiments is similar: both experiments are truth value judgement tasks, where each trial consists of a visual stimulus combined with a sentence. All visual stimuli of the target items depict situations with two characters, of which one is performing an action and the other one is passive. It is thus assumed that these visual stimuli do not support symmetrical participation. This assumption was tested using suitable control items. A second type of target items tested the role of collective intentionality. Like the primary target items, secondary target items contained visual stimuli with active and passive characters. However, the passive character in the secondary target items looked uncooperative. The goal of the target and secondary target items was to test the two hypotheses above by collecting speakers' truth value judgements on various situations where symmetrical participation is missing.

4. Method Experiment 1

Participants

48 participants (female 37, age M = 23) took part in the experiment. They were recruited via the university's database and they all received monetary compensation for their participation. All participants were native speakers of Dutch and did not report of dyslexia.

Materials

A total of 24 Dutch sentences were tested on their acceptability in a given situation. The experiment contained eight target items, eight secondary target items and eight control items. Above that, 32 filler items were used. All items consisted of a drawing and a Dutch sentence. The sentences in target items, secondary target items and control items contained reciprocal verbs that have both a binary guise (e.g. "A hugs B") and a unary-collective guise (e.g. "A and B hug"). Eight such verbs were selected:

- *knuffelen* "to hug";
- *botsen* (tegen) "to collide (against)";
- *appen* "to send whatsapp messages";
- *praten* (tegen) "to talk (to)";
- *spreken* (tegen) "to speak (to)";
- *kletsen* (tegen) "to chat(to)";
- *roddelen* (tegen) "to gossip(to)";
- *vechten* (tegen) "to fight (against)".

Materials were pretested by a pilot study.

<u>Target items</u>

Target items each included a sentence containing one of the eight selected verbs in the unary guise (e.g. "The girl and the woman hug"), resulting in a total of eight items. Drawings in target items each depicted one active individual (who performs the reported action on the other individual) and one passive individual, whose attitude is visibly "cooperative", i.e. he or she looks attentive, happy, or otherwise accepting of the ongoing action. Examples of target drawings:

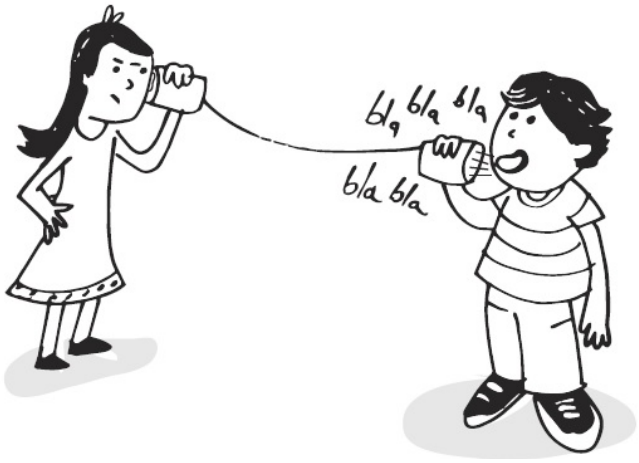

Figure 2: target drawing for *praten* ("talk")

Figure 1: target drawing for *knuffelen* ("hug")

Figure 3: target drawing for *spreken* ("speak")

The target sentences for “hug”, “collide”, “send whatsapp messages” and “talk” were built up according to this scheme:

Description of active argument – “and” – description of passive argument – verb (present form plural).

For instance, for the verb “talk” that resulted in:

(30) De jongen en het meisje prat-en
DEF.ART boy and DEF.ART girl talk-PL
“The boy and the girl are talking.”

By contrast, the target sentences for “speak”, “chat”, “gossip” and “fight” were built up according this scheme:

Conjunctive Subject – verb.

The reason for testing a different kind of sentences for “speak”, “chat”, “gossip” and “fight” was to make the sentences compatible with the drawings. For instance, with “talk” (see the target drawing in figure 1), the sentence “the boy and the girl are talking” is a more accurate and specific description than “the children are talking”. By contrast, with “speak” (see the target drawing in figure 3), it is most accurate to say “the men are speaking” and it is hard to be more specific.[3] Since the semantic difference between using a conjunctive subject and a plural subject is relatively minor in these sentences, I did not expect it to lead to a substantial difference in truth-value judgements.

