Workshop '*Cross-linguistic semantics of reciprocals*'

Utrecht University, 7th-8th October 2019

On the 7th and 8th October 2020, the workshop '*Cross-linguistic semantics of reciprocals*' took place at Utrecht University. The workshop was organized as part of the ERC-AdG project *'Forests and Trees: the Formal Semantics of Collective Categorization'* (grant agreement No 742204). The workshop brought together typologists and formal semanticists, with the idea of gaining a clearer understanding of the cross-linguistic semantics of reciprocal expressions.
This volume contains some of the papers that were presented during the event.

We are grateful to the participants whose engagement contributed to a fruitful and enjoyable workshop. We also thank Charlotte Jonker, Imke Kruitwagen, and Sonya Nikiforova for their help with the organization.

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Symmetrical and reciprocal constructions in Austronesian languages: the syntax-semantics-lexicon interface.

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Abstract

In Austronesian languages, reciprocal relations are most generally marked by productive and highly polysemous prefixes occurring in monoclausal constructions, not by reciprocal pronouns or reciprocal anaphors or quantifiers such as 'each other' or 'one another'.

These prefixes are reflexes of Proto-Austronesian *maR-/*paR- (Pawley & Reid 1979: 110), and of Proto-Oceanic *paRi- for languages of the Oceanic sub-branch (Pawley 1973).

Not all Austronesian and Oceanic languages have retained these morphemes; some have innovated new markers (Bril 2005, Moyse-Faurie 2008). The focus here will be on languages that have retained these affixes in various Austronesian subgroups; the Amis (Formosan) and Nêlêmwa (New Caledonia) data were collected during fieldwork.

1. Introduction: polysemous affixes for plural and reciprocal relations

The reciprocal affixes considered are reflexes of Proto-Austronesian (PAN) *maR-/*paR, which contain an infix <aR> (Sagart 1994: 275, Zeitoun 2002, Blust 2009) marking plurality of relations; this was inherited as Proto-Oceanic (POc) *paRi-. These prefixes basically express co-participation, collective actions and reciprocal relations as a sub-set of some general notion of union of plural relations (Pawley 1973, Lichtenberk 2000).

These prefixes have become extremely polysemous (Lichtenberk 1985, 2000). In some languages (esp. Malayo-Polynesian and Oceanic), they have taken on Middle functions and developed various other meanings (intensive, iterative, dispersive, distributive, Bril 2005), these will not be detailed here. In the course of their evolution as Middle markers, these morphemes have come to denote self-directed actions in some languages,[2] yet, these affixes are not originally reflexive morphemes, nor are they reconstructed as such in Proto-Austronesian or Proto-Oceanic.

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[2] In various New Caledonian languages (Drehu, Ajië, Xârâcùù, Bwatoo, Cemuhî, see Bril 2005, Moyse-Faurie 2008), as well as Malay, Indonesian. But not in Amis, nor in Nêlêmwa.

There are in fact no reconstructed reflexive morpheme at PAN or POc levels. Reflexive meanings are expressed in various distinct ways: by intransitive verbs, by transitive verbs with coreferential pronominal arguments (as in Nêlêmwa), by nouns like *tireng* 'body' (Amis), by verbs like 'return' (Moyse-Faurie 2008), by modifiers such as 'alone' (Bril 2005), etc.

The discussion will mostly focus on the reciprocal and collective meanings of these affixes, including some of their Middle functions, and their expression of dyadic kinship.

Section 2 deals with their morphosyntactic features, section 3 with the distribution of affixes encoding reciprocal and plural relations; section 4 and 5 discuss the semantics of the various reciprocal affixes, including dyadic kinship. To conclude, several possible developments towards other Middle functions and meanings are outlined.

2. The morphosyntax of reciprocal and plural relations

Two Austronesian languages go under some more detailed scrutiny in what follows; Amis is a Formosan language spoken in Taiwan, and Nêlêmwa is an Oceanic language of New Caledonia. Both have reciprocal, collective markers that are cognate with the reconstructed morphemes. The reflex of PAN *maR- in Amis is *mal(a)-*, which I analyse as the middle prefix *ma-* and the infix <aR> marking plurality of relations. In Nêlêmwa, the reflex of POc *paRi- is *pe-*.

In Amis as in Nêlêmwa, there are few inherently reciprocal verbs, except Amis *ma-ramud* 'marry', *ma-licinuwas* 'separate from each other' (both exclude the reciprocal affix ***mal(a)-***); but verbs like Amis *cabiq* 'compete', *taes* 'fight' all take reciprocal affixes and constructions. Consider *mal-cabiq* 'compete with each other' (vs. *mi-cabiq* 'want to be ahead'), *mal-taes* 'fight with each other' (vs. *mi-taes* 'beat, flog s.o.').

In Nêlêmwa and in many Oceanic languages, verbs like 'they meet, separate, compete, fight, kiss' all carry reciprocal affixes.

(1)   Nêlêmwa (New Caledonia)
   a.   Hli   pe-ru-i.
          3DU   REC-find-R[3]
          'They met.'

   b.   Hli   pe-boima.
          3DU   REC-embrace[4]
          'They hugged.'

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[3] The circumfix *pe-…-i* is the reflex of POc *paRi-…-i* denoting reciprocal, collective and iterative meanings (Pawley 1973: 152).

[4] Abbreviations follow the Leipzig gloss rules ; additional ones are : AV actor voice; NM noun marker/article; PM personal marker/article; UV undergoer voice; -R reciprocal suffix (part of a the circumfix *pe-…-i*).

Reciprocal affixal strategies occur in monoclausal constructions, sometimes in combination with reduplication, as in Amis, but not in Nêlêmwa. Owing to the symmetrical relations between the agent and patient, reciprocals are generally low transitive constructions, often favouring the evolution of these prefixes towards middle markers, though rarely into reflexive markers; if they do, some additional and disambiguating morphemes usually occur (Bril 2005, Moyse-Faurie 2008).

2.1. Reciprocal constructions in Amis

The two reciprocal prefixes in Amis are *mal(a)-* (from PAN *maR-*), and *ma-Ca-* (i.e. the middle-voice marker *ma-*, together with obligatory *Ca-* reduplication). Their semantics are detailed in §4 and §5 below. Reciprocal constructions are intransitive (2a) or low transitive constructions with an oblique patient (2b). The reciprocal or collective subjects are expressed once.

(2)   Amis (Formosan)
    a.   Mal-taes k-ira   ta~tusa-ay.
              REC-fight   NOM-DEIC   CA~two-NMZ
              'Those (two) people are fighting with each other.'
    b.   Mal-alaw t-u   titi   k-ira   wacu.
              REC-snatch   OBL-NM   meat   NOM-DEIC   dog
              'The dogs snatched the meat from each other.' (nu Kiwit atu Piyuma a lalais.050)

2.2. Reciprocal constructions in Nêlêmwa

In Nêlêmwa, the reciprocal prefix *pe-*, together with dual or plural subject pronouns, express restricted or extended reciprocity, without any reduplication. On the other hand, *pe-* is highly polysemous (Bril 2007); it is affixed to stative or active verb stems, and to derived event nominals (3b) and nouns.

(3)   Nêlêmwa (Bril 2002)
    a.   Hla pe-whaayap.
              3PL   REC-fight
              'They fight with each other.'
    b.   .. na ni   hleeli pe-whaayaw-i   hla.
              LOC in   those   REC-fight-DET   3PL
              '… during their mutual fight.' (lit. in those mutual fights of theirs)

Reciprocal constructions can be (i) 'light' constructions as in (4a), with an intransitive verb, one absolutive argument denoting co-participants engaged in some reciprocal relation, or (ii) 'heavy' constructions as in (4b) with a transitive verb, but two coreferential subject and object pronouns. The heavy construction denotes more strongly and symmetrically reciprocal relations, it may denote pluractional reciprocal events.

(4) a. Hla pe-tax**u**   agu.
   3PL REC-give.INTR people.ABS
   'The people are in exchange relationship.' (Bril 2007)

   b. Hla pe-tax**i**-hla   (o hnoot).
   3PL REC-give.TR-3PL OBL riches
   'They give each other (riches).' (lit. with riches).

The 'light' intransitive construction also has Middle semantics (see Bril 2007).

In many Oceanic languages, strict reciprocal relations tend to be expressed by 'heavy' constructions with the prefix and two coreferential pronominal arguments, while weakly, non-strictly reciprocal relations (and Middle constructions) are marked by 'light', one-argument constructions.

3. Distribution and semantics of reciprocal affixes in Amis

The distribution and semantics of the two reciprocal prefixes *mal(a)-* and *ma-Ca-* in Amis are now discussed.

3.1. *Mal(a)-* holistic reciprocal event vs. *ma-Ca-* plural reciprocal sub-events

Mal(a)- tends to be used for collective and reciprocal relations profiled as one holistic event, without considering any potential sub-event; it is selected by verbs whose semantic features allow holistic profiling. *Mal(a)-* is also used for comparison (§5.2) and for dyadic kinship (§5.3).

On the other hand, *ma-Ca-* tends to profile more weakly symmetrical relations, possibly involving several reciprocal sub-events, such as chaining or actions done in turn as in (5a). The verb's basic voice in a non-reciprocal construction is given in (5b). Both *mal(a)-* and *ma-Ca-* reciprocal constructions are intransitive or low transitive and reciprocal/collective subjects are nominative/absolutive, as in (5a, 6).

(5) a. Ma-sa~suwal [k-aku a ci Abas].
   MIDD-CA~speak NOM-1SG and PM Abas
   'I and Abas spoke to each other.'

   b. S<em>uwal   cira.
   <AV>speak   NOM.3SG
   'He's speaking.'

(6) Ma-ka~kuku [k-u   wacu atu nani].
   MID-CA~chase NOM-NM dog and cat
   'The dog and the cat chase each other.'

— Restricted vs. extended reciprocal relations: the role of reduplication

In addition, two types of reduplications occur in reciprocal relations. *Ca-* reduplication is used for reciprocal relations involving two or more participants, while CVCV- reduplication is used for extended (plural) reciprocal relations and often with intensive meaning.

Both types of reduplication occur with *mal(a)-* and *ma-*. Compare *mal-paliw* in (7a), which denotes a holistic event, while *mal-pali~paliw* (7b) denotes a plurality of participants engaged in reciprocal, iterated actions, also denoting intensity. The non-reciprocal construction is given in (7c).

(7) a. Mal-paliw=tu   k-uhni.
      REC-collaborate=PFV   NOM-3PL
      'They collaborated.'

    b. Mal-pali~paliw=tu   k-uhni.
      REC-CVCV~collaborate=PFV   NOM-3PL
      'They collaborated.' (a lot, or often)

    c. Mi-paliw   cira   a   mi-tepus.
      AV-collaborate=PFV   NOM.3SG   COMP AV-harvest.rice
      'He cooperates in harvesting rice.'

The same pattern occurs on stems denoting dyadic or plural social relations; (8a) may denote dual or plural relations, while (8b) denotes plural, extended reciprocal relations.

(8) a. Mal(e)-cabay k-ami.
      REC-friend   NOM-1PL.EXC
      'We're friends' (dual, symmetrical relation)

    b. Mal(e)-caba~cabay   k-uhni.
      REC-CVCV~friend   NOM-3PL
      'They're a group of friends.'

The *ma-Ca-* construction in (9a, b) tend to profile actions done in turn or involving various sub-events. *Ma-Ca-* is indeterminate for number, thus compatible with dual or plural reciprocal participants. On the other hand, extended reciprocity with CVCV- reduplication, as in (9b) denotes plural participants, pluractionality, intensity or protracted actions, with possible sub-events. The non-reciprocal construction is given in (9c).

(9) a. Ma-ka~kiting k-ita   a   r<em>akat.
      MIDD-CA~hold   NOM-1PL.INCL LNK <AV>walk
      'We walk holding each other's hands.'

    b. Ma-ka~kiti~kiting k-uhni a   ma-keru.
      AV-CA~CVCV~hold   NOM-3PL LNK NAV-dance
      'They dance holding each other by the hands.' (in a chain)

    c. Mi-kiting cira   t-u   kamay n-u   wawa.
      AV-hold   NOM.3SG OBL-NM hand   GEN-NM child
      'He takes the child's hand.'

3.2. Distribution of reciprocal affixes in Amis

Reciprocal affixes attach to roots or stems denoting actions or events, properties, entities, as well as kinship terms, locative nouns in predicative or referential functions, which then denote reciprocal or symmetrical relations.

(10)　Amis

　　a.　Mala-abang　k-u　　cabay.
　　　　REC-hold.shoulder　NOM-NM　friend
　　　　'The friends held each other by the shoulder.' (dual, symmetrical)

　　b.　Mal-ada　k-uhni.
　　　　REC-enemy　NOM-3PL
　　　　'They're enemies.'

　　c.　Mal-abubu　k-uhni.
　　　　REC-embrace　NOM-3PL
　　　　'They hug each other.'

Mal(a)- and *ma-Ca-* are both compatible with entity-denoting and action-denoting roots, the derived reciprocal stems have different meaning. For instance, *mal-paliw* 'collaborate' describes one cooperative action, while *ma-pa-paliw* profiles several events of reciprocal help done in turn, as in (11b).

(11)　Amis

　　a.　Mal-paliw　　　k-uhni
　　　　MIDD-CA~take.turn　NOM-3PL
　　　　'They collaborated.'

　　b.　Ma-pa-paliw　　　k-ami　　　t-u　　demak　n-u　　　umah.
　　　　MIDD-CA~collaborate　NOM-1PL.EXC　OBL-NM　work　　GEN-NM　house
　　　　'We helped each other with our (own) fieldwork.' (i.e. in turn)

To sum up, the reciprocal morpheme *mal(a)-* tends to profile reciprocal and collective relations as one holistic event, while the middle reciprocal affix *ma-Ca-* profiles less symmetrical relations such as chaining, or which involve several sub-actions done in turn, possibly with distributive semantics. Extended (plural) participants are additionally marked by CVCV reduplication.

4. Strong vs. weak reciprocal constructions and their morphological encoding

Semantically, restricted (dual) reciprocity is more symmetrical than extended reciprocal relations which remain vague as to whether all participants are symmetrically involved in the reciprocal event, but imply some general union of local reciprocal relations (Dalrymple et al. 1998). The notion of co-participation (Creissels & Voisin 2008) or the union of local relations is sufficient. Meanings other than strictly reciprocal relations are generally weakly symmetrical. They denote collective or plural relations, mode of grouping, chaining; these

sometimes paves the way for other non-reciprocal meanings, such as iterative, intensive, distributive meaning, (as in Nêlêmwa, and various other Austronesian and Oceanic languages, Bril 2005, 2007).

In chaining relations such as *they run after one another*, the reciprocal morpheme denotes some co-participation, done in turn and with unspecified symmetry. In languages where chaining is expressed as a subtype of reciprocal, but asymmetrical, relation, the whole chain makes up the domain of co-participation and is the union of local asymmetries, as in *they walk one behind the other*, in (13, 14) below.

Similarly, without a context, the semantics of *they dance holding each other's hands* is indeterminate. With up to three people, given a circle or loop configuration, it can denote a symmetrical relation (graph 1). Beyond that, the relation is necessarily one of chaining (graph 2), with weakly symmetrical or asymmetrical relation between plural participants; the reciprocal affix then denotes transitive relations, which may not be strictly reciprocal, but the union of which constitutes the domain of co-participation.

They dance holding each other's hands' can read as in graph 1 or 2.

Graph 1: strongly reciprocal

X ←→ Y

Z
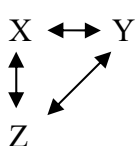
Graph 2: weakly reciprocal, chaining
indirect reciprocity between X & Z

X ←→ Y ←→ Z
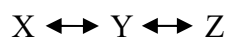
4.1. The role of lexical semantics in Amis

Lexical semantics contribute to selecting either or both affixes, with different profiling. Lexical roots derived with *mal(a)-* have, or are compatible with some inherent collective or collaborative meaning and with actions done simultaneously. But roots like *curuk* 'take turn' in (12a), denoting asymmetrical reciprocal relation, must take the *ma-Ca-* construction. The basic meaning of the stem *padang* 'help s.o.' is asymmetrical, and only occurs with *ma-Ca-* (12b), it denotes distinct events of reciprocal help, done in turn. The non-reciprocal construction is given in (12c).

(12) Amis

   a. Ma-ca~curuk   k-uhni a   mal-paliw.
      MIDD-CA~take.turn   NOM-3PL LNK REC-collaborate
      'They took turns to collaborate.'

   b. Ma-pa-padang k-ami   (a   pa-tireng t-u   lumaq).
      MIDD-CA~help   NOM-1PL.EXC LNK CAUS-erect OBL-NM house
      'We helped each other (to build our own house).' (i.e. in turn)

c. Mi-padang   cira   itakuwan.
   AV-help   NOM.3SG   OBL.1SG
   'He helped me.'

