

Plurality of relations in German Sign Language: Mapping semantics onto morphosyntax

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1 Introduction¹

- The term “plurality of relations” (PR, Lichtenberk 1985, 2000) describes situations in which multiple participants/objects ($n \geq 2$) entertain a relation with each other such that (typically) every participant/object is at the same time actor and undergoer.
- It has been noted, that across typologically diverse spoken languages, a single marker is commonly used to encode the various, partially overlapping functions subsumed under PR: reciprocal, collective, chaining, converse, repetitive (Lichtenberk 2000; Nedjalkov 2007b).
- Consider e.g. the German examples in (1), in which the reciprocal pronoun *einander* is used to express a “true” reciprocal (1a), a collective/sociative (1b), and a spatial/chaining (1c) meaning. As the English translations show, the same holds for English *each other*.

- (1) a. Mein Bruder und ich helfen **einander** [German]
my brother and I help-PL REC.PRO
‘My brother and I help each other.’
- b. Die Kind-er spiel-en mit-**einander**
the child-PL play-PL with-REC.PRO
‘The kids are playing with each other.’
- c. Die Büch-er lieg-en neben-**einander**
the book-PL lie-PL next.to-REC.PRO
‘The books are lying next / on top of each other.’

- Across spoken languages, use of one and the same marker for two or more of the functions subsumed under PR (i.e. polysemy) seems to be the rule, not the exception. Often this marker is also polysemous with the reflexive marker (Lichtenberk 1985; Kemmer 1993; Heine 2000).
- In this talk, we will show that German Sign Language (DGS), unlike spoken German, does not make use of one (pronominal) strategy to encode different types of PR. Rather, there are various situation-dependent strategies which involve verbal and adverbial markers.
- We will focus on the PR functions illustrated in (1); we will refer to these functions as reciprocal (section 2), sociative (section 3), and chaining (section 4), respectively.
- In all sections, we will introduce the semantics as well as some typological properties of the specific function, before discussing how the function is realized in DGS, i.e. how the semantics is mapped onto (spatial) morphosyntax.

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2 Plurality of relations I: reciprocal function

2.1 Semantics of the reciprocal function

- A prototypical reciprocal situation implies a mutual relation between several subjects and objects; each participant is typically agent and patient; see the situations depicted in Fig. 1.
- According to Langendoen (1978), a simple reciprocal expression can be characterized by the abstract form $[A R r]$, where A represents a set the cardinality of which is $|A| \geq 2$, R a relation $A \times A$, and r a reciprocal marker (RM).

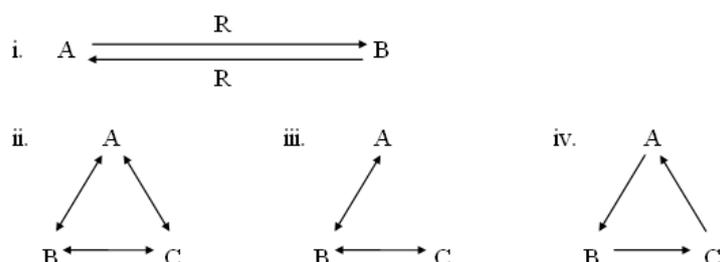


Figure 1. Prototypical reciprocal situations

- Figures 1-i and 1-ii depict strong reciprocity with 2/3 participants; for the semantics of strong reciprocity see (2a). The formula in (2b) captures the semantics of weak reciprocity shown in Fig. 1-iii and 1-iv (Fiengo & Lasnik 1973; Dougherty 1974; Langendoen 1978).

- (2) a. $\forall x, y \in A (x \neq y \rightarrow R\langle xy \rangle)$
 b. $\forall x \in A \exists y, z \in A (x \neq y \wedge x \neq z \wedge R\langle xy \rangle \wedge R\langle zx \rangle)$

- In the following, we mostly focus on situations with two participants ($|A| = 2$; Figure 1-i). The general patterns we describe are the same for situations with more than two participants, but the movement patterns of DGS-verbs will increase in complexity.
- When we discuss the chaining function in section 4, we also include situations with more than two participants.