Table 1 contains an overview of all target item sentences:

Verb	**Sentence**
***knuffelen* “to hug”**	De vrouw en het meisje knuffelen (“The woman and the girl are hugging”)
***botsen* “to collide (with)”**	De vrachtwagen en de auto botsen (“The truck and the car collide”)
***appen* “to send whatsapp messages”**	De jongen en het meisje appen (“The boy and the girl are exchanging whatsapp messages”)

[3] It would be possible to use a sentence like “the man on the left and the man on the right are speaking”, but that might be too cumbersome.

praten **"to talk (to)"**	De jongen en het meisje praten ("The boy and the girl are talking")
spreken **"to speak (to)"**	De mannen spreken ("The men are speaking")
kletsen **"to chat(to)"**	De vrouwen kletsen ("The women are chatting")
roddelen **"to gossip(to)"**	De meisjes roddelen ("The girls are gossiping")
vechten **"to fight (against)**	De mannen vechten ("The men are fighting")

Table 1: (secondary) target item sentences

Control items

The control items tested whether the situations depicted in the target stimuli involve non-symmetric participation with respect to the relevant verb. Accordingly, the control items used the same visual stimuli and the same verbs from the target items. However, the sentence in each control item had the verb in the binary guise, where the non-active individual in the illustration serves as the subject (e.g. "The woman hugs the girl"). This resulted in a total of eight control items. The sentences in control items had the following structure:

Description of passive argument – verb (present form singular) – (preposition) - description of active argument

The binary sentence for "talk" was:

(31) Het meisje praat tegen de jongen
DEF.ART girl talk.SG to DEF.ART boy
"The girl is talking to the boy."

Table 2 contains all control item sentences:

Verb	**Sentence**
knuffelen **"tohug"**	De vrouw knuffelt het meisje ("The woman hugs the girl")
botsen **"to collide (with)"**	De auto botst tegen de vrachtwagen ("The car collides with the truck")
appen **"to send whatsapp messages"**	Het meisje appt de jongen ("The girl sends a whatsapp message to the boy")
praten **"to talk (to)"**	Het meisje praat tegen de jongen ("The girl talks to the boy")
spreken **"to speak (to)"**	De man aan de linkerkant spreekt tegen de man aan de rechterkant ("The men on the left side is speaking to the man on the right side")

kletsen **"to chat(to)"**	De vrouw aan de linkerkant kletst tegen de vrouw aan de rechterkant ("The woman on the left side is chatting to the woman on the right side")
roddelen **"to gossip(to)"**	Het meisje aan de linkerkant roddelt tegen het meisje aan de rechterkant ("The girl on the left side is gossiping to the girl on the right side")
vechten **"to fight (against)**	De man aan de rechterkant vecht tegen de man aan de linkerkant ("The man on the right side is fighting against the man on the left side")

Table 2: control item sentences

Secondary target items

Similar to the target items, secondary target items each included a sentence containing one of the eight selected verbs in the unary guise (e.g. "The girl and the woman hug"), resulting in a total of eight items. However, drawings in secondary target items differed from target items. As in the target items, these drawings depict one active individual and one passive individual. The difference between target and secondary target drawings lies in the attitude of the passive individual. For the drawings in secondary target items, the passive individual looks uncooperative or uninvolved in the action. Figures 4 and 5 show examples of secondary target drawings.

Figure 4: secondary target drawing for *praten* ("talk")

Figure 5: secondary target drawing for *knuffelen* ("hug")

Test sentences for secondary target items were identical to target item sentences. See table 1 for an overview of secondary target sentences.

True target & true control item

For "hug" two other items were added, a true target and a true control item. The true target item consisted of a drawing depicting a scenario in which both persons are actively engaged in the hug, combined with the normal target sentence for"hug". The true control item consisted of the same drawing (hence with both persons are actively engaged in the hug) but combined with the normal control sentence for "hug". The drawing differs minimally from the drawing for the target item (figure 1) and it is reproduced in figure 6:

Figure 6: drawing for true target & true control for *knuffelen* ("hug")

The test sentences for the true target/control items were, respectively:

De vrouw en het meisje knuffelen (“The woman and the girl are hugging”)
De vrouw knuffelt het meisje (“The woman hugs the girl”)
These two extra items were added to compare acceptability rates with the target/control items, where one of the persons is passive. I intuitively expected a ceiling effect with the true target/control items, as opposed to the other items, where I expected some participants to reject the target sentence due to its lower typicality. To avoid excessive influence on the judgements about normal target items, I only included these items for the verb ”hug”.

