Reciprocal predicates: a conceptual prototype model

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Introduction. Semantic analyses [1,2,5] of reciprocal verbs like *kiss, date, collide, hug* and *talk* often assume a strong logical connection between the unary entry and their binary alternate. For instance, the unary entry of the verb *hug* (Violet and Mark hugged) is assumed to be semantically related to binary *hug* (Violet hugged Mark) using the following entailment:

(1) Violet and Mark hugged → Violet hugged Mark and Mark hugged Violet.

This inference pattern requires *symmetric participation*: it predicts that the use of unary reciprocal verbs is restricted to situations where participants engage in the activity in roughly the same manner. This paper intends to demonstrate that it is not the logical rule in (1) that determines whether speakers accept or reject a reciprocal sentence, but conceptual preferences. The inference pattern in (1) does not easily generalize to the verb *collide* as in (2)

(2) The truck and the car collided.

Applying the inference pattern in (1) to (2) would predict that the latter sentence should only be true if the two vehicles are both in motion: if the truck collides into the car and the car collides into the truck. However, intuitively, we might also envision a situation where sentence (2) describes an event in which a moving truck collides into a standing car. The observation regarding *collide* might be representative for more reciprocal verbs. One experimental study [4] already showed that for a number of reciprocal verbs symmetric participation failed to be a necessary condition for the acceptance of such sentences. Participants in [4]'s experiment accepted above chance level sentences like Violet and Mark talked/hugged/whispered in situations where they rejected Mark talked/hugged/whispered to Violet. This finding raises the question of whether there are other factors besides symmetric participation that govern the semantics of the reciprocal alternation. In [4]'s experiment, the situations that showed acceptance of reciprocal verbs without symmetric participation usually showed high involvement of the passive participant. For instance, situations where Violet and Mark hugged was accepted but Mark hugged Violet was rejected usually showed Mark positively involved in the act (e.g. by smiling, showing consent etc.). Thus, we hypothesize that intentionality of the agents in the event boosts the reciprocal interpretation even in the absence of symmetric participation. According to this hypothesis, whether a sentence like Violet

and Mark hugged is judged as true depends not only on whether Violet and Mark actually hugged each other but also on the extent they both showed typical intentions associated with hugging. This hypothesized factor was not substantially tested in [4], and its possible implications for the semantics of reciprocal verbs have remained unclear. To explore the topic further, we experimentally tested the following hypotheses: H1: symmetric participation is an important but not a necessary condition for the acceptance of sentences with a unary reciprocal entry and H2: joint intentionality of the agents of an event significantly boosts the acceptance of sentences with a unary reciprocal describing events lacking symmetric participation.

Experiment. Participants were asked to give truth-value judgements on sentences with either a unary or a binary entry of a reciprocal verb, given situations where symmetric participation is missing. Situations varied with respect to the joint intention of the agents.

Materials. We studied four Dutch reciprocal verbs: knuffelen 'hug', botsen 'collide', vechten 'fight' and fluisteren 'whisper'. Items consisted of a short video and a Dutch sentence, either a sentence with a unary entry ('Violet and Mark verb') or a sentence with a binary entry ('Mark verb (preposition) Violet). For each verb, two different videos were used. All videos depicted situations with two characters, a woman ('Violet) and a man ('Mark'). In all target videos, the woman carries out the action described by the verb. The man remains passive. The difference between the two videos is in the intentionality of the man. In one type of videos the man uses his facial expression and body language to show his positive involvement in the action ('joint-intentionality-videos'). The second type of videos ('no-joint-intentionality-videos') were similar to the joint-intentionality-videos except for one respect: the man now expresses a negative or neutral attitude towards the action. In sentences with the binary entry ('Mark hugs Violet'), the subject always refers to the passive character. Thus, all sentences with the binary entry are expected to be judged as false.

Participants. 449 participants (287 female, age M = 19).

Procedure. We used a 2x2 between-subject design with as independent variables Intention (joint intentionality (+JI) or no joint intentionality((-JI)) and Sentence Type (unary entry (U) or binary entry (B)). Participants gave a truth-value judgement.

Results. See figure 1 for the results:

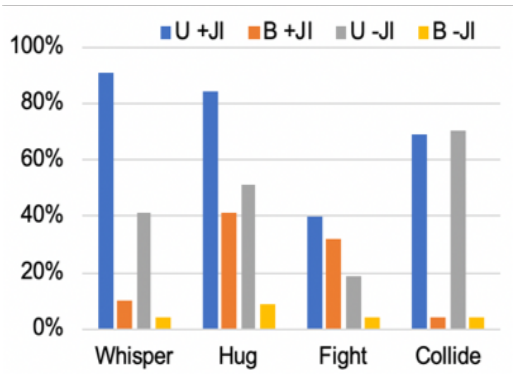

Fig. 1. Acceptance rates

The results strengthen [4]'s conclusion that symmetric participation is not a necessary condition for the acceptance of sentences with unary entry reciprocals. The data were analyzed using a logistic regression model with Sentence Type (U vs. B), Intention (+JI vs. -JI) and Sentence Type × Intention interaction as predictor variables. For all verbs a significant effect of Sentence Type was found. Thus, sentences with the unary (reciprocal) entry yield significantly more often a true answer compared to sentences with the binary entry. For all verbs except collide there was a significant effect of Intention. Sentences combined with the joint intentionality videos were accepted more frequently than sentences combined with no joint intentionality videos. No verb exhibited a significant interaction effect between Intention and Sentence Type, meaning that Intention did not have a – statistically relevant – larger effect on acceptance of the unary entry sentences than on the binary entry sentences.

Discussion. The experimental results confirm our hypotheses: symmetric participation is not a necessary condition for the acceptance of sentences with unary entry reciprocals and joint intentionality of the agents of an event significantly boosts the acceptance of sentences with unary entry reciprocal verbs describing events lacking symmetric participation. Additionally, results show that joint intentionality also positively affects the acceptance of sentences with certain binary entry reciprocals. Instead of the logical rule in (1) argued for by [1,2,5], we propose that it is conceptual preferences that determine whether speakers accept or reject a reciprocal sentence. According to prototype theory [3], concepts are modelled using prototypes: central or 'ideal' members of the category. The more similar an exemplar is to a prototype, the greater the probability of membership of the category. In the same manner, we propose that verb concepts have prototypical events associated with them. For 'Violet and Mark hugged' these are events in which Violet and Mark are both actively and intentionally engaged in the act, thus showing both symmetric participation and joint intentionality. If an exemplar – i.e. an event of hugging without symmetric participation – deviates from the prototypical exemplar of the category, it will be a less probable member of the category, but it might still be an acceptable member of the category depending on the membership threshold [3]. We propose that each reciprocal verb meaning has specific (though context sensitive) weights of symmetric participation and joint intentionality. These weights determine the similarity metrics between idealized prototypes and actual events. Although these weights vary between verbs and contexts, the scheme that leads to truth-value judgements using the threshold model is uniform.

References.

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