2.2 Some typological properties of reciprocals

- The most common (morpho)syntactic strategies for encoding the reciprocal function are (pro)nominal markers (e.g. German (3a)) and verbal affixes (e.g. Udehe (3b); Nikolaeva 2007: 939). Other strategies involve clause doubling, clitics, adverbials, zero-marking, and reduplication (Nedjalkov 2007a).

- (3) a. Mein Bruder und ich helfen **einander** [German]
 my brother and I help-PL REC.PRO
 ‘My brother and I help each other.’
 b. Nuati bele-**masi**-e-ti [Udehe]
 they help-REC-PAST-3.PL
 ‘They helped each other.’

- Two typological features are of special interest in the present context. First, in some languages, reciprocals may be zero-marked, i.e. the reciprocal meaning is expressed by the omission of the direct object (detransitivization).

- While in English, this strategy is only observed with a limited number of verbs (e.g. *kiss, embrace, meet, argue*), in Tariana, it is frequently used, especially by younger speakers (4a) (Aikhenvald 2007: 1353).
- Second, occasionally reciprocal marking involves reduplication (sometimes in combination with a dedicated affix; Moravcsik 1978; Rubino 2005), as in the Tzeltal example in (4b) (Berlin 1963: 214).

(4)	a.	naha na-kwisa wa-na	→	naha na-kwisa	[Tariana]
		they 3.PL-hate 1.PL-OBJ		they 3.PL-hate	
		‘They hate us.’		‘They hate each other.’	
	b.	mah	→	mah-mah	[Tzeltal]
		‘hit’		‘fight (hit each other)’	

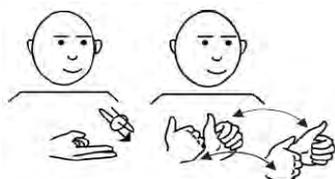
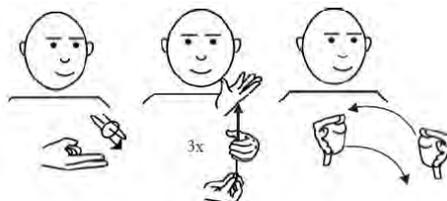
2.3 Reciprocals in DGS

- DGS does not have a reciprocal pronoun – in contrast to e.g. ASL, for which a pronoun glossed as EACH-OTHER has been described (Fischer & Gough 1980).
- In Pfau & Steinbach (2003, 2005), we have argued that in DGS, the overt realization of reciprocity depends on morphosyntactic (agreeing verb vs. plain verb) and phonological (i.e. the phonological feature [± two-handed]) properties of the verb sign.
- Here, we discuss three verb-specific reciprocal strategies: (a) sequential backward reduplication, (b) simultaneous backward reduplication, and (c) zero marking (see Pfau & Steinbach (2003) for discussion of a fourth strategy: insertion of agreement auxiliary); the choice of strategy is illustrated in Table 1.

Table 1. DGS strategies for reciprocal marking depending on verb type

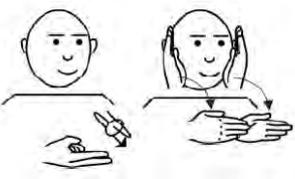
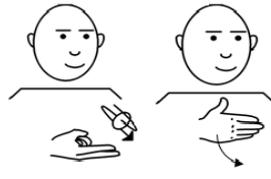
agreement verb (AV)		plain verb (PV)
two-handed sign	one-handed sign	one- and two-handed signs
sequential backward reduplication	simultaneous	zero marking

- The reciprocal form of two-handed agreement verbs (e.g. HELP) is realized by sequential backward reduplication. In (5a), we thus observe continuous parallel movement of both hands from location 1 to location 2 (as in “I help you”) and then back to location 1.