Filler items

30 filler items were added. The filler items served three purposes:
(1) Obtaining a better balance in the expected numbers of true/false reactions on target and control items;
(2) Creating some more distance between items with the same verb, so that participants would be distracted from the items they saw earlier.
(3) Preventing the participant as much as possible from using automatic strategies when reacting to the target stimuli.
To create the 30 filler items, 15 pictures were used. Each of the pictures appeared twice in the experiment. Some pictures depicted actions, such as ‘drinking coffee’ or ‘giving high fives’ and others depicted figurative things, such as lines or dots. To obtain the desired balance of true and false reactions, eight of the fillers were designed with expected true reactions to balance the expected eight false reactions to the control items. Figure 7 shows an example of such a filler item:

Figure 7: ‘drink’ filler

The test sentence for this true filler item was “the boy and the girl are drinking”.

The other 22 filler items were deliberately designed as distractorsIt was difficult to predict reactions on these filler items. See figure 8 for an example of such a filler item:

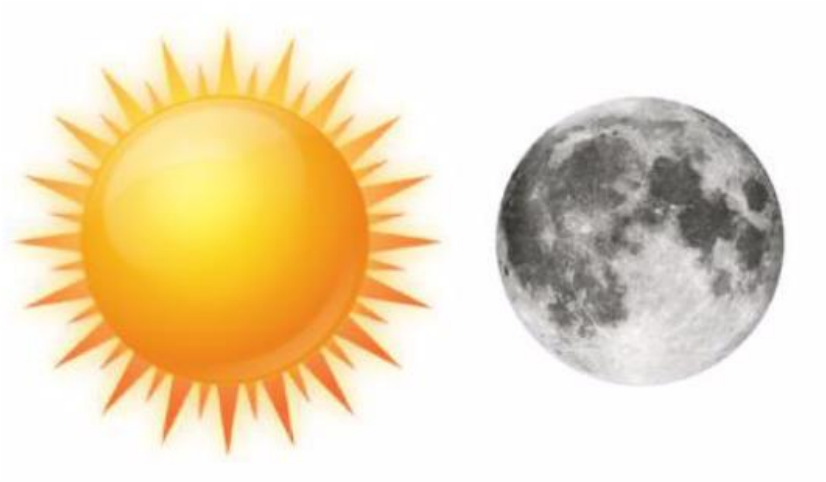

Figure 8: 'sun moon' filler

The test sentence combined with figure 8 was “the sun and the moon are equal in size”.

Order

The order of items was pseudo-randomized with the following restrictions:

• All secondary target items were presented as the very last items of the experiment.

• There were at least 15 items between a target item and a control item that contained the same verb.

Two versions of the experiment were created, the only difference between them being the order of the items:

Order 1: for the verbs *botsen* (“collide”), *kletsen* (“chat”), *praten* (“talk”), *knuffelen* (“hug”), first the target item was presented and then the control item. The other verbs *roddelen* (“gossip”), *appen* (“send whatsapp messages”), *vechten* (“fight”), *spreken* (“speak”), first the control item was presented and then the target one.

Order 2: similar to order 1, but to counterbalance possible effects of order 1, this order had the reversed order between the control and target items. Thus, the verbs *roddelen* (“gossip”), *appen* (“send whatsapp messages”), *vechten* (“fight”), *spreken* (“speak”) were firstly presented with the target sentence and then with the control sentence, and the remaining verbs *botsen* (“collide”), *kletsen* (“chat”), *praten* (“talk”), *knuffelen* (“hug”) were presented firstly with the control sentence and then with the target one.

The secondary target items were presented at the end of the experiment, so they appeared as the last 8 items. This decision was made to prevent interference and confusion from seeing the target items as well. The true target and control item were presented right before the secondary target items.

Procedure

The experiment was presented on a PC in a lab environment. Participants were instructed to indicate whether they judged the sentence true or false in the accompanying drawing, by pressing a green (=true) or red (=false) button. They were instructed not to think too long about their judgement and use their intuition. Halfway through the experiment, participants had the possibility to take a short break.