4.2. Polysemous affixes in Oceanic languages, Nêlêmwa, Fijian

Among the widely attested polysemy of reciprocal prefixes in Austronesian and Oceanic languages are mode of grouping, chaining, pluractional and intensive meanings.

Pe- in Nêlêmwa has all those meanings; it occurs for instance in chaining events (13) (Bril 2007 for the full description).

(13)   Nêlêmwa

        Hla pe-oxo-i   agu   mahleeli.
        3PL   REC-follow-R   people.ABS   those
        'Those people walk in line.' (one behind the other)

Fijian *vei* possibly co-occuring with the medio-passive, detransitivising suffix *–vi*, also occurs in chaining or actions done in turn.

(14)   Fijian (Dixon 1988 : 178)

    a. Vei-tara~tara-vi   'follow each other'
        REC-CVCV~follow-vi

    b. Vei-sii.sivi   'pass each other in turn' (*siivi* 'pass, exceed')
        REC-RED~pass

5. The semantic diversification of reciprocal affixes

Other frequent meanings include symmetrical spatial configuration, symmetrical properties in comparative constructions, dyadic kinship or social relations, and distributive meanings.

The semantic reading results from the composition of the affix and the stem. It varies with :

1) the lexical category of the stems as being (i) entity-denoting, (ii) property-denoting, (iii) action-denoting, (iv) denoting some spatial property or configuration;

2) the semantic properties of the stems (i.e. as active, stative, motion verbs);

3) their inherent ± symmetrical features and semantics.

Motion verbs and some action verbs tend to select collective or chaining readings; while stative, property-denoting verbs tend to denote comparative readings.

The strong or weak symmetrical readings are constrained by various features:

(a)   the semantics of the lexical stem (e.g. 'collaborate' vs. 'help');

(b)   the number of participants (dual vs. extended, plural participants);

(c)   the spatial configuration (such as loop, cycle, chaining);

(d)   the time frame (i.e. simultaneous actions or actions done in turns).

The following tables summarise their distribution.

Table 1. The semantics of reciprocal *mal(a)-* and *ma-Ca-* in Amis

	collective/reciprocal		chaining	mode of grouping	symmetr. positions, locations	compa-rison	dyadic kinhip / social relation
	simult. holistic	done in turn					
mal(a)-	+					+	+
ma-Ca-		+	+	+	+	+	

Table 2. The semantics of reciprocal *pe-* in Nêlêmwa

	collective/reciprocal		chaining	mode of grouping	symmetr. positions, locations	compa -rison	dyadic kinhip / social relation
	simult. holistic	done in turn					
pe-	+	+	+	+	+	+	

5.1. Symmetrical positions or locations, mode of grouping

When the prefixes attach to stems denoting positions and locations, the reading is not strictly reciprocal, but denotes some symmetrical features that are dependent on lexical semantics, as in (15) below. Again, the reciprocal affix simply signals a vague union of more or less symmetrical, iterated relations.

— **Amis**

In Amis, only *ma-Ca-* reduplication or *ma-CVCV* reduplication are attested with such semantics; the reciprocal affix *mal(a)-* does not occur in spatial configurations.

Ma-Ca- constructions are weakly symmetrical with asymmetrical configuration involving plural entities, such as *ma-ta~tungruh* (15a), derived from the locative noun *tungruh* 'top'. The same asymmetry holds with *ma-ta-tepar* derived from *tepar* 'side' in (15b); but the relation with *tepar* 'side' is more symmetrical if only two persons are involved.

(15)   Amis
    a.   Ma-ta~tungruh k-u   kasuy.
          MIDD-CA~top   NOM-NM   wood
          'The wood-logs are piled on top of each other.' (asymmetrical configuration)

    b.   Ma-ta~tepar k-ita   a   m-aruq.
          MIDD-CA~side   NOM-1PL.INCL   LNK AV-sit
          'We are sitting side by side (or) next to each other.'

— **Nêlêmwa**

In Nêlêmwa, *pe-* (POc *paRi) is also prefixed to location nouns in predicative function, or to stative verbs denoting symmetrical positions, locations or points between landmarks or objects. Again plural entities imply some vague union of more or less symmetrical, distributed relations or properties.

(16)   Nêlêmwa (N. Caledonia, Bril 2002)

   a.   Ma   pe-aramaa-i.
        1DU.INCL   REC-face-R
        'We are facing each other.' (dual)

   b.   Pe-jeuk   awôlô   mahleena.
        REC-near   dwelling   these
        'These dwellings are close to each other.' (plural)

Fijian combines the reciprocal prefix and reduplication, with similar meaning.

(17)   Fijian (Milner 1972: 112)

        Vei-taqa~taqa-i.
        REC-CVCV~put.on.top-i
        '(they) are piled on top of each other'.

The strong or weak symmetrical interpretations are thus context dependent.

5.2. Symmetry and comparison of equality

As an offshoot of symmetrical relations, these prefixes also occur as markers of comparison with respect to a *tertium comparationis*, generally a property, patterning as 'A & B are RECIP-big'. They are prefixed to property predicates (denoting age, size, appearance, quantity, property, etc.) which constitute the parameter of comparison.

   — **Amis**

In Amis, both affixes *mal(a)-* and *ma-Ca-* occur in these constructions. *Mal-* tends to profile one global symmetrical property, while *ma-Ca-* tends to profile a more distributed approach. *Mal-singteb* (18a) profiles the property *tarakaw* "height" as being globally identical in relation to the parameter of comparison (the 'same level'); *mal-selal* (18b) profiles the same collective relation to the same age group property. On the other hand, the *ma-Ca-* construction in (18c) tends to profile a more distributed membership to one age group, implying the existence of other age groups (there are eight age groups in the Amis social organisation).

(18)   Amis

   a.   Mal-singteb   k-u   tarakaw   n-uhni.
        REC-level   NOM-NM   height   GEN-3PL
        'They're of equal height.' (lit. their height is REC-level)

   b.   Mal-selal   k-ami.
        REC-age.group NOM-1PL.EXC
        'We are in the same age-group.'

   c.   Ma-sa~selal-ay   a   kaput   k-ami.
        MIDD-CA~ age.group-MODF   LNK   team   NOM-1PL.EXC
        'We are a team of the same age-group.' (others belong to another one)

— **Nêlêmwa**

In Nêlêmwa and other New Caledonian languages, the reciprocal affix *pe-* also has comparative meaning, even with stems that have inherent comparative meaning, like *maariik* 'similar'. In (19a), 'they are like each other' must be used with the reciprocal prefix (**hli maariik*).

(19)   Nêlêmwa

    a.   Hli   pe-maariik   âlô   mahliili.
        3DU   REC-similar   child   these
        'These children are similar to/look like each other.'

    b.   Wa   pe-khooba-wa.
        2PL   REC-number-POSS.2PL
        'You are in equal number.'

    c.   Hlaabai   pe-ida-la.
        those   REC-line-POSS.3PL
        'Those (who are) of the same generation.'

5.3. Dyadic kinship or social relationship

When affixed to stems denoting kinship or social relations, these prefixes express dyadic kinship (Evans 2006) or reciprocal social relations, which are symmetrical ('they're RECIP-friends', 'they're RECIP-sisters') or asymmetrical ('they're RECIP-mother and daughter'). Languages vary as to which term of the dyad is chosen, i.e. the higher or the lower term.

5.3.1. Amis and other western Austronesian languages

In Amis, only *mal(a)-* (from PAN *maR-) is used with that meaning and function; it refers to relations which are profiled holistically, as the union of ± symmetrical relations, as in (20).

(20)   Amis

    a.   U   mal(e)-kaka-ay   k-ami.
        NM   REC-elder.sibling-NMZ   NOM-1PL.EXC
        'We're elder siblings.' (together, as a group, symmetrical kinship)

    b.   Mal(e)-wama k-uhni, mal(e)-wina k-ami.
        REC-father   NOM-3PL REC-mother   NOM-1PL.EXC
        'They're father and child, we're mother and child.' (asymmetrical kinship)

    c.   Mal-cabay   k-ita.
        REC-companion   NOM-1PL.INC
        'We're friends.' (symmetrical social relationship)

    d.   Mal-kaput k-uhni.
        REC-team   NOM-3PL
        'They're class-mates.' (symmetrical social relationship)

There is much unpredictable variation on whether the root selects the higher or the lower term of the asymmetrical kinship dyads. In Formosan languages, the root tends to be the

higher term, with some exceptions. In Amis, the root is always the higher term. In Paiwan (21), the same reciprocal affix *maɣ-* occurs on noun stems denoting dyadic kinship, as well as on verb stems.

(21)   Paiwan (Formosan, Zeitoun, 2002)
         maɣ-aʎa-aʎak 'parent and children' (*aʎak* 'child'; tri-moraic reduplication marks plurality)
         maɣ-ta-təvəʎa ~ paɣ-ta-təvəʎa 'answer each other' (the basic actor voice is *t<əm>vəʎa* 'answer')

   Dyadic kinship is common among Austronesian languages. In Tagalog, the choice of the higher or the lower term of the dyad has different meanings.

(22)   Tagalog (Philippines, Schachter and Otanes 1972: 293)
         mag-ama 'mother and child' (*ama* 'mother')
         mag-anak 'parent and child' (*anak* 'child').

5.3.2. Dyadic kinship in New Caledonian and other Oceanic languages

There are some variations in New Caledonian languages; in Bwatoo, the higher term is chosen; in Nêlêmwa, it is the lower term. There is also some variation in the choice of affixes, either reciprocal prefixes or different affixes. Bwatoo uses morphemes that are different from reciprocal prefixes; so does Nêlêmwa.

(23)   Bwatoo (N. Caledonia, Rivierre & Ehrhart 2006)

         Lu   **xaa-**(ve)-voona-**n**.
         3DU   DYAD-(REC)-maternal.uncle-DYAD
         'The maternal uncle and his nephew.'

   Nêlêmwa also uses different morphemes for dyadic kinship and reciprocal constructions.

(24)   Nêlêmwa (Bril 2000, 2002)

   a.   Hli   **am-**xola-**n**.
         3DU   DYAD-nephew-DYAD
         'They are in maternal uncle/aunt and nephew/niece relation.'

   b.   Hli   **a-**maawa-**n**.
         3DU   DYAD-spouse-DYAD
         'They are spouses.'

   c.   Hli   **pe-**whan.
         3DU   REC-agree
         'They are married.'

   On the other hand, the same reciprocal affixes are used in Caac. Dual or plural relationships are marked by distinct pronouns.

(25)   Caac (N. Caledonia, Hollyman 1971)

Pe-abaa-le.
REC-brother-POSS.3PL
'They are brothers and sisters.'

In Fijian, the reciprocal affix is also used for dyadic kinship.

(26)   Fijian (Milner 1972 :112-113, Dixon 1988)

a.   Keirau   vei-gane-ni.
1DU.EXC   REC-sibling-NI
'We(2) are in sister-brother relationship.'

b.   Erau   vei-tauri   liga.
3DU   REC-take   hand
'They (2) are holding hands.'

5.4. Pairing or distributed mode of grouping

In Amis, neither *mal(a)-* nor *ma-Ca-* occur on numerals with distributive meaning, a distinct morpheme *ha(la)* denotes numeral distributivity.

(27)   Amis

Ma-ha-tulu   a   mal-kaput (k-uhni).
MIDD-DISTR-three   LNK   REC-team   (NOM-3PL)
'They were grouped by 3/(they) made a team of three.'

In Nêlêmwa, the distributive meaning of *pe-* is mostly restricted to mode of grouping in 'natural' pairs of similar entities. Beyond pairs, a distinct distributive morpheme is used.

(28)   Nêlêmwa (Bril 2000, 2002)

Co   na   me   pe-balet.
2SG   put   AIM   REC-partner
'Put them two by two/in pairs.' (from a bigger amount of similar entities)

On the other hand, the distributive use of the reciprocal affix is attested in Indonesian: *ber-ratus-ratus* 'by hundreds' (see Bril 2005).

5.5. Other meanings

Among other meanings, generally related to the co-occurrence of the reciprocal or middle affix with reduplication, are intensive and augmentative meanings.

Moving further away from the notion of collective/reciprocal action, these once "reciprocal" affixes take on meanings that increasingly pertain to the Middle domain such as (i) anticausative meaning denoting spontaneous, unintentional actions lacking any initiator as in (29a), or (ii) aimless, dispersive, unbounded actions lacking a patient, as in (29b); Indonesian *ber-* also has that meaning, e.g. *ber-malas-malas* 'be idle, be lazying around'. (See Bril 2005, 2007 for detailed analysis).

(29)   Nêlêmwa (Bril 2007)

    a.   Pe-nuk=du   bwa doo   pwâ-mâgo.
        MIDD-fall=down on   ground fruit-mango
        'Mangoes are falling.' (because they are ripe, anticausative)

    b.   Wa   pe-diya roven fo awa-wa.
        2PL   MIDD-do all   EXS heart-POSS.2PL
        'You may do as you wish.'

In some Oceanic languages, these meanings are marked by circumfixes that are reflexes of POc *paRi-…(-i /-aki*) together with some additional, disambiguating morphemes. POc *paRi-…-i* expresses reciprocal, collective and iterative meanings, "combined or repeated action by a plurality of actors or affecting a plurality of entities" (Pawley 1973: 152); this is attested in Nêlêmwa, see (30a); POc *paRi-…-aki* expresses distributive, dispersive actions (Lichtenberk 2000: 55-56, Bril, 2005).

In Nêlêmwa, subject-oriented reciprocity (30a) and object-oriented reciprocity (30b) are distinguished by the presence of *pe- …-i* (from *paRi-…-i*); object reciprocity is marked by *pe–* together with the transitive verb form (30b).

(30)   Nêlêmwa (Bril 2007)

    a.   Hâ   **pe**-wuug-**i** agu Pum   ma   agu Cavet.
        1PL.EXC REC-gather-R people Poum   people Tiabet
        'We people from Poum and people from Tiabet have gathered.'

    b.   Hâ   **pe**-wuug-**e** agu Pum   ma agu Cavet.
        1PL.EXC REC-gather-TR people Poum   and people Tiabet
        'We have gathered people from Poum and people from Tiabet.'

6. Conclusion

Austronesian languages support Nedjalkov's (2007) generalisation that affixal reciprocal morphemes are more polysemous than are lexical reciprocal markers.

In Amis, the two morphemes *mal(a)-* and *ma-Ca-* profile distinct reciprocal relations; *mal(a)-*tends to profile one holistic, collective relation, while *ma-Ca-* tends to profile multiple sub-events, with distributed properties. Both morphemes combine with *Ca-* or *CVCV-*reduplication. *CVCV-* reduplication is used for plural relations and denotes pluractional, iterative and intensive meanings.

Combination with reduplication is also found in Philippine (Tagalog) and Malayo-Polynesian languages (Malay, Indonesian) and, further to the east, in many Oceanic languages which also retained the original reciprocal affixes (e.g. Fijian, Dixon 1988), some New Caledonian languages (but not Nêlêmwa), Samoan (Milner 1966). In those languages, the reciprocal-middle prefixes often combine with reduplication to express the core meanings, i.e. collective, reciprocal relationship, and various types of more or less symmetrical relations,

such as dyadic kinship, comparison, chaining, mode of grouping (in pairs), sometimes expanding towards distributivity. They also have more peripheral meanings, such as pluractionality *via* the notion of actions done in turn, and intensity.

Many languages have also developed other meanings probing further into the middle domain. Among them are anticausative meaning, atelic, unbounded actions, sometimes expressing aimlessness, as well as middle reflexive notions, generally starting from their occurrence on verbs of grooming. Tagalog is such a case, *mag*- (from PAN *maR-) expresses collective, reciprocal meaning, pluractionality, intensive meanings, as well a more middle-like functions such as durative, and middle reflexive notions with verbs like 'shave oneself'. This also occurs in Indonesian and in various Oceanic languages, among which some Kanak languages of New Caledonia (Bril 2005). Of course, not all such meanings are attested; for instance, the very polysemous *pe*- in Nêlêmwa stops short of the reflexive meaning. Amis reciprocal prefixes have not moved as far into the middle domain, due to the existence of competing morphemes for middle voice, and to different constructions for reflexives, such as the use of the *tireng* 'body', or the recourse to transitive verbs with coreferential arguments.