(5)	a.		b.	
		RH: WE-TWO ₁ HELP ₂ HELP ₁		RH: WE-TWO FLOWER++ ₁ GIVE ₂
		LH: ₁ HELP ₂ HELP ₁		LH: FLOWER ₂ GIVE ₁
		‘We are helping each other.’		‘We are giving flowers to each other.’

- This strategy is clearly verbal in nature; under backward reduplication a part of the verb’s skeleton is attached in reverse order: L₁-M-L₂ → L₁-M-L₂-M-L₁ (see Pfau & Steinbach (2003: 14f) for arguments against a bi-clausal analysis).

- Other DGS verbs that derive their reciprocal form by sequential backward reduplication: EXPLAIN, TEASE, INFLUENCE, SHOW, VISIT (two-handed), LEND.
- Backward reduplication is also observed with one-handed agreement verbs (e.g. GIVE, LOOK) In these verbs, however, backward reduplication is not realized sequentially but simultaneously by the non-dominant hand (5b).
- Other DGS verbs that derive their reciprocal form by H2-copy and simultaneous backward reduplication: KISS, SEND, LOOK, PITY, PINCH, VISIT (one-handed), E-MAIL.
- Plain verbs encode reciprocity by means of zero marking, i.e. by dropping the object DP, so that – in spite of the use of a transitive verb – a seemingly intransitive sentence surfaces. This holds for two-handed (6a) and one-handed signs (6b).

(6) a.  b. 

RH: WE-TWO TRUST
LH: TRUST
'We trust each other.'

RH: WE-TWO LIKE
LH:
'We like each other.'

- Note that zero marking is (unlike in English) not semantically motivated but rather by morphosyntactic properties of the underlying verb.
- Further verbs which derive their reciprocal form either by means of zero marking are: COMFORT, UNDERSTAND, HATE, CONVINCED, DESPISE, LOVE, SUPPORT.

2.4 PR I: Mapping semantics onto morphosyntax

- To express the reciprocal function, DGS uses morphological strategies that are also found in spoken languages: reduplication and zero marking. However, use of the signing space for reduplication (i.e. backward reduplication) as well as phonological and morphological restrictions on reduplication and zero marking are clearly modality specific (see Figure 2).
- Backward reduplication makes use of the movement patterns of agreement verbs and the iconic potential afforded by the signing space. The reciprocal relation between two participants, which is always interpreted as strong reciprocity, is expressed by an additional simultaneous or sequential backward movement in the signing space (7a).

(7) *Semantics* *Morphosyntax*

a. $\forall x, y \in A (x \neq y \rightarrow R\langle xy \rangle)$ ↙ backward reduplication

b. $\forall x \in A \exists y, z \in A (x \neq y \wedge x \neq z \wedge R\langle xy \rangle \wedge R\langle zx \rangle)$ → randomized spatial red.

- Whenever more than two participants are involved (i.e. strong or weak reciprocity in (7ab)), the movement of the hand(s) becomes 'randomized'. Hence, the marker for more than two participants is morphologically more complex ('heavier') than the marker for two participants (cf. Nedjalkov 2007: 25).
- In addition, the realization of the reciprocal function in DGS is subject to modality-specific phonological and morphosyntactic constraints illustrated in Figure 2:
 - (a) morphosyntactic: agreement vs. plain verb
 - (b) phonological: one-handed vs. two-handed sign