5. Results Experiment 1

See table 3 for results on target and control items:

Verb	**% true responses on target items**	**% true responses on control items**	**% of participants who answered true on the target item & false on the control item**
knuffelen ("hug")	79%	31%	48%
botsen ("collide")	98%	2%	96%
appen ("send whatsapp messages")	94%	8%	85%
praten ("talk")	46%	4%	42%
spreken ("speak")	69%	13%	56%
kletsen ("chat")	98%	17%	81%
roddelen ("gossip")	90%	6%	83%
vechten ("fight")	73%	15%	58%
MEAN	**81%**	**12%**	**69%**

table 3: results on target items and control items

The percentages in the second column show the acceptance rates for the target items, which tested reactions on reciprocal sentences in situations with asymmetric participation. As expected, the percentages were high above zero, and varied from 46% for *praten* ("talk") to 98% for *kletsen* ("chat") and *botsen* ("collide"). The third column shows the acceptance rate for the control items, which tested reactions on binary sentences in asymmetric situations. Recall that intuitively we would judge these items as false, so acceptance rates near zero were expected. Interestingly, rates differ between 2% for *botsen* ("collide") and 31% for *knuffelen* ("hug").

The fourth column of the results shows the percentage of participants who judged the target item as 'true' and the control item as 'false'. This is thus the percentage of participants who acknowledged that one of the arguments is passive, but nevertheless judged the unary guise to be true. For these participants symmetrical participation in the drawing was not necessary to accept the use of a unary reciprocal sentence.

Table 4 shows the acceptance rates of the target item (a repetition of column 2 in table 3) and the acceptance rates of the secondary target items:

Verb	**% true responses on target items**	**% true responses on secondary target items**
knuffelen ("hug")	79%	19%
botsen ("collide")	98%	65%
appen ("send whatsapp messages")	94%	44%
praten ("talk")	46%	13%
spreken ("speak")	69%	33%
kletsen ("chat")	98%	27%
roddelen("gossip")	90%	46%
vechten ("fight")	73%	23%
MEAN	**81%**	**34%**

table 4: target items and secondary target items

Recall that the test sentences for the target and the secondary target item were identical – the difference between the target item and the secondary target item was the attitude of the passive argument in the drawing. The acceptance rates between the two types of stimuli differ most for *kletsen* ("chat"). The target item for *kletsen*("chat") was accepted by 98% of the participants, while the secondary target item was accepted by only 27% of the participants. For *botsen* ("collide"), 98% of the participants accepted the target item, but 65% also accepted the secondary target. To test whether there is a relationship between drawing (target or secondary target) and acceptance rate, I performed a chi square test for independence for each verb individually. Results of the chi square test are in table 5:

Verb	Df	N	X^2	P
knuffelen ("hug")	1	96	35.06	<0.001
botsen ("collide")	1	96	17.50	<0.001

appen (“send whatsapp messages”)	1	96	27.93	<0.001
praten (“talk”)	1	96	12.91	<0.005
spreken (“speak”)	1	96	12.05	<0.005
kletsen (“chat”)	1	96	51.38	<0.001
roddelen(“gossip”)	1	96	21.01	<0.001
vechten (“fight”)	1	96	24.04	<0.001

table 5: results chi square test for independence

Results of the chi square test indicate very strong evidence of a relationship between type of drawing and acceptance rate.

For *knuffelen* (“hug”) a true target item and a true control item were included: one in which both participants were engaged in the hug. Results of *knuffelen* (“hug”) for all targets are shown in table 6:

Verb	**% true responses on true target item**	**% true responses on true control item**
knuffelen (“hug”)	100%	96%

Table 6: results for *knuffelen* (“hug”)

If a depicted event shows symmetrical participation, like the true target item for *knuffelen* (“hug”), acceptance rates are higher than for events without symmetrical participation, like the target items for all verbs. See table 3 for results on target items.

6. Discussion Experiment 1

Experiment 1 tested the hypothesis that speakers accept sentences with reciprocal verbs in situations in which there is no symmetric participation. One conclusion from the results is that a substantial percentage of participants identifies a passive agent in the drawing, but nevertheless accepts the reciprocal sentence. The acceptance rates vary per target item, but they were substantial for all tested verbs (M = 69%).