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Groups vs. covers revisited: Evidence from symmetric readings of sentences with plurals*

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Abstract

We present new arguments for the existence of genuine symmetric readings of sentences with plural terms, which we claim challenge all current semantic theories of plurality. We sketch two analytical directions and describe some of the diverging predictions they make.

Keywords: plurals, groups, covers, ambiguity, underspecification, reciprocals

1   Introduction

The subject of sentence (1) is a conjunction of two plural terms. The sentence can be true in a context in which the French students hit the Italian students and the Italian students hit the French students. On standard theories of plurality (e.g., Link 1983), conjunction of two pluralities generates a flat plurality, so how does the compositional semantics gain access to the two sub-pluralities that hit each other?

(1)   The French students and the Italian students hit each other.

Landman ([1989]) introduces a group-forming operator (↑) that may apply to plural noun phrases. Thus, ↑[*the French students*] *and* ↑[*the Italian students*] denotes a plurality containing two atomic groups. On this logical form, (1) is true if members of each group hit members of the other one. Schwarzschild ([1996]) proposes an alternative analysis on which the interpretation of sentences with plural arguments depends on the choice of covers of their denotations. Any cover that is recoverable from context can in principle serve this role. The reading above is obtained with a cover of the students (here, explicitly mentioned) that divides them into two pluralities: the French students and the Italian students.

Schwarzschild's semantics generates many more readings as well, since every possible cover yields a possible reading, and possible covers are restricted only by pragmatic factors. This is in sharp contrast with Landman's analysis, which is restricted by the syntactic structure of plural noun phrases, according to which each plural noun phrase may denote a group. In favor of his own analysis, Schwarzschild argues that sentences like (2) have an equivalent reading, but that there is no relevant node in the logical form at which a group-forming operator can attach. For sentence (3), too, he suggests that such a reading exists, arguing that (3) can be true in a situation like the one described above.

(2)   The students from the two countries hit each other.

(3)   The students hit each other.

Let us call the putative reading described above the "symmetric" reading (cf. Winter and Scha [2015]). The empirical question we address in this squib is which, if any, of (1–3) genuinely have a symmetric reading. We argue that genuine ambiguity between two or more readings must be dissociated from (mere) underspecification, and we present results from a short judgment survey to that effect. We show that, contra Landman ([1989]), sentence (2) *does* have a reading equivalent to the one in (1). But we also show that, contra Schwarzschild ([1996]), sentence (3) does *not* have this reading, even in a context in which the relevant cover is highly salient. Our results thus pose a challenge to two longstanding views on plurals. Furthermore, although we focus here on reciprocals for simplicity, the challenge is not limited to reciprocals, nor to the two specific theories articulated in Landman ([1989]) and Schwarzschild ([1996]).

2   Ambiguity vs. underspecification

Sentence (3) may be true in the situation described above, but this does not mean that this is an independent reading of the sentence. This may simply correspond to underspecification, just as *sibling* is underspecified with respect to gender. To detect genuine ambiguity, one should consider not only when the sentence is true, but also when it is false. Specifically, if a sentence is ambiguous between several readings, then there may be situations in which it is judged true

under one reading, and false under another (Gillon 1990, 2004). In practice, speakers' intuitions about truth and falsity turn out to be not so clear when focusing on simple sentences like (1). To alleviate this problem, we consider sentences with ellipsis and negation, such as (4), uttered in a context in which two separate covers are relevant.

(4) *Context: This class has only French and Italian students. On Monday, a fight broke out: the French students hit the Italian students, and the Italian students hit the French students. On Tuesday, another fight broke out, but this time within the two groups: the French students hit one another, and the Italian students hit one another.*

On Monday, the French students and the Italian students hit each other, but not on Tuesday.

If sentence (1) has the reading characterized at the outset, then the sentence on this reading should be judged true with respect to Monday, but false with respect to Tuesday. The full sentence in (4) should thus be able to be judged true. If (1) has only a single, underspecified reading — roughly, "some students hit some other students" — then (4) should be false, because this is true on both Monday and Tuesday (cf. the "inclusive alternative ordering" reading of Dalrymple et al. 1998).

Structures of this form thus provide a way to test the existence of the relevant reading for the sentences in (1–3). Notably, as is highlighted by both Landman (1989) and Schwarzschild (1996), the mechanisms giving rise to such a reading are not specific to reciprocals, but arise from general properties of plural predication. Examples with a parallel structure can thus be constructed using sentences with no overt reciprocal, as in (5). These sentences have the same truth conditions as if a reciprocal were present (e.g., *The zookeeper separated the tigers from each other*).

(5) *Context: This zoo has two types of tigers — African tigers and Asian tigers — who typically live together. In April, there were two special exhibits, one on African animals and one on Asian animals, so the zookeeper separated the tigers into two groups according to their continent of origin. In May, it was mating season, so to have careful control over breeding, the zookeeper again separated the tigers into two groups, but this time by sex.*

a. In April, the zookeeper separated the African tigers and the Asian tigers, but not in May.

b. In April, the zookeeper separated the tigers of the two continents, but not in May.

c. In April, the zookeeper separated the tigers, but not in May.

The authors' own judgments on sentences in these two contexts were confirmed with a short survey of eight trained linguists who are native speakers of North American English. Subjects were asked to evaluate (on a scale from 1 to 7) the extent to which each sentence can be used truthfully in the given context. The prefixed numbers in (6) report average judgments for each sentence type, generalizing over the two contexts. Full survey judgments are provided in the supplemental materials.

(6) a. [4.94] On Monday, the French students and the Italian students hit each other, but not on Tuesday.

   b. [5.13] On Monday, the students from the two countries hit each other, but not on Tuesday.

   c. [1.25] On Monday, the students hit each other, but not on Tuesday.

Judgments about our four trios of sentences thus show that the (b) sentences can be judged as true just as easily as the (a) sentences, but that the (c) sentences are systematically judged as false. This suggests that the (a) and (b) sentences share a reading — the symmetric reading discussed for (1) — that (c) sentences don't have. This contradicts the predictions of both Landman's analysis and Schwarzschild's analysis. Note that it is unlikely that Schwarzschild could explain the data via pragmatics, since the (c) sentences were always presented following (a) and (b) on the same page of the survey, so the relevant cover should in principle be highly salient in all cases.

3   Directions for analysis

These results paint a picture that is challenging to all current theories. In particular, we find that the symmetric reading of (1) corresponds to a distinct logical form that is not derivable by simple pragmatic means. On the other hand, this reading is not due to group-forming operators, nor to "generalized conjunction" (Partee and Rooth 1983), since the reading is also available for (2), whose subject is a single noun phrase, without conjunction. How are we to analyze (2)? Here, we sketch two analytical directions — one an enrichment of Landman (1989); the other a revision of Schwarzschild (1996) — then describe the diverging theoretical predictions that they make.

3.1   Group-formation operators plus scope

On Landman's analysis, we would ideally like to assign the noun phrase in (7a) an interpretation equivalent to the one in (7b).

(7) a. the students from the two countries

   b. ↑[the students from France] ⊕ ↑[the students from Italy]

Such an interpretation can be obtained by combining Landman's group-formation operator with a mechanism of scope taking and the operation of 'Collectivity raising' from Winter (2001). We assume that (7a) is assigned the structure in (8), in which the DP *the two countries* has been quantifier raised outside of a structure containing a group-formation operator. Following Kobele (2010)'s analysis of inverse linking, this structure is assigned the interpretation in (9).

(8)

```
                          4
                      /       \
                   C            3
                             /     \
                          2_i          1
                        /     \      /    \
              the two countries   ↑(the students from t_i)
```
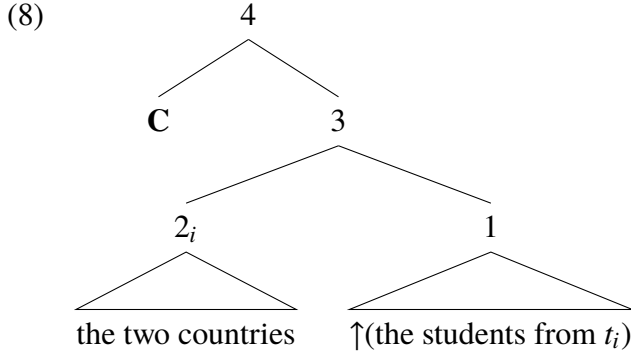
(9) $\mathbf{C}(\lambda P.\text{the two countries}(\lambda t.P(\uparrow \text{ the students from}(t))))$

Node 1 denotes the (atomic) group of students from country i. Node 2 is a generalized quantifier that is true of all predicates that contain each of the two contextually salient countries (here, France and Italy). Using the compositional system of Kobele (2010), Node 3 returns another generalized quantifier: the set of predicates that contain both the atomic group of students from France and the atomic group of students from Italy. Finally, we apply Winter (2001)'s **C** operator, defined in (10), which transforms a generalized quantifier into a (lifted) plurality.

(10)   a. $\text{min} = \lambda Q.\lambda A.Q(A) \wedge \forall B \in Q[B \subseteq A \rightarrow B = A]$

      b. $\mathbf{E} = \lambda A.\lambda P.\exists X[A(X) \wedge P(X)]$

      c. $\mathbf{C} = \lambda Q.\mathbf{E}(\text{min}(Q))$

Given a generalized quantifier, the function 'min' returns the set of all of its minimal predicates. Thus, applied to Node 3, it returns the singleton set containing the set $\{\uparrow \text{ (students from France)}, \uparrow$ (students from Italy)$\}$. This is precisely the plurality desired in (7b). (Winter (2001) models pluralities as sets instead of sums, but the translation can be made easily.) Existential Raising in (10b) asserts that there is some such plurality that has the property denoted by the predicate.[1] With the predicate *hit each other*, the resulting sentence is true if the group of students from France hit the group of students from Italy, and vice versa.

This analysis thus explains our data by enriching Landman's framework with more recent hypotheses regarding scope-taking and the relation between generalized quantifiers and plurality.

3.2   Covers plus dynamic semantics

A second strategy of analysis retains the essential compositional components of Schwarzschild (1996), but places further restrictions on the pluralities that can be recovered from context. In particular, the framework of dynamic semantics aims to provide a precise system that determines what singular and plural discourse referents are recoverable from a given discourse context.

One thread of work on dynamic semantics focuses on the way that plural discourse referents are introduced and manipulated (van den Berg 1996; Nouwen 2003; Brasoveanu 2008). On

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1 Existential Raising plays a less trivial role in cases with indefinites, where 'min' does not return a singleton set, as in *The students from two countries hit each other.*

these theories, when one plurality is placed in a semantic relation with another plurality, the dynamic system represents not only the two pluralities, but also the thematic relation between them. Thus, the DP in (11a) generates an information state like the one in (11b); here, horizontal rows indicate that the 'from' relation holds between the values of x and y.

(11) a. the^y students from the^x two countries

    b. G:

x	y
France	student 1
France	student 2
Italy	student 3
Italy	student 4

Recent work has argued that these semantic associations — and the subpluralities that are created by them — can be accessed by linguistic items elsewhere in the sentence (Dotlačil 2013; Kuhn 2017). One can modify Schwarzschild's analysis to be similarly sensitive to the relations established in the discourse representation. Schwarzschild's analysis involves two variables: a plurality, and a cover over that plurality. For a plural information state G, we let $G|_{x=d}(y)$ be the set of values that y takes on those rows that map x to d. Collecting the sets as d ranges over the values of x provides a cover of y with respect to x. For the information state in (11b), $G(y/x)$ generates the cover $\{\{\text{student 1}, \text{student 2}\}, \{\text{student 3}, \text{student 4}\}\}$.

(12) $G(j/i) = \{S : \exists d[d \in G(i) \land G|_{i=d}(j) = S]\}$ (Kuhn 2017)

By restricting Schwarzschild's cover variables to only those pluralities that are dynamically accessible, we rule out the cases of overgeneration that arise from a purely pragmatic theory. In particular, if no semantic relation is established between two pluralities, then no dependency is established in the information state. As an example, the discourse in (13a) produces an information state as in (13b), which encodes a trivial relation in which every student is associated with every country.

(13) a. Two^x countries are represented in the class. The^y students hit each other.

    b. G :

x	y
France	student 1
France	student 2
France	student 3
France	student 4
Italy	student 1
Italy	student 2
Italy	student 3
Italy	student 4

For this information state, $G(y/x) = \{\{\text{student 1}, \text{student 2}, \text{student 3}, \text{student 4}\}\}$, and $G(y/y) =$

$\{\{\text{student 1}\}, \{\text{student 2}\}, \{\text{student 3}\}, \{\text{student 4}\}\}$, but no choice of variables will provide the necessary cover for the relevant reading. This predicts that the second sentence in (13a) cannot receive a symmetric reading.

This analysis thus explains our data by restricting Schwarzschild's framework using recent developments on the dynamic semantics of plurals.

3.3 Predictions of the two directions

The two analytical directions make differing predictions on a number of fronts.

First, we observe that the DP in (14) exhibits a cumulative interpretation between the students and the two countries: each of the students comes from one of the two countries, and each country is the origin of at least one of the students. A relatively common way to derive a cumulative interpretation is via pluralization of the predicate (Beck and Sauerland 2000) — in this case, pluralization of the preposition *from*, as in (15a). The double-star operator is defined in (15b).

(14)   the students from the two countries

(15)   a.   the students **from the two countries

      b. $**R = \lambda X \lambda Y.\forall x \in X[\exists y \in Y[R(x)(y)]] \wedge \forall y \in Y[\exists x \in X[R(x)(y)]]$

On the other hand, close inspection of the structure in §3.1 reveals that an equivalent interpretation is derived from a rather different logical form on the scope-taking analysis. On the logical form in (16), the effect of cumulativity is generated by an anaphoric dependency. To paraphrase: 'for each of the two countries, include the students *from that country*.' Of note, the resulting logical form ends up mirroring the analysis that Winter (2000) proposes for cumulative readings generally, which analyzes *the soldiers hit the targets* as equivalent to *the soldiers hit their targets*.[2]

(16)   the two countries λx [the students from x]

As a matter of fact, it may be the case that either of these logical forms is available for the DP in (14). Evidence for the availability of both logical forms can be found by adding a numeral to the DP. Empirically, we observe that the two sentences in (17) can both be used to describe the same situation, in which each state is represented by two senators.

(17)   *Context: Each state has exactly two senators.*

      a.   The twelve senators from those six states voted against the bill.

      b.   The two senators from those six states voted against the bill.

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2 On the other hand, the analysis in §3.1 does not need to subscribe to other analytical assumptions of Winter (2000). Specifically, it is not committed to the availability of anaphoric dependencies everywhere — only to the fact that anaphoric dependencies may be generated by certain scope-taking operations.

In order to capture this synonymy, the two sentences must be assigned different structures. On a logical form with pluralization of *from*, neither numeral is in the distributive scope of the other, so we can derive an interpretation of (17a) which also has twelve senators total. On a logical form with an anaphoric dependency, we can derive an interpretation of (17b) with twelve senators total, since the numeral *two* appears in the quantificational scope of *those six states*. That both of these sentences can be used in this context provides evidence in favor of the availability of two distinct logical forms.

Turning to the case at hand, the two analyses in §3.1 and §3.2 make different predictions regarding what logical forms should be available. On the dynamic revision of Schwarzschild (1996), both polyadic quantification and anaphoric dependency will generate a dependency relation, so both will generate an information state of the correct form to provide a non-trivial cover variable. Thus, the symmetric reading should be available on either logical form. On the other hand, the scopal enrichment of Landman (1989) only allows the logical form in (16). Because *the two countries* raises out of the restrictor of the lower NP, the trace that remains below automatically introduces an anaphoric dependency.

The two analyses thus make differing predictions when it comes to (18). The dynamic revision of Schwarzschild (1996) predicts that (18) will allow a symmetric reading in a situation with ten students or with twenty students. The scopal enrichment of Landman (1989) predicts that (18) will only allow a symmetric reading in a situation with twenty students.

(18)   The ten students from the two countries hit each other.

A related prediction regards the interaction of the symmetric reading with scope islands. Because the scopal enrichment of Landman (1989) relies on the ability of *the two countries* to take wide scope, introducing an island boundary between the two DPs should rule out the necessary logical form. Since relative clauses are generally observed to introduce scope islands, the scopal analysis thus predicts that (19) will not allow the symmetric reading. On the other hand, it is not clear if the predictions are significantly different for the dynamic analysis. In particular, Beck and Sauerland (2000) show that island boundaries may also block the cumulative reading that is derived by polyadic quantification, since the double-star operator would need to apply to a constituent that spans an island boundary. Thus, it is possible that the island boundary in (19) simply reduces the acceptability of the cumulative reading across the board.

(19)   The students ⟨who come from the two countries⟩ hit each other.