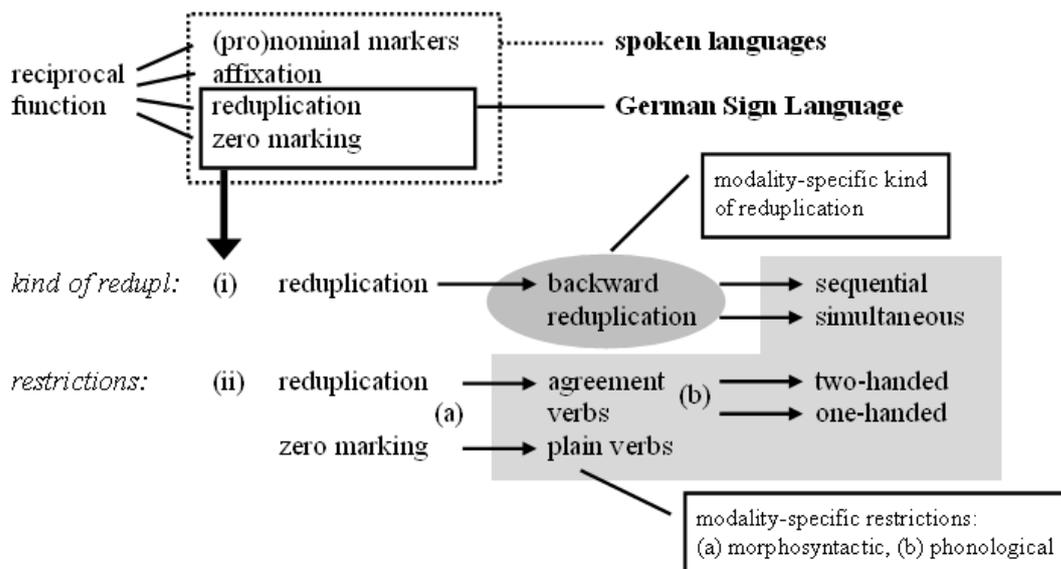


Figure 2. Reciprocal markers in DGS and in spoken languages

3 Plurality of relations II: sociative function

3.1 Semantics of the sociative function

- The sociative function (‘together’ – also called collective or associative) also includes the comitative (‘(together) with, jointly’) and the assistive (‘with the help of’) function (Nedjalkov 2007b). Here, we will not distinguish between these different functions.
- In sociatives, two or more participants are together involved in a situation. Typically, but not necessarily, the participants are involved in the overall situation simultaneously and all participants are assigned the same semantic role (typically agent or actor) by the verb.
- In (8), ‘R<a...>’ is a predicate with one or more arguments. ‘C_R’ stands for the comitative relation, which says that both arguments are mutually involved in the situation denoted by ‘R’. Note that the arguments of ‘C_R’ are semantically the first argument of R. In German or English, this argument is usually linked to the subject position.

$$(8) \quad \forall x, y \in A (x \neq y \rightarrow R\langle x\dots \rangle \wedge R\langle y\dots \rangle \wedge C_R\langle xy \rangle)$$

3.2 Some typological properties of sociatives

- In many spoken languages, the reciprocal marker – be it nominal or verbal – is also used to encode sociative situations. In Halkomelem, for instance, the reciprocal suffix *-təl* (9a) is also used to signal actions undertaken jointly when combined with unergative verbs (9b) (Gerds 2000: 133,155).

- | | | | | |
|-----|----|-----------------------------------|----------------------|--------------|
| (9) | a. | ćawə- təl | ‘help each other’ | [Halkomelem] |
| | | xiqə- təl | ‘scratch each other’ | |
| | | lam- təl | ‘look at each other’ | |
| | b. | ʔətən- təl | ‘eat together’ | |
| | | ya:ys- təl | ‘work together’ | |
| | | q ^w əyiləš- təl | ‘dance together’ | |

- Note that both sentences in (13) would also be grammatical without TOGETHER but would lose the implication of interaction of participants.
- TOGETHER cannot be used with the transitive verbs discussed in section 2.3 to express reciprocity; cf. the ungrammaticality of the reciprocal interpretation of (14a). However, with these verbs, in the presence of a direct object, TOGETHER can express the sociative function, i.e. that an action has been undertaken jointly (14b).

- (14) a. * WE-TWO TOGETHER HELP
 ‘We are helping each other.’
 b. WE-TWO POSS₁ BROTHER TOGETHER INDEX_{3a} HELP_{3a}
 ‘We are jointly helping my brother.’

- In DGS, like in spoken languages, the sociative function can be expressed with any kind of verb.