There are two possible explanations for this finding. One possible explanation is that reciprocity does not require symmetric participation, as I hypothesized. Another possible explanation is that participants thought that the passive individual in the drawing was going to act later, or acted before the depicted moment. According to this explanation, although the great majority of participants judged the act in the drawing as asymmetric, when judging the target item sentence with the reciprocal verb, participants might have inferred symmetric participation in some time that was not depicted. All passive persons in the drawings have the capacity to reciprocate the action. Since a drawing depicts just one particular moment, participants might have completed the scenario in their minds and inferred that the passive person was going to reciprocate the action, resulting in 'true' answers. To distinguish between the two possible explanations a follow-up experiment using video clips was conducted, as described in the next section. Another conclusion from the results concerns the substantial difference between acceptance rates of sentences for target items and secondary target items. The only difference between these items is in the attitude of the passive individual towards the situation (as demonstrated by her facial expression, attention, etc.). The conclusion is that a positive attitude of the passive individual positively influences the acceptability of reciprocal sentences in situations without symmetric participation. This can be considered as evidence for the role of "collective intentionality" in judgements about reciprocal sentences, or as evidence for inferred acts of the passive person in some non-depicted time.

7. Method Pilot Experiment

To tease apart the two possible explanations of the results of Experiment 1, I conducted a follow-up experiment that resembled the first experiment but included short video clips as visual stimuli. These video clips showed events with a clear beginning and a clear end, hence they allowed us to test reciprocal sentences referring to a completed event in the past. Since I was referring to an event in the past, the test sentences were in the past tense.

Participants

A total of 25 participants (19 female, age M = 22) took part in this pilot experiment. All participants were native speakers of Dutch and indicated not to have been diagnosed with dyslexia. They all received monetary compensation for their participation. None of the participants participated in Experiment 1.

Materials

A total of 20 Dutch sentences were tested on their acceptability in a given situation. In contrast to Experiment 1, situations were now depicted using video clips instead of drawings. Additionally, a new type of item was added: true filler items. In the video clips of the true filler items, both characters were actively engaged in the action. In total, the experiment contained five target items, five control items, five secondary target items, five true fillers and seventeen other fillers. Every item consisted of a video clip of approximately 30 seconds, followed by a sentence. In all video clips, the same two professional actors – a man and a woman – acted out a script that was designed to test our expectations about reciprocal verbs.

To construct target, control, secondary target and true filler sentences 5 verbs from experiment 1 were selected:

- *knuffelen* “to hug”;
- *botsen* (tegen) “to collide (against)”;
- *appen* “to send whatsapp messages”;
- *praten* (tegen) “to talk (to)”;
- *vechten* (tegen) “to fight (against)”.

The reasons for selecting these particular verbs were dual. The verbs had to be similar to the verbs in experiment 1, since I wanted to test whether I could find a similar effect as in experiment 1. Because of time and budget limitations, not all verbs could be included. The verbs *kletsen (*"chat"), *roddelen* ("gossip") and *spreken* ("speak") were dismissed because semantically they are rather similar to *praten* ("talk"), and if there would be no effect for *praten* ("talk"), it is not expected to find it for semantically similar verbs.

Target items

All target items included a sentence containing one of the five selected verbs in the unary guise (e.g. "Violet and Mark hugged"), resulting in a total of five items. All video clips in target items started with the actors being silent and/or staying at some physical distance from each other. Then, the woman (Violet) acted out the verb while the man (Mark) was passive, but attentive. After the action, the man and woman departed from each other. After the movie clip, a unary guise reciprocal sentence of the following form was displayed:

Violet – "and" – Mark – verb (present perfect).

For instance, for the verb "talk", that resulted in:

(32) Violet en Mark hebb-en ge-praat
Violet and Mark have-AUX.PL PST.PERF-talk.
"Violet and Mark talked".

The script (translated to English) as given to the actors for "talk":

Mark and Violet are sitting at a short distance from each other, facing each other. They both look very attentive and are focused on each other's face. Violet starts talking to Mark: „ *ik weet het niet met dat overwerken van je. Het is tegenwoordig bijna elke avond hetzelfde! Ik zie je nooit meer en ik heb het idee dat er iets aan de hand is. Misschien kunnen we het er vanavond even goed over hebben."* (translation: I am confused about you working late all the time. These days you are working late almost every evening! I almost never see you and I feel that there is something wrong. Perhaps we can have a good talk about it tonight). Mark is listening attentively to Violet. He seems to be involved in what Violet is saying, but he is not talking himself. He also does not make a gesture

(such as nodding) that could be interpreted as 'talking'. He is just sitting there, visibly paying attention, but silent. Then Violet stops talking to Mark. Violet walks away.