Another prediction on which the two analyses differ regards the availability of cross-sentential anaphora. Since the dynamic analysis is built on a system developed for cross-sentential anaphora, it predicts that a plural pronoun in one sentence should be able to access a plural dependency established in a previous sentence. Under the dynamic analysis, the second sentence in (20) is thus predicted to have a symmetric reading. In contrast, the scopal analysis depends on sentence-internal mechanisms, so does not predict a symmetric reading for (20).

(20)   The students come from two countries. They hit each other.

3.4   Discussion of survey results

These predictions were tested in the same survey of eight English-speaking subjects. While the three initial target sentences received relatively clear judgments, the sentences with numerals, islands, and cross-sentential anaphora all received intermediate judgements, making definitive conclusions difficult. Below, we report average judgments on the 7-point scale, generalizing over the two contexts.

Several general observations can be made. First, in contradiction with the empirical generalization suggested by (17), the dependent reading of a numeral turns out to be very challenging to obtain, even in control sentences with no syntactic islands. Concretely, in a context in which a class has ten French students and ten Italian students, sentence (21a) can easily be judged as true, but sentence (21b) cannot.

(21)   a. $^{6.56}$ The twenty students from the two countries passed the exam.

     b. $^{2.81}$ The ten students from the two countries passed the exam.

When we turn to the target sentences, the high rating of (21a) goes down for the symmetric reading in (22a), apparently displaying the interaction predicted by the scope-based analysis. On the other hand, the dependent reading of the numeral in (22b) remains even worse. Indeed, the fact that the dependent reading is so hard in general seems to provide evidence *against* a scope-based analysis, as (6b) receives a true reading without any difficulty.

(22)   a. $^{2.75}$ On Monday, the twenty students from the two countries hit each other, but not on Tuesday.

     b. $^{2.31}$ On Monday, the ten students from the two countries hit each other, but not on Tuesday.

Adding syntactic islands and cross-sentential anaphora also reduces judgments, though not to the degree of sentences in which no logical dependency is mentioned, as in (6c). Degraded judgments on these sentences are predicted on the scope-based analysis, though we saw that some cases of island sensitivity may also be derivable on the dynamic analysis. Note also that the low judgments for (21b) make it hard to independently test the strength of syntactic islands.

(23) $^{3.44}$ On Monday, the students who come from the two countries hit each other, but not on Tuesday.

(24) $^{2.50}$ The students come from two countries. On Monday, they hit each other, but not on Tuesday.

4   Conclusion

Landman (1989) and Schwarzschild (1996) provide two clear and well-known perspectives on the debate regarding the way in which and the degree to which higher-order pluralities are represented in natural language. We have provided new data showing that this debate remains open. When we control for the distinct *readings* of sentences with plural predication, neither Landman (1989) nor Schwarzschild (1996) is able to capture the full pattern of judgments.

We have seen that either analytical perspective can be modified to capture the observed pattern, but that these modifications entail new theoretical commitments. Landman (1989) can capture the remaining attested reading, but needs to assume a mechanism of inverse linking plus further type shifters, such as Winter (2001)'s **C** operator. Schwarzschild (1996) can rule out the unattested reading, but needs to assume a rather powerful framework of dynamic semantics. In either case, there remain holes that would need to be filled by future research. For example, the dynamic system would need to be fleshed out with a compositional semantics that makes the necessary discourse referents available for both (1) and (2).

Finally, we note that it is possible to modify each of the theories to generate predictions that converge towards the other. For example, a post-suppositional analysis of numerals (Brasoveanu 2013) may provide a way for the dependency analysis to allow the 'ten students' reading of sentences with numerals. Similarly, there is quite a bit of variation in the dynamic literature about regarding how cumulative readings are derived (van den Berg 1996; Brasoveanu 2013; Henderson 2014). These analytical choices have the potential to restrict the interpretations available on the dynamic analysis, potentially causing partial convergence with the scope-taking analysis. We hope that this investigation may serve as the start of a more detailed study of theories of symmetric readings, of the predictions those theories make, and how best to test those predictions.

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Reciprocity: Anaphora, scope, and quantification

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<div align="center">Malagasy Reciprocals: Lexical and Syntactic</div>

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Abstract   In Malagasy (W. Austronesian, Madagascar) reciprocal verbal morphology is very productive and applies to both lexical and syntactically derived VPs, arguing against a Lexicon/Syntax parameter (Siloni 2012, Reinhart & Siloni 2005), and more compatible with a Distributed Morphology approach (Embick & Noyer, 2005 (E&N)). We discuss first its most lexical properties, then its interaction with the voice system, Possessor Raising, Raising to Object, Causativization, Nominalization and Voice Harmony. We conclude with some brief comparisons between Malagasy and cited properties of reciprocals in other languages.

Preliminaries

Like Philippine languages Malagasy syntax rides on its voice system. Verbs are derived by iteratively affixing roots, There are seven voices!. We illustrate the four atelic voices: AV (*active*): m+pfx+root; TV (*theme*): a+root; PV (*patient*): root+Vna; and CV (*circumstantial*): AV+pfx+root+ana).

1 a. [manolotra (m.aN+tolotra) vary ny vahiny amin'ny lovia vaovao] [Rabe]_{DP}   AV

   offers   m.AV.offer   rice det guest prep'det dishes new   Rabe

   Rabe offers rice to the guests on the new dishes

  b. [atolon-dRabe (a+tolotra+n+Rabe) ny vahiny amin'ny lovia vaovao] [ny vary]_{DP}   TV

            TV+offer+lnkr+Rabe det guest prep'det dishes new   det rice

   The rice is offered by Rabe to the guests on the new dishes

  c. [toloran-dRabe (tolotra+ana+n+Rabe) vary amin'ny lovia   vaovao] [ny vahiny]_{DP} PV

            offer+PV+lnkr+Rabe   rice prep'det dishes new   det guests

   The guests are offered rice by Rabe on the new dishes

  d. [anoloran-dRabe (aN+tolotra+ana+n+Rabe) vary ny vahiny] [ny lovia vaovao]_{DP}   CV

            AV+offer+cv+lnkr+Rabe   rice det guests det dishes new

   The new dishes are used by him to offer rice to the guests

(1a-d) are paraphrases like English actives and passives. All have the form [Pred+ DP (subject)]. All are atelic, have an imperative form, and mark past tense with *n/no* and future with *h/ho*. In all cases only subjects relativize (*The shirt Ed washed* must be *The shirt that was washed by Ed*). Voice differences: only AV verbs have *m* in present tense. AV imperatives suffix -*a*, non-AV ones *o* (= /u/), or y (= /i/) when the root contains *o*. Suffixing a root (+/– prefix) shifts stress right and may induce an epenthetic consonant (really part of the root, Erwin 2001, Pearson 2001). In non-AV verbs the Agent links to the verb as possessors do to their heads.

The AV, TV and PV forms affix the root directly. The neutral active prefixes are *m.i-*, *m.an-*, *m.a-*, and *m.∅-*, the latter two closed classes. The range of voice affixes a root takes must be listed; there are suppletive forms, so AV, TV, and PV marking is lexical.

In contrast circumstantial verb (CV) formation is fully productive, built by suffixing -*ana* to any of the AV forms minus the initial *m*. All AV verbs feed CV forms, which nominalize by prefixing *f-* with complete productivity, preserving subcategorization and case marking of arguments and so are more transparent than gerund formation in English (Ntelitheos 2012). We turn now to Reciprocal Formation.

1. Basic Reciprocals

Reciprocal IF affixes n+2 place AV predicates φ to form n+1 place AV ones IF(φ), which take a set as argument (per DMP 1994 and Poortman et al 2018).

1. Lexical Properties:

1.1 Reciprocal IF selects AV verbs, its allomorphs conditioned by the choice of AV prefix

2 a. Manenjika (m+an+enjika) an-dRabe Rakoto   *Rakoto is chasing Rabe*

    pres+av+chase   acc-Rabe Rakoto

  b. Mifanenjika (m+rec+av+chase) Rabe sy Rakoto   *R&R are chasing each other*

  c. Mifanenjeha! (Stress shifted from *ne* to *nje* = *ndze*)   *Chase each other*! (imperative)

3 a. Niarahaba (n+i+arahaba) azy   aho   *I greeted him*

  greeted   pst+av+greet   3acc 1s.nom

b. Nifampiarahaba (n+ifamp+i+arahaba) isika   *We greeted each other*

    pst+rec+av+greet   we.incl

c. **Nifiarahaba isika   *We greeted each other*

4 a. Mahita anao aho   *I see you*

    see you.acc 1s.nom

b. Mifankahita Rabe sy Rakoto   *Rabe and Rakoto see each other*

A closed class of ∅-prefix verbs behave similarly: *m+i+ino* 'believe', *mifampino* 'believe in e.o.'

Remark *amp-* and *ank-* are causative prefixes but in AV *mi-*, *ma-* and *i-* verbs they just support *if-*. Historically *amp-* is likely aN+f = nominalizer, as in synchronic *aN+fo = ampo* (= /a.mpu/ 'in heart'. And *ank-* is likely aN+h = nominalizer. So historically *if* may just prefixe to *aN*-AV verbs.

1.2 P2s may be built from P3s+Argument, and P1s + "accessible" PPs:

5 a. m+aN+tolotra (manolotra) torohevitra an-dRabe Rasoa   *Rasoa offers advice to Rabe*

    pres+av+offer   advice   acc-Rabe Rasoa

b. m+if+aN+tolotra (mifanolotra) torohevitra Rabe sy   Rasoa   *R and R offer e.o. advice*

    pres+rec+av+offer   advice   Rabe and Rasoa

6 a. manoratra (m+aN+soratra) taratasy ho an-dRabe Rasoa   *Rasoa writes letters to Rabe*

    writes   (pres+av+write)   letter   for acc-Rabe Rasoa

b. mifanoratra (m+if+aN+soratra) taratasy Rabe sy   Rasoa   *R&R write letters to e.o.*

         pres+rec+av+write   letters   Rabe and Rasoa

7 a. manao (m+aN+tao)   farafara ho an-dRasoa Rabe   *Rabe is making a bed for Rasoa*

    makes (pres+av+make) bed   for acc-Rasoa Rabe

b. mifanao (m+if+aN+tao) farafara Rabe sy Rasoa   *R and R are making beds for e.o.*

8 a. mandainga (m+aN+lainga) amin-dRasoa Rabe   *Rabe lies to Rasoa*

            pres+av+lie   prep-Rasoa   Rabe

b. mifandainga (m+if+aN+lainga) Rabe sy   Rasoa   *Rabe and Rasoa lie to each other*

    lie to e.o. (pres+rec+av+lie)   Rabe and Rasoa

But we cannot reciprocalize out of existence a rich PP (though the idea is expressible):

9 a. mipetraka (m+i+petraka) akaikin-dRabe Rasoa   *Rasoa is sitting near Rabe*

            pres+av+sit   near-Rabe.gen Rasoa

b. *Mifampipetraka Rabe sy Rasoa   *Rabe and Rasoa are sitting near e.o.*

c. mipetraka   m+if+an+akaiky   Rabe sy   Rasoa   *R & R are sitting near e.o.*

    pres+av+sit pres+rec+av+near Rabe and Rasoa

Gen 1 Verbal affix reciprocals only bind one argument of a given verb to an antecedent.

        Pronominal reciprocals can do two: *We protected / saved e.o. from e.o.*

Corollary: Reciprocal IF does not iterate.

10. Nifaneho sary isika   *We showed each other pictures*

    **Nififaneho isika   *We showed each other to each other*

Gen 2 (Malagasy) Theme, passive and circumstantial voice verbs do not reciprocalize

(But, reciprocal verbs causativize, which reciprocalize, then causativize, passivize,...)

11 a. Enjehin-dRakoto (enjika+ina+Rakoto) Rabe   *Rabe is being chased by Rakoto*

              chase+pass+Rakoto Rabe

   b. *Ifenjehin-dRakoto sy Rabe   *Rabe and Rakoto are being e.o. chased*

1.3 Some reciprocal verbs lack a non-reciprocal source

12 a. Mifanaritarika (m+if+an+tarika^2)   any   an-tsena   any   ny tovolahy

        pres+rec+av+lead there loc-market there det young.man

   The young men walk around the market a bit helter-skelter

   b. *manarika, *mifanarika. So the apparent sources for the reciprocal in (12a) do not exist.

13 a. Nifanena (n.if.an.tsena) t.any   an-tsena Rabe sy Ravelo

    pst.rec.av.meet   pst.there loc-market R and R

   Rabe and Ravelo met e.o. at the market

   b. *manena 'meet'; *mitsena* = m.i.tsena 'meet'.

Similarly *mifanerasera* 'to communicate' appears derived from **manerasera*, non-existent,
(indeed the apparent root *sera* no longer exists, *serasera* is (one of many) frozen
reduplications).

1.4 Reciprocal verbs which differ in meaning from their non-reciprocal source

14 a. mifampitaritarika any an-tsena any ny tovolahy   'same meaning as (12a)'

   b. mitarika / mitaritarika an-dRanaivo any an-tsena Rabe

     Rabe leads/guides Ranaivo in the market

   c. [$_{P1}$mitaritarika [if]] [Ranaivo sy Rabe]   **R & R lead each other in the market*

     Ranaivo and Rabe moved around helter-skelter in the market

So in (14a) the root *tarika* 'lead' accepts the AV *mi* prefix, optionally reduplicates, but both
uses mean 'lead, guide' not 'enter pele-mele'. So if we thought to interpret the meaning of
(14a) using(14c) below we would not get the right meaning (interpreting *if* as EACH OTHER):

15 a. mifanisa (m.if.an.isa)   ny ankizivavy sy   ny ankizilahy ao am-pianara.nay

        pres.rec.av.count det girls   and det boys   there at-class.our

   There are the same number of boys as girls in our class

b. manisa ny mpianatra tonga ny mpampianatra

   The teacher counts the students (who) arrive

So *manisa* means to count, its reciprocal *mifanisa* does not mean "Each counts the other(s)"

16 a. m.i.dera azy aho   b. m.ifamp.i.dera   hery   ny candidats

   praise him 1s.nom   demonstrate (their) force the candidates

17 a. Kopahy   ny   vovoka manototra ny akanjo.nao

   brush.off det dust   covers   det clothes.your

   Flap off the dust which covers your clothes

   b. Mifanototra hiditra ao am-pianarana ny ankizy

   The children crowded each other entering class simultaneously

So reciprocal *mifanototra* conjures images of people crowding each other, whereas non-reciprocal *manototra* (*m.an.tototra*) means to fill in, cover. A more striking case is the interrogative verb *maninona?* 'What (are you) doing?' and its "reciprocal" *Mifaninona?* 'What kin relation are you (pl)?'