3.4 PR II: Mapping semantics onto morphosyntax

- As for the sociative function, we observe three different strategies (see Figure 3):
 - (i) The sociative and the reciprocal function are expressed in a similar way;
 - (ii) The sociative function uses the reciprocal marker in combination with another element;
 - (iii) The sociative function is expressed with a specific sociative marker.

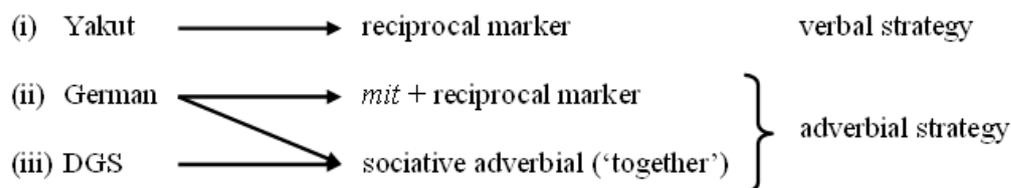


Figure 3. Sociative markers in spoken languages and DGS

- DGS uses the third strategy (iii); the first two strategies in (i) and (ii) are not available. DGS does not have a single reciprocal marker at its disposal. As was shown in Figure 2, reciprocity is expressed by a modality-specific strategy (i.e. backward reduplication), which is restricted to reciprocal relations.

4 Plurality of relations III: chaining function

4.1 Semantics of the chaining function

- In a chaining situation, participant A stands in a certain relation to participant B, B stands in the same relation to C, C to D, etc. Crucially, such situations do not include two-participant reciprocity, as in (2) and (7) (Maslova 2000); cf. Figure 4 (also Figure 1-iv).



Figure 4. Prototypical chaining situation

- The chaining relation R can be of a temporal (e.g. ‘after each other’) or spatial (e.g. ‘on top of each other’) nature. In the following, we will only be concerned with spatial chaining.

→ The semantics of chaining is captured by the formula in (15). Chaining situations are closely related to weak reciprocals, cf. Langendoen (1978).

$$(15) \quad \forall x \in A \exists y \in A (x \neq y \wedge (Rxy \vee Ryx))$$

4.2 Some typological properties of chaining

→ Cross-linguistically, chaining situations are often expressed by reciprocal markers (Lichtenberk 1985). Reciprocal-chaining polysemy is attested in e.g. Itelmen, where the prefix *lo-* marks both functions (16ab) (Volodin 2007: 1830f; *-ka* = intransitivizer).

- (16) a. *łčko-s* ('to see sb') → **lo-łčko-ka-s** ('to see each other') [Itelmen]
 tnete-s ('to push sb') → **lo-tnet-ka-s** ('to push each other')
 b. *°sol-ka-s* ('to lie') → **lo-°sol-ka-s** ('to lie next to each other')
 tekej-ka-s ('to stand up') → **lo-tekej-ka-s** ('to stand up next to each other')
 c. *ma-ʔł-ka-s* ('to play') → **lo-ma-ʔł-ka-s** ('to play with each other')

→ Interestingly, as illustrated in (16c), the same marker can also be used to derive sociatives (note that Itelmen has an adverbial *qčelx* 'together').

→ Recall from the examples in (1), repeated below as (17) for convenience, that in German and English, the reciprocal pronoun can also be used to express all three relations.

- (17) a. Mein Bruder und ich helfen **einander** [German]
 my brother and I help-PL REC.PRO
 'My brother and I help each other.'
 b. Die Kind-er spiel-en mit-**einander**
 the child-PL play-PL with-REC.PRO
 'The kids are playing with each other.'
 c. Die Büch-er lieg-en neben-**einander**
 the book-PL lie-PL next.to-REC.PRO
 'The books are lying next / on top of each other.'

→ However, in the chaining interpretation (17c), just like in the sociative (17b) function, the reciprocal pronoun is embedded under a preposition (Nedjalkov 2007: 59).