Table 7 shows all target item sentences:

Verb	**Sentence**
***knuffelen* ("to hug")**	Violet en Mark hebben geknuffeld.
***botsen* ("to collide")**	Violet en Mark hebben gebotst.
***appen* ("to send whatsapp messages")**	Violet en Mark hebben geappt.
***praten* ("to talk)"**	Violet en Mark hebben gepraat.
***vechten* ("to fight ")**	Violet en Mark hebben gevochten.

Table 7: target item sentences

Control items

All control items included a sentence containing one of the five selected verbs in the binary guise (e.g. "Mark hugged Violet"), also resulting in a total of five items. Video clips were identical to those that were used in target items. The control items aimed to test whether participants judge the "passive character" to be non-active. Intuitively, these items were expected to be judged false.
The sentences in control items had the following structure:

"Mark" – verb (auxiliary)– (tegen) - "Violet" – verb (present perfect).

The control item sentence for "talk" was:

(33) Mark heeft tegen Violet ge-praat.
Mark has.AUX.SG to Violet PST.PERF-talk.
"Mark talked to Violet".

Table 8 contains an overview of all control item sentences :

Verb	**Sentence**
***knuffelen* ("to hug")**	Mark heeft Violet geknuffeld.
***botsen* ("to collide")**	Mark heeft tegen Violet gebotst.
***appen* ("to send whatsapp messages")**	Mark heeft Violet geappt.

***praten* (“to talk)”**	Mark heeft tegen Violet gepraat.
***vechten* (“to fight “)**	Mark heeft tegen Violet gevochten.

Table 8: control item sentences

Secondary target items

Similar to the target items, secondary target items included a sentence containing one of the five verbs in the unary guise (e.g. “Violet and Mark hugged”). As in the videos of the target items, the woman performs the relevant act (hugs the man, fights him etc.) and the man does not. However, in the secondary target movie clips the man ignores the act of the woman, while in the target movie clips he is attentive. The script for the secondary target movie clip for *praten* (“to talk”) as given to the actors:

Mark and Violet are sitting at a short distance from each other, facing each other. They both look very attentive and are focused on each other’s face. Violet starts talking to Mark: „ *ik weet het niet met dat overwerken van je. Het is tegenwoordig bijna elke avond hetzelfde! Ik zie je nooit meer en ik heb het idee dat er iets aan de hand is. Misschien kunnen we het er vanavond even goed over hebben.”* (translation: I am confused about you working late all the time. These days you are working late almost every evening! I almost never see you and I feel that there is something wrong. Perhaps we can have a good talk about it tonight). Mark does not look as if he is paying attention to Violet. He does not talk himself, and he seems uninterested in whatever Violet has to say. He is quiet and does not make a gesture (such as nodding) that could be interpreted as ‘talking’. He is simply sitting there, visibly bored, and without any visible reaction to Violets’ message. Then Violet stops talking to Mark. Violet walks away.

Test sentences for secondary target items were identical to target item sentences. See table 7 for an overview of secondary target sentences.

True fillers and fillers

For the five verbs, the true filler items contained reciprocal sentences identical to those of the target items. However, in the video clips within the true filler items, both characters were equally engaged in the action. For instance, in the true filler video clip for hug, the woman hugs the man and the man hugs the woman. The aim of adding true filler items was to contrast them with the asymmetric participation in the target items. Intuitively, true filler items would be judged as true. In

addition to target items, control items, secondary target items and true filler items, 17 filler items were included. Filler items consisted of video clips depicting other verbs, such as shaking hands or whispering. Reasons for adding fillers were the same as in experiment 1:
(1) Obtaining a better balance in the expected numbers of true/false reactions on target and control items;
(2) Creating some more distance between items with the same verb, so that participants would be distracted from the items they saw earlier.
(3) Preventing the participant as much as possible from using automatic strategies when reacting to the target stimuli.

Order

The order of items was pseudo-randomized with the following restrictions:
• In order to prevent interference between the target items and the true filler items, all true filler items were presented as the final items of the experiment.
• In order to prevent interference between the target items and the secondary target items, all secondary target items were presented as second to last items, before the true filler items.
• There were at least seven items between a target item and a control item that contained the same verb.