2. Some Syntactic Properties of Reciprocal Formation
2.1 Possessive Head Incorporation feeds Reciprocalization

   Keenan & Ralalaoherivony 2000 discuss a highly productive process of Possessor Raising with incorporation of the head of an absolutive possessive DP into the predicate:

18 a. Tery [ny trano.nay]   b. [Tery trano] izahay

   tight det house.our.excl   Tight house we.excl

   Our house is cramped   *We are house-cramped*

Raising + Incorporation from Object also occurs productively and feeds Reciprocal Formation:

19 a. mandidy [ny nonon'i Soa] ny dokotera b. [mandidy nono] an'i Soa ny dokotera

  m.av.cuts det breast'art Soa det doctor   m.av.cuts breast acc'art Soa det doctor

20 a. mandrirotra ny volon'i Soa i Vao   b. mandriro-bolo an'i Soa i Vao

  pres.act.pull det hair'art Soa art Vao   pres.pull-hair acc'at Soa art Vao

  Vao is pulling Soa's hair   *Vao is hair-pulling Soa*

 c. mifandriro-bolo i Soa sy i Vao *Soa and Vao are hair-pulling each other*

  pres.rec.av.pull-hair art Soa and art Vao

Similarly we have: *nifanongotra nify Rasoa sy Ravelo* 'R&R reciprocally teeth extracted'; *mifankahita toetra Rasoa sy ny vadiny* 'Rasoa and her husband know each other's character'. Note that the possessive head may separate from a non-active host verb when the Agent phrase is present:

21 a. Tsy fantatro izay ifandroritan'ny zazavavy volo

  not know.pass.1s comp rec.pull.CV'det young.women hair

  I don't know why the women pulled e.o.'s hair

 b. Nahagaga anay ny nifanongotan'izy ireo   nify

  surprised us det pst.rec.AV.pull.CV'3dem.pl teeth

  Their mutual pulling of teeth surprised us

 c. Nampalahelo anay ny nifandroritan'i Soa sy i Vao volo

  cause-sad us.acc det pst.rec.AV.pull.CV Soa & Vao hair

  Soa & Vao's mutual hair-pulling saddened us

This separation supports the syntactic nature of PHI. Sometimes a derived form is acceptable but the intermediate stage is not (cf *Ed is said to be a thief* vs. ??*They say Ed to be a thief*):

22 a. mifangala-bady (m.if.aN.halatra-vady) Rabe sy Ranaivo

  rec. steal-spouse pres.rec.AV.booty-spouse Rabe and Ranaivo

  Rabe & Ranaivo steal e.o.'s spouses

b. *mangala-bady an-dRanaivo Rabe

   Rabe spouse-steals Ranaivo

(Choosing *bola* < *vola* 'money' instead of *bady* < *vady*, renders (22b) fine, so the * is erratic). Raising + Incorporation is not totally free: Raising from subject predicates tend to be individual level, not stage level, and so the possession is often inalienable rather than transitory. Still, this sequence of operations is very widely used, and can iterate at least once (23b). We even managed an acceptance for 23c, whose verb straddles the performance boundary:

23 a. Lavitra tokoa [ny lalana halehanay (h.a.leha.nay)]

    far   very det route   fut.TV.go.our-excl

    The route we have to take is very long

  b. [Lavi-dalan-kaleha tokoa] izahay

     far -route-fut.go   very   1pl.excl

     We have a long way to go

  c. Nampifampifandaka (n+amp+if+amp+if+aN+daka)   zanaka isika

                      pst+cause+rec+cause+rec+AV+kick child   we.incl

    We made each other's children kick each other

2.2 ECM/Raising to Object (R-to-O) feeds Reciprocalization and vice-versa

24 a. Miahiahy Rasoa fa   manitsakitsaka azy Rabe

     suspects   Rasoa that deceives   her Rabe

    Rasoa suspects that Rabe is deceiving her

  b. [Miahiahy an-dRabe ho manitsakitsaka azy] Rasoa

     suspects acc-Rabe   HO deceives   her Rasoa

     Rasoa suspects Rabe of deceiving her

c. Mifampiahiahy ho manitsakitsaka / mifanitsakitsaka Rabe sy Rasoa

rec.suspect   HO deceive   deceive e.o.   Rabe and Rasoa

Rabe and Rasoa suspect each other of deceiving each other

d. Milaza   an-dRabe sy Rasoa ho mifampiahiahy   ho mifanitsakitsaka Ravao

pres.AV.says acc-Rabe and Rasoa HO pres.rec.AV.suspect HO pres.rec.AV.deceive Ravao

Ravao says Rabe and Rasoa (to) suspect each other of deceiving e.o. (mutual adultery)

e. Lazain-dRavao   ho mifampiahiahy ho mifanitsakitsaka Rabe sy   Rasoa

pres.say.PV-Ravao HO suspect e.o   HO deceive e.o.   Rabe and Rasoa

Rabe and Rasoa are said by Ravao to suspect e.o. of deceiving e.o.

f. ny mpifampiahiahy ho mifanitsakitsaka

det nom.rec.cause.suspect HO deceive e.o.

the ones who suspect e.o. of adultery

g. ny mpifanome toky hifamelona

det nom.rec.AV.give trust support e.o.

the ones who promised e.o. to support e.o.

h. Mandre   an-dRabe sy Ranaivo   mifamaly (m.if.aN.valy)   aho

pres.AV.hear acc-Rabe and Ranaivo   pres.rec.AV.respond I

I hear Rabe and Ranaivo disputing with each other

So, (24d), the derived reciprocal subject in (24c) can R-to-O and then, (24e), passivize to subject. Paul and Rabaovololona 1998, cite in this paradigm *mihevitra* 'think', *milaza* 'say', *mino* 'believe', ...

So Reciprocalization is syntactic as it applies to syntactically created predicates. (Reciprocalizing the matrix verb in (24a) is ungrammatical). Whence Patient Passives, (24e), Agent Nominals, (24f,g) and Causativization (below) may apply in the syntax, as they apply after it.

2.3 Causative *amp-* (*ank-*) forms AV verbs from AV verbs, increasing arity by one (as does CV), as with morphological causatives generally (Turkish, Japanese). The subject argument of the causativized verb becomes accusative, and any preexisting accusatives remain. Causative verbs are active: *m-* in present tense, *-a* suffix imperatives (like reciprocals).

25 a. Nandihy   izy   b. nampandihy   azy aho

     pst.AV.dance 3s   pst.caus.AV.dance him I

     S/He danced   *I made him dance"*

26 a. manasa (m.aN.sasa) lamba   izy   b. mampanasa (m.amp.aN.sasa)   lamba   azy aho

     wash   clothes he   pres.cause.AV.wash   clothes him I

     He is washing clothes   *I am making him wash clothes*

Causativizing ditransitive verbs yielding four arguments is unproblematic, and even iterating *amp-* (once) is grammatical (but heavy):

27 a. Nanome vola azy aho   b. Nampanome vola an-dRabe azy aho

     gave money him I   made-give money acc-Rabe him I

     I gave him money   *I made him give money to R*

   c. mampandroso vary ny vahiny an-dRasoa Rabe

     cause-offer   rice the guest   acc-Rasoa Rabe

     Rabe made Rasoa offer rice to the guests

   d. m.amp.amp.i.homehy   azy   an-dRabe aho

     pres.caus.caus.AV.laugh 3acc acc-Rabe I

     I made Rabe make him laugh

Causatives and Reciprocals commute syntactically: Rahajarizafy 1960, Cousins 1885. But semantically **IFoAMP ≠ AMPoIF**. Ditto for Futunan (Moyse-Faurie) and Chicewa (Mchombo)

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28 a. Nifampanoratra (n.if.amp.an.soratra)   taratasy fisaorana ireo ben'ny tanana ireo

                  pst-rec+caus+AV-write letter   thanks   those mayor   those

   Those mayors made each other write thank-you letters

   b. Nampifanoratra   an'ireo   zanany   ireo ny rainy

   pst+cause+rec+AV+write acc'those children.his those the father.their

   Their father made his children write to each other

29. Mfûmu i+na+mény+án+its+á   anyăni   Chicewa (Bantu); DMP

   9chief   9sub+pst+hit+rec+cause+fv 2baboons

   The chief made the baboons hit each other

   Alenje   a+na+mény+ets+an+a   (kw á mûbzi)

   2hunters 2sub+past+hit+cause+rec+fv (by 10goats)

   The hunters got each other hit (by the goats)

30. a. na faka-fe-'u'uti-'aki a   le *sā* kuli e le toe   Futunan; Claire Moyse-Faurie

    pst cause-rec-bite-rec abs art clsf dog erg art child (Oceanic; E. Malayo-Polynesian)

    The child made the two dogs bite each other

   b. e fe-faka-gakulu'aki   a le sā toe

    3 rec-cause-move.slightly'rec abs art clsf child

    The two children made e.o. move a little

In causatives of reciprocals, e.g. (28b), the antecedent of reciprocal *if* is the surface object, not the subject, which is the Agent of the causativized verb. This pattern holds for reflexives as well:

31. a. Nampamono   tena an-dRabe ianao

    pst.caus.aN.kill self acc-Rabe 2s.nom

    You made Rabe kill/hit himself

2.3.1 Causatives of Reciprocals take Passive -INA and Circumstantial -ANA

32 a. Tokony *h.amp.if.an.entan.ina*   ve ny isan'ny olom-boafidy sy ny isan'ny mponina?

     Should [fut+[[cause+[rec+AV+entana]]+PV]] Q the number'of officials elected and the

     number'of the inhabitants be made to correspond to e.o.? (Newspaper 1992-95)

  b. ny taratasy *nampifanoratan*-dRabe (n+amp+if+an+soratra+ana+Rabe) ny zanany

    the letters   pst+cause+rec+AV+soratra+CV-Rabe   the children.his

    the letter(s) that Rabe made his children write to each other

    (*The letters that were caused by Rabe to be written by his children to e.o.*)

  c. ny teny vahiny nifampianarantsika   (n +   ifamp + i + anatra + ana + ntsika)

    the foreign lgs taught to each other by us   pst + [[rec+AV+study]+CV+1pl.incl.gen]

NB: (32c) shows that reciprocals of causatives undergo Circumstantial Formation and (32a) shows that *-ina* passives (PV) can be formed after Reciprocalization and Causativization, so these operations can apply in the syntax as well. At the lexical level *-ina* exhibits irregularities and some suppletion so it applies also in the lexicon. So little if any bound morphology is limited to the lexicon.

2.3.2 Iterating Causative and Reciprocals?

    (28a,b) show that causative creating AMP applies to active verbs built from reciprocal IF and conversely, so in principle they should iterate.

33 a. Nandaka (n+aN+daka) azy   isika   b. N.if.an.daka   isika

    pst+AV+kick   3acc we.incl   pst+rec+AV+kick we.incl

    We kicked him   *We kicked each other*

  c. Nampifandaka (n+amp+if+aN+daka) antsika   Rabe

          pst+cause+rec-af+kick   us.acc.incl Rabe

  Rabe made us kick each other

    d. Nifampifandaka (n+if+amp+if+aN+daka)   isika

                           pst+rec+cause+rec+AV+kick we.incl

We made each other kick each other

    d′. N.if.amp.if.an.oratra   taratasy fisaorana Rabe sy Rakoto   (Built from 28b)

        pst.rec.cause.rec.AV.write letter   thanks   Rabe and Rakoto

Each of Rabe and Rakoto brought it about that the other had letters of thanks written

    e. N.amp.if.amp.an.oratra   taratasy azy ireo   aho   (Built from 28a)

        pst.caus.rec.caus.AV.write letter   3acc dem.pl 1s.nom

I obliged them to have letters written to each other

Educated non-linguists start pausing at (33d); structural linguists smile but do not reject it – it is well formed morphosyntactically and compositionally interpreted. So we count it grammatical, though it is pushing the performance boundary. Another example that was interpreted correctly with only modest exasperation was (34b). (34c) seems clearly to cross the performance boundary:

34 a. Mampifanome vola   an-dRabe sy Rakoto aho

        m.rec.give   money   acc-Rabe and Rakoto 1s.nom

      I had R and R give each other money

    b. M.if.amp.if.an.ome   vola   Rabe sy Rakoto

        m.rec.caus.rec.AV.give money Rabe and Rakoto

      Each of R and R had the other given money

    c. M.amp.if.amp.if.an.ome   vola   azy ireo   aho

        m.caus.rec.caus.rec.AV.give money 3acc dem.pl I

      I made them each have the other given money

2.4 Circumstantial verbs (CV), as in (32b,c) are formed with complete productivity by suffixing -*ana* to an AV verb, sometimes modifying the last consonant of the root or inducing

an epenthetic consonant. The subject DP is non-subcategorized: locative, instrumental, temporal, manner, reason,...

35 a. n.an.enjika   azy   tamin'io   fiara io   Rabe
       pst.AV.chase him.acc pst.with'that car   that Rabe
       Rabe chased him with that car

   b. n.if.an.enjika   tamin'ireto   fiara ireto Rabe sy Rakoto
      pst.rec.AV.chase pst.prep'those car those Rabe and Rakoto
      R and R chased e.o. in those cars

   c. N+aN+enjika+ana+Rabe (nanenjehan-dRabe) azy   io   fiara io
      pst+[[AV chase]+CV]+Rabe   him.acc that car   that
      That car was used by Rabe to chase him (Rabe ≠ him)

   d. nifanenjehan-dRabe sy Rakoto ireto   fiara ireto
      pst.rec.AV.chase.CV-R and R   dem.pl car   dem.pl
      Those cars were used by R & R to chase each other in

   e. ny fiara (izay) nifanenjehan-dRabe   sy   Rakoto
      the car (that) pst+rec+AV+chase+CV.Rabe and Rakoto
      the car(s) in which R & R chased each other

NB Whenever we relativize (question, cleft) an oblique, or even an object, of a reciprocal verb it will be put in the CV. Thus expressions like (35d) and (36a,b,c) are common and natural.

36 a. ny soa (izay) nifanaovantsika   (n+if+aN+tao+ana+ntsika)
      the good (that) was done by us to e.o.   pst+[[rec+AV+do]+CV]+our.incl

   b. ny taratasy nifanoratan-dRabe sy Rasoa   (n+if+aN+soratra+ana+R&R)
      the letters written to e.o by Rabe & Rasoa   pst+[[rec+AV+write]+CV]+R&R

c. – Nahoana izy ireo no tsy hifanampy?

   why   they   foc not fut.rec.AV.help?

   Why don't they help each other?

 – Tsy fantatro   izay   tsy h.if.an.ampi.a.ny

   Not known.by.me comp not fut.rec.AV.help.CV.3gen

   I don't know why they don't help each other

2.5 Circumstantial Nominalizations (Ntelitheos 2012 is a careful book length study).

    Prefixing (tenselsss) CV verbs with *f* yields a gerundive nominal. It preserves the
subcategorization and case marking of its verbal arguments. It is highly productive and
transparently interpreted. *If* may have a DP internal antecedent or may lack an antecedent and
be interpreted as "mutual".

37 a. Mifanolotra (m.if.aN.tolotra) f.an.omez.ana   isan-taona isika

                pres.rec.AV.offer   nom.AV.give.CV each-year we.incl

    We offer e.o. gifts each-year

  b. Ho.tohizana   ny fifanolorantsika (f.if.aN.tolotra.ana.ntsika) fanomezana isan-taona

     fut.continued det   nom.rec.AV.offer.CV.our   gifts   each-year

     Our mutual offering of gifts each year will be continued (textual example)

  c. f.if.anka.tiav.ana 'mutual love'; ny fifankatiavan-dRabe   sy   Rasoa

     nom.rec.caus.love.CV   det mutual love-gen.Rabe and Rasoa

                                        Rabe & Rasoa's mutual love

38 a. Nanameloka ny fifamonoana (f.if.aN.vono.ana) niseho   tany   Rwanda ny ONU

     condemned the genocide   nom.rec.AV.kill.CV happened pst.there Rwanda det U.N.

     The U.N. condemned the mutual killings (which) happened in Rwanda

  b. Ny fifandirana (f.if.aN.ditra.ana)   ela   loatra no   tsy mampiroso ny dinika

     det squabbling nom.rec.AV.dispute.CV long too   FOC not advance   det careful.study

This continual squabbling hinders the deliberations

(lit: not make-advance = make not advance)

c. Ny polisin'ny   tanàna no   mandamina ny fifamoivoizana (f.if.aN.voivoy.ana)

det police'gen.det town   FOC control   det traffic   (nom.rec.AV.shuffle.CV)

d. Fifanampiana Malagasy 'Malagasy Mutual Aid (Society)'

(F.if.aN.ampy.ana = nom.rec.AV.aid.CV)

Morphological reciprocal verbs also nominalize in Chicewa (Mchombo) and Futunan (Moyse-Faurie).

2.6 Agent nominalizations are formed by prefixing AV verbs, including reciprocals of causatives, so the agentive reciprocal marker *mp-* applies to both lexical and phrasal verbs.

39 a. Mianatra 'studies' ⇒ mpianatra 'student'

  b. Mampianatra 'cause to study' ⇒ mpampianatra 'teacher'

  c. Mifanampy 'help e.o.' ⇒ mpifanampy 'people who are helping e.o.'

  d. Mifankahalala 'detest e.o.' ⇒ mpifankahalala 'people who detest e.o.'

  e. Mifankatia 'love e.o.' ⇒ mpifankatia 'lovers'

  f. Mifanome vola 'give e.o. money' ⇒ mpifanome vola 'givers of money to e.o.

  g. Mifampilaza ho mpangalatra 'call e.o. thieves' ⇒

      mpifampilaza ho mpangalatra 'people who call each other thieves'

40 a. ny   mpampianatra (mp.amp.i.anatra) ahy   "my teacher" lit: the teacher me

      det teacher   er.caus.AV.study 1s.acc

  b. ny mpampianatro = 'the teacher-my' (the teacher I "possess" e.g. hired)

2.7 Reciprocal predicates host subordinate verb raising

    We commonly find in Malagasy discourse an S followed by a sequence of [subordinator + VP] whose understood subjects are the same as that of the initial VP.