→ While the sociative function (17b) is expressed by a combination of the reciprocal pronoun and the preposition *mit* ('with'), the chaining function in (17c) is expressed by a combination of the reciprocal pronoun and a spatial preposition denoting the spatial relation between the entities.

4.3 Chaining in DGS

→ DGS employs yet another strategy for the chaining function. Actually, spatial prepositions are hardly ever used in SLs because spatial relations can be mapped iconically onto the signing space by means of entity classifiers (Perniss 2007; but see Aboh & Pfau 2010).

→ In order to encode the chaining function, DGS employs different localization strategies. In spatial chaining involving two (not necessarily identical) referents, both can be localized simultaneously by the dominant and non-dominant hand (18) (Perniss 2007: 94).

5 Conclusion

- To encode different types of plurality of relations, DGS employs different strategies none of which involves a pronominal reciprocal marker – a pattern that is in striking contrast to the one found in German and English; see Table 2 for overview of the patterns.

Table 2. Plurality of relations in DGS

semantics	'true' reciprocal		sociative	chaining
strategy	verbal (inflection)		adverbial	verbal (signing space)
morphophonological realization	backward reduplication	zero marking	TOGETHER	entity classifiers & movement patterns
DGS verb types	(di)transitive verbs		all kinds of verbs	spatial verbs (with locative argument)
	agreeing	plain		
examples	HELP, GIVE, LOOK	TRUST, LIKE	DANCE, PLAY	STAND, LIE, (FOLLOW)

- A crucial factor motivating the attested strategies is the potential to use the signing space to express grammatical relations and spatial configurations. This potential is exploited with the reciprocal and chaining function.
- Depending on verb type, (di)transitive verbs express **reciprocity** either by means of backward reduplication (sequential or simultaneous) or by means of zero marking.
- **Chaining** (in the sense of spatial arrangement of entities) is expressed by means of reduplicated classifier predicates (spatial verbs) that are localized in the signing space.
- The use of space, however, is irrelevant for the **sociative** function. In DGS, the adverbial TOGETHER is used to express sociative (collective) situations.
- Studies on spoken languages often focus on prototypical polysemies that unite markers for the reciprocal and other PR-functions. However, we are not aware of studies that would focus on the expression of different types of PR by different morphophonological means within one language – as is the case in DGS.
- In future work, we hope to include in the general picture further types of PR, such as converse relations, distributed situations, and repetitive functions.

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German Sign Language (Deutsche Gebärdensprache or DGS for short) is a natural sign language mainly used in Germany. Estimates assume that there are approximately 80 000 deaf people living in Germany (e.g., Deutscher Gehörlosenbund 2019). This number is often equated with the number of deaf sign language users in Germany (e.g., Herrmann 2007; Schwager & Zeshan 2014). However, on some estimates, the number of signers is much higher. The European Union of the Deaf (Wheatley & Pabsch 2012) or the Ethnologue (Simons & Fennig 2018), for example, assume that there are approximately 200 000 deaf signers in Germany. Mapping sentence form onto meaning: The syntax-semantic interface. @article{Friederici2007MappingSF, title={Mapping sentence form onto meaning: The syntax-semantic interface}, author={A. Friederici and J. Weissenborn}, journal={Brain Research}, year={2007}, volume={1146}, pages={50-58} }. The way the brain manages to process word meaning and syntactic relations during language comprehension on-line still is a matter of debate. Here we review the different views discussed in the literature and report data from crucial experiments investigating the temporal and neurotopological parameters of different information Expand. View on Elsevier. 2016. Modality and meaning: Plurality of relations in German Sign Language. *Lingua* 170, 69-91 [doi:10.1016/j.lingua.2015.11.002]. Pfau, Roland & Markus Steinbach. 1997. Einige Aspekte der Morphologie und Morphosyntax in Deutscher Gebärdensprache [Some aspects of German Sign Language morphology and morphosyntax]. *Frankfurter Linguistische Forschungen* 20, 30-48. 1996.