Similar to Experiment 1, two versions of the experiment with different order of items were created:
Order 1: for the verbs *praten* ("talk") and *vechten* ("fight") first the control item was presented and then the target item. For the verbs *knuffelen* ("hug"), *appen* ("send whatsapp messages") and *botsen* ("collide"), first the target item was presented and then the control item.
Order 2: For the verbs *knuffelen* ("hug"), *appen* ("send whatsapp messages") and *botsen* ("collide"), first the control item was presented and then the target item.
For the verbs *praten* ("talk") and *vechten* ("fight") first the target item was presented and then the control item.
For both orders, the secondary items were presented after all target items, just before the true fillers, which were presented as the last items. This decision was made to prevent interference between the secondary target and the target items. Both versions started with a test item, which was one of the fillers. This way participants could get accustomed to the experiment.

Procedure

Participants performed the experiment individually in a soundproof booth on a computer. Videos were displayed, after which a sentence was shown on the screen. Participants were instructed to indicate whether they judged the sentence true or false, by pressing a green (=true) or red (=false) button. They were instructed to not think too long about their judgement and use their intuition. Halfway through the experiment, participants had the possibility to take a short break.

8. Results Pilot Experiment

As the results show, although the mean acceptance rates are lower than in Experiment 1, a substantial percentage of participants accepted reciprocal sentences in situations without symmetric participation. See table 9 for results on true filler, target, control and secondary target items:

Verb	**% true responses on true filler items**	**% true responses on target items**	**% true responses on control items**	**% of participants who answered true on the target item & false on the control item**	**% true responses on secondary target items**
knuffelen ("hug")	100%	64%	28%	36%	24%
botsen ("collide")	84%	92%	0%	92%	76%
appen ("send whatsapp messages")	100%	20%	0%	20%	8%
praten (" talk)"	88%	48%	4%	48%	8%
vechten("fight")	84%	48%	4%	48%	8%
MEAN		54%	7%	49%	**25%**

Table 9: results on true filler, target, control and secondary target items

The second column of table 9 contains the rates of true judgements for the filler item sentences that were considered as intuitively true in the filmed situation. As expected, these sentences showed high acceptance rates. The third column contains the rates of "true" judgements on target item sentences. These show a considerable variation: from 20% (for *appen* "send whatsapp messages") to 92% (*botsen* "collide"). The fourth column contains the rates of "true" judgements on the control items. Expectedly, these rates were very low, with one notable exception: 28% acceptance for control item sentences containing *knuffelen* ("hug"). Column 5 shows the percentages of participants who judged the control item sentences as false and the corresponding target item sentences as true. Column 6 summarizes

results for the secondary target item sentences, which show a large variance: between 76% (with botsen "collide") to 8% (with *appen* "send whatsapp messages", *praten* "talk" and *vechten* "fight"). To test whether the relationship between type of movie clip (target or secondary target) and acceptance rate is significant, a chi square test of independence was performed for each verb individually. Results of the chi square test are in table 10:

Verb	Df	N	X^2	P
knuffelen ("hug")	1	25	8,117	0,004*
botsen ("collide")	1	25	2,381	0,123
appen ("send whatsapp messages")	1	25	1,495	0,21
praten ("talk)"	1	25	9,921	0,002*
vechten ("fight ")	1	25	9,921	0,002*

Table 10: chi square test

As the P-values show, only for *knuffelen* ("hug"), *praten* ("talk") and *vechten* ("fight") the relationship between item and acceptance rate is significant. For *appen* ("send whatsapp messages") and *botsen* ("collide") the P-values are above 0,05, meaning that for these verbs there are no indications for a relationship between type of movie clip (target or secondary target) and acceptance rate.

9. Discussion Pilot Experiment

Like Experiment 1, the Pilot Experiment tested the hypothesis that speakers accept sentences with unary reciprocal verbs in situations without symmetric participation. The percentages of participants that identified a passive agent but nevertheless accepted the reciprocal sentence were substantial for all verbs (M = 49%) but were in general lower than in Experiment 1 (M = 69%). In the Pilot Experiment the video clips depicted a completed event and the sentences referred to a past event, hence it is unlikely that participants made inferences about unseen interactions between the two characters in the video clips. Since acceptance rates for the Pilot Experiment were lower than acceptance rates for Experiment 1, I conclude that some of the "true" reactions in Experiment 1 might indeed have ensued from inferences about past and/or future. However, the Pilot Experiment shows that this cannot be the full explanation of the high acceptance rates of reciprocity without symmetry in Experiment 1. I conclude that there is a substantial number of participants for whom symmetric participation is not a requirement for accepting unary guise reciprocal sentences.