41 a. Tsy nanatrika   ny fety Rabe satria   narary

      not pst.AV.attend det party Rabe because was.sick

      R didn't attend the party as (he was) sick

  b. Mihevitra   Rabe fa   hahazo   ny valisoa

      pres.AV.think Rabe that fut.receive det prize

      Rabe thinks that (he) will get the prize

  c. Diso   hevitra ianao raha mino   izany

      wrong thought 2.s   if   believe that

      You are mistaken if (you) believe that

42 a. Mampanantena an'i   Koto ny zokiny   fa   ho azony   ny valisoa

      cause.hope acc'art Koto   det elder sibling comp fut receive.pass.3gen the prize

      His elder sibling promises Koto that the prize will be received by him

  b. Mifampanantena   i Koto sy ny zokiny   fa   hahazo   ny valisoa

      pres.rec.caus.hope art Koto and det elder sibling.his comp fut.AV.receive det prize

      Koto and his elder sibling promise each other that he (the other) will get the prize

  c. Mifampanantena hahazo   ny valisoa i Koto   sy   ny zokiny

      rec.hope   fut.receive the prize   art Koto and det elder sibling of his

The main predicates in (42b,c) are reciprocal and syntactically complex. We are clearly just
touching serious binding patterns here. We note cases where both the matrix and "lower"
verb are reciprocal and In (43c) we have a complex reciprocal predicate with reciprocality
marked twice, once on each verb.

43 a. Manome toky Rabe fa   hamelona an-dRasoa

      AV.give   trust Rabe comp fut.AV.live acc-Rasoa

      Rabe promises that (he) will support Rasoa

b. Mifanome toky Rabe sy Rasoa fa hifamelona

    m.rec.AV.give trust Rabe and Rasoa comp fut.rec.AV.live

    R&R promise e.o. that (they) will support e.o.

c. Mifanome toky hifamelona Rabe sy Rasoa

    Rabe and Rasoa promise e.o. to support e.o.

d. mpifanome toky hifamelona

    nom.rec.AV.give trust fut.rec.AV.live

    ones who give e.o. trust they will support e.o.

3. Further syntactic properties of reciprocal predicates

3.1 Coordination

    Reciprocal predicates coordinate well with each other but not well with non-reciprocal ones. But a reciprocal subject does license the absence of a distributive subject in a subordinate clause (45b).

44 ny fanaovana fanasana [ifampiarahabana sy [ifampirariana soa]] amin'ny mpiara-miasa ...

   the doing banquets in which they and the people who work with them greet each other

   and wish each other well ...   (newspaper example)

45 a. Nifampiarahaba sy   nifampitsiky   izahay

    greeted e.o.   and   smiled at e.o. we.excl

    We greeted e.o. and smiled (at e.o.)

b. Nifampiarahaba ny olona   dia   naka toerana

    greeted e.o.   det people and.then took places

    The people greeted e.o. and took their places

3.2 Tensed VP Sequences: Voice Harmony

    Malagasy does not distinguish an infinitival form of a verb from a voiced tensed form, so it presents a variety of predicate types headed by sequences of overtly tensed verbs. One such

is as in (46) where the second verb functions adverbially (see Kalin and Keenan 2011).

46 a. Mihinana   mitsangana   Rabe
      pres.AV.eat pres.AV.stand Rabe
      Rabe is eating standing up

  b. Mihinana   sy mifampiresaka   mitsangana   Rabe sy Ranaivo
     pres.AV eat and pres.rec.AV.converse pres.AV. stand Rabe and Ranaivo
     Rabe and Ranaivo are eating and conversing standing up

Tensed verb sequences cover cases of control in English. It seems rather natural to treat a verbal sequence as a single complex predicate whose arity is determined by the last verb and whose tense is determined by that on the initial verb, the tense on a later verb being determined as a function of that of the previous one. Verbs like *mikasa* 'intends', *mitady* 'seeks to', *maniry* 'wants', *mikendry* 'plans' form such complex predicates bound to the same subject and governing future tense (regardless of voice). Relativizing (etc) on an argument of the final verb triggers appropriate voice on all the verbs in the chain – Voice Harmony. Here is an example. (Caveat: Iceberg ahead!).

47 a. Nikasa   hifanampy hitsara   ny fanadinana izahay   omaly   (All verbs AV)
     pst.intend fut.rec.help fut.judge det exam   we.excl/nom yesterday
     We intended to help each other grade the exams yesterday

  b. ny fanadinana (izay) no.kas.ai.nay   h.if.an.ampi.ana   ho.tsara.ina   omaly
    det exam   comp pst.intend.PV.our.excl fut.rec.AV.help.CV fut.judge.PV yesterday
    the exams that we intended to help each other grade yesterday
    lit: *the exams that intended by us to be helped by each other to be corrected yesterday*

  c. Omaly   no n.i.kasa.n.tsika   h.if.an.ampi.ana   hitsarana   ireo fanadinana ireo
     yesterday FOC pst.AV.intend.CV.our fut.rec.AV.help.CV fut.AV.judge.CV dem exam dem
    It was yesterday that we intended to help each other grade those exams

A commonly cited (e.g. Rajaobelina 1960) paraphrase of control as in (48a) uses VP nominalization:

48 a. Maniry   hiala   sigara   aho   *I want to quit smoking*
    pres.AV.desire fut.AV.leave cigarettes 1s.nom

  b. Maniry   [ny hiala sigara]   aho   *I want to quit smoking*
    pres.AV.desire [det fut.AV.leave cigarettes] 1s.nom

  c. [Iriko (iry.ina.ko) hialana   ny sigara   *I want to quit smoking*
    desire.PV.1s.gen fut.leave.PV det cigarettes

  d. Iriko   [_{DP} ny hiala   sigara]   *I want to quit smoking*
    desire.PV.,by.me [det fut. AV. leave cigarettes]

The subject of (48a,b) is "I", that of (48c) is "the cigarettes" and that of (48d) is the DP "the future quitting smoking".   Tensed predicates host Dets like *ny* 'the' or demonstratives like *io...io* 'that' to form a DP.   The DP boundary breaks the verbal sequence so the voice of the verb within the DP is AV, independent of that of the matrix verb, which is passive (PV). This use of the DP boundary applies in our more complex examples. Thus (47c) with all verbs circumstantial, is paraphrased by (48e):

  e. Omaly   no nikasantsika [ny hifanampy   hitsara   ireo fanadinana ireo]
    yesterday FOC intend.CV.our [det fut.rec.AV.help fut.AV.judge those exam   those]
    It was yesterday that we intended the helping of each other to grade the exams.

4. Malagasy Reciprocals compared with those of other languages

Here we note a bit randomly how Malagasy behaves relative to various properties discussed for reciprocals in other languages.

4.1 Is reciprocal -if- an anaphor moved into the verb in the syntax?

It has been suggested to me that as in (49a) we might treat *-if-* as an object pronoun interpreted as EACH OTHER. It would later move to incorporate into the verb, (49b):

49 a. Manaja (m+an+haja) azy$_i$ Rabe$_j$ *Rabe respects him* (i ≠ j)

    b. Mif$_j$anaja [e$_j$] [Rabe sy Rakoto]$_j$ *Rabe and Rakoto respect each other*

But there are many reasons to reject this analysis. First, the personal pronouns distinguish three cases: nominative, accusative, and genitive. They vary with person and number. But *-if-* is morphologically constant, showing none of these pronominal attributes. Further verbs do not incorporate pronouns (though possessors, including pronominal ones, are linked to the end of the verb). So verbs vary in form with tense, aspect and voice but not with person or number. Note that *-if-* does not impose a plural requirement on its subject, as the use of the comitative construction with a singular subject is common:

50 a.   Mifanaraka   hevitra aminao   aho   *I rec-agree with you / We agree with e.o.*

      pres.rec.AV.follow thought with.your I

  b. Nifankahita   t.amin-dRabe Rakoto   *Rakoto reciprocally saw Rabe*

      pst.rec.AV.see pst.with-Rabe Rakoto

    Second, we have already noted that in several cases the semantic interpretation of a reciprocal verb is somewhat idiosyncratic, not that predicted by rendering symmetric the relation denoted by the underlying non-reciprocal verb. *Manisa* means to count, but reciprocal *mifanisa* does not mean to (mutually) count each other. Rather it is better rendered as "divide in half".

    Third, and even worse, we noted several cases above where the underlying non-reciprocal verb simply does not exist and so has no interpretation that we could enrich by forcing it to be symmetric. That is (51b) does not provide a semantic basis for interpreting (51a) as the Malagasy speaker does not assign an interpretation to *manena:

51 a. mifanena any an-tsekoly Rabe sy Rasoa   b. *[manena [if]] any an-tsekoly R sy R

      meet e.o. there at-school Rabe and Rasoa

    Fourth the existence of an object comparison reading in Ss like (52) has been held to justify the existence of a reciprocal anaphor in object position. And as indicated Malagasy lacks this reading:

52. Mifankatia (m.ifank.tia) kokoa Rabe sy Rasoa   noho   Ranaivo sy Ravao

             pres.rec.like more Rabe and Rasoa than/against Ranaivo and Ravao

   Rabe and Rasoa like e.o more than Ranaivo and Ravao like e.o   (Subject Comp)

   *Rabe and Rasoa like e.o. more than they like Ranaivo and Ravao   (Object Comp)

    Fifth Malagasy does not support the "I" reading in cases like (54):

53 a. John and Mary think they love each other

    b. John and Mary each think "We love each other"   ("We" reading)

    c. John thinks he loves Mary and she thinks she loves him   ("I" reading)

54   Mihevitra Rabe sy Rasoa   fa   mifankatia   *R & R think that they love e.o.*

    pres.AV.think Rabe and Rasoa comp love e.o.

    Each thinks "we love each other" – no other reading

HLM represent the scope ambiguity in (53a) using *each other* as an object anaphor and moving *each* to different landing sites. This assumes *each other* is in argument position. So the absence of a reciprocal anaphor in Malagasy is consistent with the absence of an object comparison reading. Also reciprocal *if* in Malagasy is synchronically monomorphemic, so no movement of "each" can be appealed to. (But historically the Malagasy reciprocal reconstructs to *fai* (Blust, pc < *paRi*). (cf Futunan *fe-*). Perhaps the *i* in *if* is just the active voice *i-* and the diphthong *ai* assimilates to the following vowel.

     Sixth, on the *if* = anaphor view the reciprocal allomorphy is unexpected as pronouns do not vary in shape with the active prefix of their governing verb: *ma̲nenjika a̲zy izy* lit: chases him he; *mi̲kapoka a̲zy izy* 'beats him he'; *ma̲hita a̲zy izy* 'sees him he'. Additional reasons for rejecting the *if* = anaphor view are given in Keenan & Razafimamonjy 2004. Here is just the most obvious one: *if* does not occur in argument positions:

55 a. *[Niarahaba [if]] isika   b. Niarahaba azy isika

     greeted   EO we.incl   greeted   him we.incl

     We greeted each other   *We greeted him*

One might counter that lexically *if* must attach to a host – but that contradicts directing generating it in object position and then "compensating" by moving it. Why not do it right to begin with? Note that *if-* does not occur in argument position even when independent constraints would block movement.

56 a. Niarahaba azy sy ny vadiny   isika   b. *Niarahaba if sy ny vadiny   isika
    greeted   him and the spouse.his we.incl   greeted   e.o. and the spouse.his we

4.2 Semantic diversity: Chaining and Inanimates

57 a. mifandimby (m+if+ aN+dimby)   ny taona   *The years follow upon one another*
        m+rec+AV+successor det year

   b. Ohatra ny zaza mifanarakaraka   izahay   *We quarrel all the time (like older*
       Like   det child pres.rec.(follow)² we.excl.   *and younger siblings)*

   c. mifanapatapaka (m+if+an+tapaka²) eto ireto   roa tsipika ireto
            pres+rec+AV+cut   here dem.pl two line   dem.pl
       These two lines intersect here

   d. Mifanasaka / misasaka ny ankizilahy sy ny ankizivavy ao am-pianaranay
       The boys and the girls in our class each number half

58 a. Akaiky ny tranoko   ny azy
        near   det house.my det his
        His house is near mine

   b. mifanakaiky (m+if+ an+akaiky) ny tranonay   *Our houses are near each other*

A similar case is *tandrify* / *mifanandrify* 'be opposite (each other)'.

notation w² is the reduplication of w. It involves dropping weak endings *-ka, -na, -tra* and some consonant mutation: *tapaka² = tapatapaka*; the (non-reciprocal) AV form is

manapatapaka. Reduplication is widely used, applies to roots (and some *aN*+root) and so feeds Reciprocalization (in distinction to Chicewa where the reciprocal affixes copy under Reduplication). Reduplicating after reciprocalization in (57c) we get, incorrectly, *mifanapakapaka.

4.3 Sociatives

As reciprocals require n > 1 participants they may involve a notion of "togetherness". Of note though Malagasy presents a specifically sociative prefix derived from the verb *miaraka* 'to do or be together' which occurs outside tense morphology resulting in derived verbs with tense marked twice..

59 a. miaraka (m+i+araka)   izahay   *We are together*
        pres+AV+follow we.excl

  b. miasa (m+i+asa)   izy   ireo   *They are working*
        pres+AV+work 3nom dem.pl

  c. miara-miasa (m+i+ara(ka)-m+i+asa)   izahay   *We work together*
        pres+AV+follow-pres-AV-work we.excl

  d. mpiara-miasa (mp+i+ara(ka)-miasa   izahay   *We are co-workers*
        er+AV+follow-pres+AV+work we.excl

The prefixal status of *miara-* is shown by the fact that throughout the language compounding w+w′ triggers the loss of final *-ka*, *-tra*, and *-na* on w, mutating an initial continuant consonant of w′ to the corresponding non-continuant: *manapaka+hevitra* 'decide' = *manapa-kevitra* : lit cut+thought', *mivarotra+hena = mivaro-kena* 'sells meat'. But with *miaraka*+verb, usually an initial consonant on w′ just copies that on *miaraka*. So we have *hiara-hiasa*, *hiara-hihira* 'will jointly work, sing, etc. rather than *hiara-kiasa, hiara-kihira*.

4.4 Affixless Reciprocals

Malagasy presents lexical verbs which incorporate mutual participation. They optionallly take reciprocal morphology with no change in meaning.

60 a. mipaka (m+i+paka) / mikaona (m+i+kaona) ireo   hazofisaka ireo

      M+AV+touch   M+AV+join   these boards   these

   These boards touch / are joined

  b. m<u>ifamp</u>ipaka (m+ifamp+i+paka) / m+<u>ifamp</u>+i+kaona ireo hazofisaka ireo

   These boards touch / are joined to each other

  c. M<u>if</u>anasaka / misasaka ny ankizilahy sy ny ankizivavy ao am-pianaranay

   The boys and the girls in our class each number half

4.5 Event quantifiers

    Ss like (61a) are not felt as ambiguous as between (61b) and (61c), the adverbs there just add new information.

61 a. Nifandaka (n.if.an.daka)   intelo   Rabe sy Rakoto

            pst.rec.AV.kick 3 times Rabe and Rakoto

   Rabe and Rakoto kicked e.o. three times

  b. Nifandaka intelo <u>nisesy</u> Rabe sy Rakoto

   They kicked each other three times <u>in a row</u>

  c. Nifandaka intelo <u>avy</u> Rabe sy Rakoto

   They kicked each other three times <u>each</u>

4.6 Quantified antecedents

    Worth noting that reciprocal P1s accept quantified DP antecedents just as non-reciprocal ones do (see Keenan 2008, Paul 2012).

62. Mifankahazo / Mifanentana   ny mpianatra rehetra (ao an-dakilasy)

   get-along-with e.o / get-along-with e.o. det student   all   (there in-class)

   The students in the class all get along with each other

ny mpianatra rehetra 'det student all' can be replaced by: *ny ankamaroan'ny mpianatra* 'the majority of the students', *ny mpianatra vitsivitsy* 'few students', *ny antsasaky ny mpianatra* 'half the students', *ny valompolo isan-zaton'ny mpianatra* '80% of the students, *ny roa ampahatelon'ny mpianatra* 'two thirds of the students'. Often non-increasing DPs are expressed predicatively:

63 a. Tsy nisy afa-panadinana ny mpianatra na iray aza

     not was/had free-exam det student   or one even

     No student at all passed the exam

  b. Antsasaky ny mpianatra katroka no   m.if.an.entana

     half.gen   det student   exactly FOC get along with each other

     Exactly half the students get along with each other

4.7 A Closing note on reciprocal imperatives

   We have claimed that reciprocals are active in voice and take their imperative with -a, shifting stress. When we put them in the circumstantial form they take their imperatives with -o/-y, as indicated.

64 a. Manao (m.an.tao) farafara ho azy   Rabe

        pres.AV.do   bed   for 3acc Rabe

   Rabe is making beds for him/them

  b. Manaova (m.an.taov.a) farafara ho azy!

         pres.AV.do.imp

   Make beds for him/them!