The Pilot Experiment also tested the second hypothesis: I hypothesized that collective intentionality has a positive effect on acceptance rates of reciprocal sentences describing events without symmetrical participation. The secondary target movie clips depicted events without collective intentionality: the passive person has a visibly negative attitude towards the ongoing action, or he does not give any reaction at all. The acceptance rates for target items - items with collective intentionality - are higher than for the secondary target items –items with no collective intentionality. The difference between acceptance rates is significant for *knuffelen* ("hug"), *praten* ("talk") and *vechten* ("fight"). For these items, I conclude that collective intentionality played a role in acceptability of the unary guise reciprocal sentences.

10. Discussion

In this thesis, I adopted an empirical approach to examine the factors that contribute to acceptance of unary guise reciprocal verbs, e.g. “the girl and the boy hugged”. The dominant view in the literature is that a unary guise reciprocal sentence entails two conjoined subevents, meaning that “the girl and the boy hugged” entails “the girl hugged the boy” and “the boy hugged the girl”. From this, it follows that both “the boy” and “the girl” are hugging, hence they both act symmetrically. My hypothesis challenged this view. I hypothesized that there is no logical entailment between a unary guise reciprocal sentence and its two binary subsentences. Therefore, I hypothesized that symmetrical participation is, instead of a necessary requirement, a preferential feature for the acceptance of a unary guise reciprocal sentence such as “the girl and the boy hugged”. This means that while speakers are more inclined to accept a sentence like “the girl and the boy hugged” if the event described by this sentence displays symmetrical participation, there are some speakers who will not reject a unary guise reciprocal sentence to a degree that is above chance level if there is no symmetrical participation. Secondly, I hypothesized that collective intentionality is another factor that positively influences the acceptability of unary guise reciprocal sentences.

In two experiments I tested these hypotheses. The results from both Experiment 1 and the Pilot Experiment show that for a substantial percentage of speakers, symmetrical participation is not a mandatory requirement with all reciprocal verbs. On the other hand, our results clearly show that situations without symmetrical participation are not acceptable for all speakers, and full symmetry is quite uniformly preferred. Also, collective intentionality positively influenced the acceptability of reciprocity.

Based on these results, I conclude that speakers do not rely on logical relations between the guises, but are mostly led by conceptual features of the verb itself. I propose that the most typical events for any reciprocal verb display both symmetrical participation and collective intentionality, as in figure 9 below. Less typical events for a reciprocal verb would be figure 10: there is no symmetrical participation, but there is collective intentionality. The least typical reciprocal event is figure 11: an event without symmetrical participation and collective intentionality.

Figure 9: typical hug

Figure 10: less typical hug

Figure 11: untypical hug

The more prototypical an event is for the reciprocal concept, the more speakers are inclined to accept an accompanying reciprocal sentence. Reciprocity is thus sensitive to both symmetrical participation and collective intentionality.

Suggestions for further research

To explore more the complexity of reciprocity, there are various options for further research. To disentangle the effects of symmetrical participation and collective intentionality on the acceptance of reciprocal verbs, extra visual stimuli depicting events with symmetrical participation but without collective intentionality could be added to the stimuli of Experiment 1. By adding these items, truth value judgements on reciprocal sentences for events without symmetrical participation but with collective intentionality (e.g. figure 10) could be compared to judgements on events with symmetrical participation, but without collective intentionality. It would then be possible to examine in more detail the different effects of collective intentionality and symmetrical participation; which one of them has the biggest positive influence on the acceptability of reciprocity? Also, the interaction of reciprocal verbs and prepositions as “with” and “against” could be studied further. A comparison between the acceptance of, for instance, “Violet fights with Mark”, “Violet fights against Mark” and “Violet and Mark fight” describing non symmetrical events forms an interesting experiment. The concept of collective intentionality can be examined in more detail by studying acceptance of reciprocal sentences describing events without a volitional agent; for instance two balls rolling and colliding with each other, or perhaps a robot talking or participating in a hug.

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