65 a. Mifanao (m.if.an.tao) farafara Rabe sy Rajaona

        pres.rec.AV.do

   R and R are making beds for e.o.

b. Mifanaova (m.if.an.taov.a) farafara!

       pres.rec.AV.do.imp

Make beds for each other!

66 a. ifanaovan-dRabe sy Rakoto farafara ity vy   ity

      rec.make.CV R   and R   bed   this metal this

      This metal is used by R&R to make e.o beds

  b. ifanaovy   farafara ity vy   ity!

      rec.make.CV.imp bed   this metal this

      Use this metal to make beds for each other!

NB: The clumsy English translations of non-active Ss serve to remind the reader that the verbs have a different voice morphology than the active one. The Malagasy sentences are fully natural. □

Conclusion

    Malagasy reciprocals are highly productive. They exhibit both classical properties of being lexical, but also enter many syntactically productive paradigms. Thus our data support a Reciprocalization operation that introduces bound morphology in the syntax and also has exponents in the lexicon.

Footnotes

1. My analysis here can be disputed on two grounds:

  (1) *amp-* and *ank-* are causative prefixes, so one might claim that we are just forming the reciprocal of a causative verb. I reject this because the causative of e.g. *miarahaba* 'greet' should have three arguments and the reciprocal two, but it only has one, so Causative has not meaningfully applied, the *amp-* morpheme just functions to carry the reciprocal. Similarly *mifampijery* 'watch e.o.' and *mifampilaza* 'say to e.o.' only have the bare reciprocal sense, not the reciprocal of causative one. Adding a second argument directly to the reciprocal is rejected by native speakers: **Mifampiarahaba azy R sy R*. We can (see later) causativize the reciprocal adding another argument: *Mampifampiarahaba azy R sy R*.

(2) The choice of active prefix is largely determined by the choice of root. Many roots do accept both *man-* and *mi-* but in general one of these, most usually the *mi-* one, is intransitive or middle (e.g. from *sasa* ⇒ *manasa* 'wash$_{tr}$' and *misasa*$_{int}$ 'wash (self)') so we do not expect to find reciprocals built from both. Traditional Malagasy grammar regards *mif-*, *mifamp-*, and *mifank-* as three reciprocal prefixes selecting different roots in general.

A last (dictionary) case: the root *ely* 'disperse'. From transitive *manely* (as in to scatter rice on the mat) we form *mifanely* 'spread e.o. out' and from *miely*, *mifampiely*. But maybe the second case is the reciprocalization of the causative verb *mampiely* 'to scatter, distribute' (not listed in the dictionary).

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Vagueness or ambiguity?
On the reflexive and reciprocal interpretation of Italian *si*-constructions[*]

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Abstract

The paper explores the question of whether Italian *si*-constructions, which can express both reflexivity and reciprocity, are vague or ambiguous between these two interpretations. The paper provides empirical support in favour of ambiguity: we show that *si*-constructions do not allow a so-called 'mixed' reading (partially reflexive and partially reciprocal), unlike what has been proposed in the literature for other languages that convey reflexive and reciprocal meanings with the same form. Moreover, the paper explores a confound played by *lexical reflexivity*: mixed readings may emerge with verbs that have a lexical reflexive entry, due to their lexical meanings which does not require coreference between agent and patient. Therefore, we argue that such cases do not contribute to the vagueness/ambiguity question.

1   Introduction

Many languages express reflexivity and reciprocity with the same form (Lichtenberk, 1985; Nedjalkov et al., 2007; König and Gast, 2008). This is also the case with Romance languages: in Italian, for instance, both interpretations can be conveyed by the element *si* when the subject is plural: (1) can either be interpreted with Mary and Irene punishing themselves or each other. On the other hand, only a reflexive interpretation is available with a singular subject (2).[1]

(1)   Mary e   Irene si puniscono
       Mary and Irene SI punish.PRES.3PL
       'Mary and Irene punish themselves/ each other'

[1]Abbreviations used in this paper: PRES = present tense; AN = animate; INF = infinitive; AUX = auxiliary; PP = past participle.

(2)   Mary si punisce
        Mary SI punish.PRES.3S
        'Mary punishes herself'

The pattern shown above and its widespread nature led to questions about the relation between reflexivity and reciprocity in languages that express both meanings with the same form. More specifically, an issue that has been raised in the literature concerns whether such constructions are ambiguous or vague between these two interpretations. This question is not only crucial for the semantics of reflexivity and reciprocity, but also for understanding how these two meanings interact and whether they require to be analyzed independently of one another.

Some approaches suggested that constructions expressing both reflexivity and reciprocity must be *ambiguous* between the two, thus implying a lexical distinction between these two meanings (Gast and Haas, 2008; Heine and Miyashita, 2008). On the other hand, some proposals argued in favour of an analysis of such constructions in terms of *vagueness*: these works imply that reflexivity and reciprocity are only two of the possible instances of the same meaning. In support of this type of analysis, Murray (2008) argued that the Cheyenne reflexive/reciprocal affix *ahte* allows a so-called 'mixed' interpretation: a situation that is partially reflexive and partially reciprocal, such as the one depicted in Figure 1.
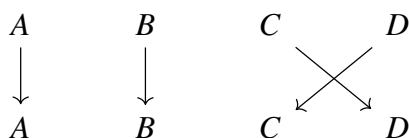
Figure 1: Schematic representation of a possible mixed reading

Accordingly, (3) can truthfully describe a situation where some children scratched themselves and some children scratched each other. Various works took up Murray's idea and went further analyzing reflexivity and reciprocity as two possible instances of the same meaning (Dotlacil, 2010; Cable, 2014; Haug and Dalrymple, 2018). These works assumed that mixed readings could potentially be available in any language that conveys reflexivity and reciprocity with the same form; yet, the empirical evidence on which they rely is not the outcome of a systematic cross-linguistic comparison, and so far there have been no claims in the literature about languages that might challenge this universal.

(3)   Ka'ėškóne-ho é-axeen-ahtse-o'o
        childPL.AN   3-scratch.AN-*ahte*-3PL.AN
        'Some children scratched themselves/ each other'

The present paper contributes to this line of research by focusing on the relation between reflexivity and reciprocity in Italian. We present empirical data in favour of ambiguity, showing that Italian *si*-constructions do not generally support the so-called 'mixed interpretation' exemplified in the Cheyenne example in (3). Moreover, this paper illustrates a confound that plays a crucial role with respect to the availability of mixed interpretation in Italian, namely *lexical reflexivity*. It will be shown that mixed readings do sometimes emerge in Italian *si*-constructions, but only with verbs that have a lexical reflexive entry, such as *wash* or *dress up*. We argue that such cases should not be taken as a general strategy: lexical reflexive verbs leave underspecified whether the agent is distinct from the patient or not (Doron and Rappaport Hovav, 2009), thus the availability of mixed readings with these verbs is a a semantic epiphenomenon of the meaning denoted by their lexical entry.

The paper is structured as follows. In §2 we will provide a brief overview of the notions of vagueness or ambiguity. In §3 we will explore the confound created by lexical reflexivity in the interpretation of Italian *si*-constructions: we will first draw a distinction between lexical and grammatical reflexivity and argue that in the former the grammatical subject does not necessarily function as the agent and patient of the action described by the verb (Doron and Rappaport Hovav, 2009). As a result, lexical reflexive verbs do allow a variety of interpretations with a plural subject, including the so-called 'mixed' interpretation. In §4 we present the results of a questionnaire showing that mixed interpretations are available with lexical reflexive verbs, but only marginally accepted with grammatical reflexives. We discuss the findings as support for ambiguity of *si*-constructions. In §5 we provide general conclusions.

2   A brief note on vagueness and ambiguity

Vagueness and ambiguity are two notions that have been crucial in semantic research; before getting to the core of the research question of this paper, let us provide a brief overview of how these concepts are intended here.

By *ambiguity* we refer to the existence of two different semantic representations. For instance, with respect to the reflexivity/reciprocity distinction, ambiguity translates into two different operators for these two meanings: an operator conveying reflexivity and an operator conveying reciprocity. By *vagueness*, we indicate that a meaning is underspecified enough to cover different types of situations. With respect to the reflexivity/reciprocity question, ambiguity would be defined in terms of one single operator, covering both reflexive and reciprocal situations. There are different syntactic and semantic tests to distinguish between vagueness and ambiguity; for the sake of this paper, let us introduce the identity

test.

2.1 The identity test

The *identity test* (Zwicky and Sadock, 1975) is a variation of the more well-known *zeugma test* (discussed in Lakoff (1970), Tuggy (1993), inter alia) which relies on conjunction reduction. The idea underlying the identity test is that if two different interpretations of the same predicate are available when applied to a conjoined argument, then the predicate is vague between the two senses, otherwise it is ambiguous. Let us provide an example. The possibility of the sentence in (4) to accurately describe a context where A is a girl and B is a boy, suggests that the lexical item *child* must be vague in terms of gender. On the other hand, (5) cannot truthfully describe a situation where A refers to a financial institution and B refers to a river bank: the fact that the lexical item *bank* in (5) cannot cover the two different senses simultaneously suggests that it must be ambiguous between these two instances of *bank*.

Similarly, if we apply the identity test to a reflexive/reciprocal interpretation, we see that (6) cannot describe a situation where Mary and Irene punished each other while Lisa and Linda punished themselves.

(4) A and B are children
     (context: A is a girl and B is a boy)

(5) #A and B are banks
     (context: A is a monetary institution and B is a river bank)

(6) #Mary, Irene, Lisa e   Linda si puniscono
     Mary, Irene, Lisa and Linda SI punish.PRES.3PL
     'Mary, Irene, Lisa and Linda punish each other/themselves'
     (context: M and I punish each other, L and L punish themselves)

The construction in (6) could accurately refer to a situation where each of the individuals in the subject punished herself, or to situations where they punished each other. However, the reflexive and the reciprocal interpretations do not seem concurrently accessible, and a 'mixed' reflexive/reciprocal situation, such as the one previously represented in Figure 1, seems to be ruled out. The fact that such a scenario fails to be truthfully described by (6) suggests that *si*-constructions must be ambiguous between these two interpretations.

In an apparent contradiction with this claim, it has been assumed in the literature that Romance languages, including Italian, could allow mixed readings (Cable, 2014). In the rest of the paper, we will argue that while some verbs do allow a mixed reading in *si-*

constructions, the generalization that such a reading emerges with all verbs is inaccurate. We will propose that when mixed readings appear, they are a result of the *lexical reflexivity* of the verbs involved in these examples, and therefore such cases do not contribute to the general vagueness/ambiguity question. In the next section, we will introduce lexical reflexivity and illustrate how this concept comes into the picture.

3   Lexical and grammatical reflexivity

Let us first lay down some terminology. We refer to *grammatical* reflexivity as the productive strategy by which any transitive verb can convey a reflexive interpretation; in the case of English, it is realized with a reflexive pronoun. The interpretation of instances of grammatical reflexivity such as (7) requires the subject to simultaneously refer to agent and patient of the action described by the verb: in (7), Mary is necessarily the person punishing Mary. This interpretation also holds when the subject is plural: in (8) each individual in the denotation of the subject necessarily carried out the action on herself.[2]

(7)   Mary punished herself

(8)   Mary, Irene, Lisa and Linda punished themselves

Reflexive *si*-constructions in Italian yield parallel interpretations.[3] Accordingly, in (9) Mary is the agent and the patient of the punishing event, while in (10) each individual performs the action on herself.

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[2]Grammatical reciprocity also allows a *proxy* reading (Jackendoff, 1992): (7) could possibly describe a situation where Mary punished a statue of herself. This reading is not relevant for the present paper and will not be included in our discussion.

[3]As previously mentioned, a difference between English and Italian is that in the latter language, when the subject is plural, a reciprocal interpretation is also available.

(9)   Mary si punisce
        Mary SI punish.PRES.3S
        'Mary punishes herself'

(10)   Mary, Irene, Lisa e   Linda si puniscono
        Mary, Irene, Lisa and Linda SI punish.PRES.3PL
        'Mary, Irene, Lisa and Linda punish each other/themselves'

On the other hand, *lexical* reflexivity is not a productive strategy, but it is only available with a restricted number of verbs. It is for instance the case of verbs like *bath* in English, which describe a reflexive configuration in their intransitive entry (11).

(11)   Mary bathed

(12)   Mary, Irene, Lisa and Linda bathed

In English, the interpretation of such constructions may differ from that of grammatical reflexivity (Doron and Rappaport Hovav, 2009). In (11) the subject does not obligatorily coincide with the agent and the patient of the action described by the verb: the only obligatory coreference is between subject and patient, as long as the subject is volitional. For instance, (11) can be truthfully uttered if Mary is a kid who was bathed by one of her parents, as long as she was volitional and collaborative. The same sentence, in fact, could not be used to describe a situation where Mary was forcefully washed against her will. Note that the agent can possibly (and perhaps preferably) coincide with the subject (i.e. Mary can be the person bathing Mary in (11)), but not obligatorily. Throughout the paper, we will refer to this interpretation as Passive-collaborative (PCo): where the subject coincides with a collaborative patient while the agent is unspecified.

Let us now look at instances of lexical reflexivity with a plural subject. In (12), the PCo reading is required to hold for each individual in the subject: both Mary, Irene, Lisa and Linda were bathed by an unspecified agent, while being collaborative. It follows that each of them was bathed either by herself or by someone else. For instance, (12) could be true if Mary, Irene, Lisa and Linda each bathed herself, or if they all were bathed by someone else while showing volition, or even if they collaboratively bathed each other. The sentence supports a variety of interpretations, including a so-called 'mixed' one, like the one previously depicted in Figure 1: (12) would also be true if Mary and Irene bathed each other (and each of them showed volition during the act), while Lida and Linda bathed themselves. Therefore, as long as a PCo reading is possible with a singular subject, a mixed reading can emerge with a plural subject.

In Italian there is no way to distinguish morpho-syntanctically between grammatical

and lexical reflexivity in finite clauses, but PCo readings are still available with some verbs. Let us take *lavare* 'to wash' as an example. This verb requires the element *si* to convey reflexivity; yet, both (13) and (14) allow a PCo interpretation. In fact, (13) is true regardless of whom washed Mary, as long as she was collaborative. The same holds for each individual in the subject of (14): accordingly, this sentence is consistent with a 'mixed' interpretation, for instance with Mary and Irene washing each other and Lisa and Linda washing themselves.

(13)   Mary si lava
        Mary SI wash.PRES.3S
        'Mary washes (herself)'

(14)   Mary, Irene, Lisa e   Linda si lavano
        Mary, Irene, Lisa and Linda SI wash.PRES.3PL
        'Mary, Irene, Lisa and Linda (each other/themselves)'

The PCo meaning subsumes reflexive, reciprocal and mixed situations, among others. Thus, the availability of a mixed reading for (14) is a manifestation of the PCo interpretation illustrated in (13), and such a case has little to say about the general vagueness/ambiguity question between reflexivity and reciprocity. As a matter of fact, with the lexical reflexive verb *bath* the mixed reading is available even in English, a language where there is no structural overlap between reflexivity and reciprocity.

Therefore, 'mixed' scenarios (where patients are collaborative) can emerge as a result of lexical reflexivity. For this reason, lexical reflexivity constitutes a confound that should be taken into account when considering the emergence of a mixed interpretation as evidence for vagueness between reflexivity and reciprocity. For what concerns Italian, we hypothesize that mixed readings are possible with verbs that allow PCo readings with a singular subject. On the other hand, we hypothesize that mixed readings are not available with verbs that do not allow PCo readings, as hinted by the instance of the identity test that we presented in the previous section.

3.1   Lexical and grammatical reflexivity in Italian

We have illustrated that mixed readings emerge with verbs that allow a PCo interpretation, and that such interpretations are generally associated with lexical reflexivity. However, predicting the availability of such readings in Italian requires independent evidence for the existence of lexical reflexivity in this language. In fact, as illustrated by the identical surface realization of (10) and (14), there are no morpho-syntactic cues to identify lexical reflexivity in finite clauses, given that *si* is always required in order to convey reflexivity.

Independent evidence for some Italian verbs to have a morpho-syntactic behaviour that is ascribable to lexical reflexivity, comes from the causative construction (Doron and Rappaport Hovav, 2009). In this construction *si* is disallowed, and verbs embedded under the causative verb *fare* 'to make' generally get a passive interpretation: (15) is interpreted with Mary being punished, necessarily by someone different from herself. However, on top of this passive reading, the verb *lavare* 'to wash' in this construction also generates a reflexive/PCo interpretation, according to which Mary washed: Mary was possibly the person washing Mary.

(15) Ho   fatto   punire   Mary
      have.AUX.1S make.PP   punish.INF   Gianni
      'I caused Mary to be punished'

(16) Ho   fatto   lavare   Mary
      have.AUX.1S make.PP   have.INF   Mary
      i. 'I caused Mary to be washed'/ ii. 'I caused Mary to wash'

The reflexive reading that is available for (16) must be generated by the verb itself, as there are no other components in the sentence that might be responsible for such an interpretation. Thus, we take the possibility to generate a reflexive interpretation without *si* in causatives as an indication of lexical reflexivity (Doron and Rappaport Hovav, 2009).

We have explained how to identify lexical reflexivity in Italian, and why it has an effect on the availability of mixed readings. At this point, it is possible to elaborate on our proposal. We propose that: (i) Italian verbs that allow a reflexive reading without *si* in causatives have a lexical reflexive entry. Thus, they may allow a PCo reading with a singular subject. If they do, they will also allow a mixed reading in the plural. (ii) Italian verbs that do not allow a reflexive reading without *si* in causatives are not lexical reflexives. Accordingly, they do not allow a PCo reading in *si*-constructions with a singular subject, nor a mixed reading with a plural subject. The absence of mixed interpretations of *si*-constructions with transitive verbs provides evidence for such constructions to be ambiguous between reflexivity and reciprocity.

4 Empirical support for ambiguity: data from a questionnaire

Lexical reflexivity and its possible effects influencing the availability of mixed readings have not been explicitly taken into account in the semantic works that propose vagueness

between reflexivity and reciprocity. According to such accounts, we would expect the mixed reading to emerge in Italian, regardless of the verb that is used. We hypothesize, on the other hand, that mixed interpretation will be only available with verbs that show a PCo interpretation in the first place.

To provide empirical support for our hypothesis, we collected data with a questionnaire. The questionnaire was a truth-value judgement task to assess the acceptance of *si*-constructions as describing 'mixed' situations (partially reflexive and partially reciprocal) and PCo interpretations (where an individual is the volitional patient of an action carried out on herself by someone else), both for lexical reflexive and transitive verbs. Based on the possibility to generate or to not generate reflexivity without *si* in causatives, we picked five transitive verbs (*votare* 'to vote', *ammirare* 'to admire', *criticare* 'to criticize', *punire* 'to punish', *premiare* 'to give a prize') and five lexical reflexive verbs (*lavare* 'to wash', *depilare* 'to epilate', *vestire* 'to dress up', *truccare* 'to apply make up', *pettinare* 'to comb').

Materials: Each item consisted of a short written story, accompanied by a *si*-construction to be judged as TRUE or FALSE. All the stories were different from each other; each verb was tested in two scenarios:

i. 'mixed' scenario: a story with four individuals A, B, C and D, of which two carried out an action on each other while the other two carried an action on themselves, accompanied by a sentence containing the following construction: 'A, B, C & D *si* verb'.

ii. PCo scenario: a story with an individual A who had an action performed on herself by another person while being collaborative, accompanied by a sentence with the following construction: 'A *si* verb'.

Procedure: The questionnaire also contained control stories accompanied by questions with an indisputable true or false answer, included to assess the accuracy of participants. The questionnaire had a between-subject design: each participant was exposed to five target items and ten control items. No participant was exposed to any verb more than once. The target items were split into two main versions, each of them subsequently split into two sub-versions:

- **1a**: 3 L. reflexive verbs in PCo scenarios, 2 trans. verbs in mixed scenarios
- **1b**: 2 L. reflexive verbs in PCo scenarios, 3 trans. verbs in mixed scenarios
- **2a**: 2 L. reflexive verbs in mixed scenarios, 3 trans. verbs in PCo scenarios
- **2b**: 3 L. reflexive verbs in mixed scenarios, 2 trans. verbs in PCo scenarios

The questionnaire was run online with LimeSurvey.

Participants: 527 participants took part in the questionnaire and their participation was voluntary. The results below are for 373 participants selected based on 100% accuracy on

Type of Verb	Verb	PCo	Mixed
transitive	*votare* 'to vote'	1 %	39 %
	ammirare 'to admire'	0 %	10 %
	criticare 'to criticize'	6 %	24 %
	punire 'to punish'	13 %	35 %
	premiare 'to give a prize'	0 %	39 %
	average	**4%**	**29%**
lexical reflexive	*lavare* 'to wash'	78 %	97 %
	depilare 'to epilate'	83 %	98 %
	vestire 'to dress up'	98 %	96 %
	truccare 'to apply make-up'	87 %	92 %
	pettinare 'to comb'	42 %	96 %
	average	**78%**	**96%**

Table 1: Acceptance rates for all verbs

the controls.

Results: The results of the questionnaire are illustrated in Table 1, which contains the acceptance rate of each verb, i.e. the percentage of participants that answered TRUE to the target item. Mixed readings are marginally accepted with the transitive verbs that were tested, while they are almost unanimously accepted with the lexical reflexives that were tested. A similar pattern characterizes the acceptability of the PCo interpretation: almost absent for transitive verbs but widely accepted for lexical reflexives. Therefore, the results are in line with our hypothesis that mixed readings in Italian are available with lexical reflexive verbs that allow a PCo reading in the singular form, while the lower acceptance of mixed readings for transitive verbs points in favour of an ambiguity of the *si*-construction.

Discussion: Our hypothesis that the availability of mixed readings would depend on the availability of PCo interpretations seems to be borne out. However, the higher acceptance rate in mixed readings compared to PCo, which constitutes a rather stable pattern, does not follow from our hypothesis. Another observation that emerges from the data is that the acceptance of mixed readings with transitive verbs is low, but not absent: as Table 1 shows, an average of 29% of participants accepted the mixed interpretation with transitive verbs. Nonetheless, the results do follow the pattern predicted by our hypothesis. Our proposal accounts for the data more accurately than a vagueness hypothesis, which would predict mixed readings to be widely accepted with all verbs. In other words, while an ambiguity account cannot explain the 29% average acceptance in mixed readings of transitive verbs, a vagueness account cannot explain the average 71% of rejection, nor the striking difference between the two classes of verbs that we tested.

5 Conclusions

The goal of the paper was to investigate whether Italian *si*-constructions, which convey both reflexivity and reciprocity, are vague or ambiguous between these two interpretations. We provided empirical support in favour of ambiguity: the outcomes of a questionnaire show that *si*-constructions do not generally support mixed interpretations (i.e. partially reflexive and partially reciprocal), unlike what has been claimed in the literature for other languages that also employ one construction for both meanings (Murray, 2008; Cable, 2014).

We have argued that lexical reflexivity plays a crucial role with respect to the availability of mixed interpretations: Italian verbs with a lexical reflexive entry may allow a mixed interpretation when they appear in *si*-constructions, as a result of their intrinsic lexical meaning. In fact, such verbs, with a singular subject, often allow an interpretation that we labeled here Passive-Collaborative (PCo), which is underspecified with respect to the agent of the action. Accordingly, lexical reflexive verbs that appear in *si*-constructions with a plural subject can truthfully describe an array of scenarios where each individual in the subject had the action performed on herself while being collaborative (regardless of whom was the agent), including a so-called 'mixed reading'.

The data illustrated in the paper are restricted to Italian and they cannot be immediately generalized to other languages. However, PCo readings are available with lexical reflexive verbs in other languages as well, and that could influence tests that are intended to examine the availability of mixed readings. Therefore, lexical reflexivity and its possible effects should be taken into account in further research on the topic.

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Reciprocal anaphors in singular constructions in Hungarian

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Abstract

This paper discusses a striking and yet unnoticed difference in the grammatical coding of reflexive and reciprocal anaphora in Hungarian. Whereas plural reflexives require a plural subject antecedent and a plural verb, the reciprocal anaphor does not need an antecedent that bears a morphosyntactically expressed plural feature, nor does it require the verb to be in the plural. The emerging empirical picture points to a fundamental difference between the licensing of reflexive and reciprocal anaphors, inasmuch as the plurality that reciprocals feed on need not be a feature available internal to the computational system. These data thus provide further arguments for the differential treatment of reflexive and reciprocal anaphora.

1. Introduction

In the introduction to their influential paper, Heim et al. (1991: 63) emphasize that "it is well known that expressions like *each other* and *one another* can cooccur only with plural antecedents..." . A true reciprocal anaphor undeniably requires a plural antecedent, and it is hard to conceive of this constraint as anything else but mandatory. Yet it is not necessarily evident in what sense the antecedent must be plural, and my aim in this paper is to argue that this plurality need not be represented in the computational system. I describe and discuss Hungarian data to substantiate this claim, focussing on constructions in which reciprocal anaphors occur without morphosyntactically plural antecedents but they are still grammatical, unlike plural reflexives, which are ruled out in the self-same contexts. These data have not been discussed so far in the pertinent literature on Hungarian, and together they provide strong evidence for the assumption that the grammar of reciprocal anaphors fundamentally differs from the grammar of plural reflexives. The sole aim of the paper is a systematic presentation of the Hungarian data that points towards this conclusion.

As expected, both plural reflexive anaphors and the reciprocal anaphor can take plural antecedents in Hungarian:[1]

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[1] The Hungarian reciprocal *egymás* 'each other' is the complex of the numeral *egy* 'one' and the distributor term *más* 'other'. The reflexive anaphor *maga* 'oneself' is a highly grammaticalized body part possessive construction,

(1) a. A   gyerek-ek   látták   egymás-t   a   tükörben.
       the   child-PL   saw.3PL   each_other-ACC   the   mirror.in
       'The children saw each other in the mirror.'

  a. A   gyerek-ek   látták   maguk-at   a   tükörben.
       the   child-PL   saw.3PL   themselves-ACC   the   mirror.in
       'The children saw themselves in the mirror.'

It is also non-surprising that a singular noun phrase denoting a singular (atomic) individual can antecede a singular reflexive (2b), but not a reciprocal (2a):

(2) a.*A   gyerek   látta   egymás-t   a   tükörben.
       the   child   saw.3SG   each_other-ACC   the   mirror.in
       '*The child saw each other in the mirror.'

  a. A   gyerek   látta   magá-t   a   tükörben.
       the   child   saw.3SG   oneself-ACC   the   mirror.in
       'The child saw himself in the mirror.'

Nevertheless, the reciprocal is licensed in constructions in which the plurality of the antecedent is not coded morphosyntactically. I discuss four such Hungarian constructions in this paper: quantified antecedents with a singular noun head (Section 3), singular coordinate noun phrases with singular verbs (Section 4), singular collective noun antecedents (Section 5), and a special case of singular variables acting as local antecedents for the reciprocal (Section 6). We focus on configurations in which the antecedent is the local subject, as they provide very clear evidence that plural reflexives need to be in PLURAL contexts: both the antecedent and the verb must be in the plural for the plural reflexive to be acceptable. Reciprocals are not subject to this restriction.

We start the discussion in Section 2 with one possible confounding factor: as den Dikken et al. (2001) note, same person inclusive anaphora of the singular subject – plural object type is possible in Hungarian. This is a superficial counterexample to our claim that plural reflexive

with some synchronically available possessive traits (see den Dikken et al. (2001) and Rákosi (2009, 2011) for discussion). Since Hungarian lacks grammatical gender, neither of these pronominals show variation in gender. The reflexive has the full paradigm, but the reciprocal is an invariable form, showing no φ-feature-related variation.

anaphors need plural antecedents. I show here that such examples are fundamentally different from the singular contexts we discuss here for reciprocals, and I also argue, contra den Dikken et al. (2001), that this construction is not an instance of true reflexive anaphora, since these reflexives do not function as bound variables. The discussion on reciprocals (Sections 3-6) starts from this vantage point, which allows us to treat the tolerance reciprocal anaphors show towards singular antecedents as a genuine characteristic of their grammar. The paper is concluded with a brief summary in Section 7.

2.   Inclusive reference reflexives

Den Dikken et al. (2001) call attention to a special case of same person singular-plural anaphora in Hungarian. Consider the following examples from the Hungarian National Corpus (Oravecz et al. 2014) for illustration:

(3)   a. Látom   magunk-at   ülni   az   autóban.
          see.1SG   ourselves-ACC   sit.INF   the   car.in
          'I see us sitting in the car.'
       b. Sokszor   sajnálom   magunk-at.
          often   feel_sorry.1SG   ourselves-ACC
          'I often feel sorry for us.'

The subject antecedent – the speaker in this case – is understood to be included in the denotation of the 1PL anaphor in both sentences, and this kind of inclusive reference anaphora (henceforth: *inclusive anaphora*) is available in second and third person as well. Note that English would have a pronoun in these cases in place of the reflexive, but the preferred choice is the reflexive in Hungarian. Though den Dikken et al. (op. cited fn. 1) raise the possibility that similar examples with non-argument PPs may contain logophoric reflexives rather than true anaphors, they claim explicitly that argument reflexives, like the objects in (3), are true anaphors. Here I want to argue against this assumption, saving thereby the empirical generalisation that plural reflexive anaphors need plural antecedents.

Note first of all that reflexive anaphors in the inclusive anaphora construction cannot be bound variables. As is clear from the paraphrase below (4a), the reflexive here can only be interpreted as a referential pronominal element. In run-of-the-mill reflexive constructions,

where antecedents and reflexives have fully matching φ-features, the bound variable reading is available, as expected (4b).[2] The same is true of reciprocals (4c).

(4) a. Csak én   sajnálom   magunk-at.
        only I   feel_sorry.1SG   ourselves-ACC
        'Only I feel sorry for us.'
        ['no other people feel sorry for us/*for themselves']

     b. Csak mi   sajnáljuk   magunk-at.
        only we   feel_sorry.1PL   ourselves-ACC
        'Only we feel sorry for ourselves.'
        ['no other people feel sorry for themselves']

     c. Csak mi   sajnáljuk   egymás-t.
        only we   feel_sorry.1PL   each_other-ACC
        'Only we feel sorry for each other.'
        ['no other people feel sorry for each other']

Second, this kind of inclusive anaphora is only available if the predicate supports a collective reading on its object argument, and it often occurs in representation-of-the-selves contexts. When this collective construal is not available, inclusive reflexives are not acceptable. Judgements are very clear, for instance, in the case of inherent reflexive verbs, whose object argument can only be a reflexive anaphor and it cannot be a referential pronoun or DP. Consider (5) for illustration:

(5) a. A   gyerek-ek jól viselték   maguk-at.
        the   child-PL   well behave.3PL   themselves-ACC
        'The children behaved themselves.'

     b.*A   gyerek   jól viselte   maguk-at.
        the   child   well behave.3SG   themselves-ACC
        '*The child behaved themselves.'

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[2] Some speakers can also accept the coreference-based interpretation for (4b), but this is orthogonal to our present concerns.

Here the collective reading of the object argument is unavailable, and hence the inclusive anaphora construction is ungrammatical (5b).[3] I will use similar reflexive examples in Sections 3 and 4 below to rule out a potential inclusive anaphora reading in cases where this would be an irrelevant alternative for us.[4]

I finally add that reciprocals are absolutely ungrammatical in inclusive reference anaphora. Thus (6), unlike (3b), is ungrammatical.

(6)   *Sokszor   sajnálom   egymás-t.
          often   feel_sorry.1SG   each_other-ACC
         '*I often feel sorry for each other.'

The antecedent is not plural here in any sense of the word, and the reciprocal is not licensed therefore. This is different with the examples that we just turn now to discussing, since they involve subject arguments that are morphosyntactically singular, but denote pluralities nevertheless.

3.   Quantified antecedents

The plural morphology only appears on the noun head in Hungarian if no quantifying expression is present. Quantified noun phrases are morphologically singular in Hungarian, and they do not trigger plural agreement with the verb (see É. Kiss 2012 for a comprehensive discussion). Thus we have the following agreement patterns:

(7)   a. A   gyerek-ek *látta/látták   a   kép-et.
          the   child-PL   saw.3SG/saw.3PL   the   picture-ACC.
          'The children saw the picture.'
      b. Két/Minden/Néhány   gyerek(*-ek) látta/*látták   a   kép-et.
          two/every/some   child(*-PL)   saw.3SG/saw.3PL   the   picture-ACC.
          'Two/All/Some children saw the picture.'

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[3] It is ungrammatical in each person.

[4] In principle, examples like (4b) may have a *distributed inclusive anaphora reading* if the subject is interpreted distributively ('each one of us on his or her own feels sorry for the self plus the others', as in *Each of us feels sorry for us*). Arguably, such interpretations require strong contextual support, but they are real nevertheless. This issue merits further discussion, which we do not entertain here since it would not further our immediate goals concerning the comparison of reciprocals anaphors and reflexives that act as true bound variables.

A quantified noun phrase of any kind can only antecede a singular, but not a plural reflexive (8). The noun head of the subject DP, as well as the verb agreeing with it, is singular in this case, and so is then the reflexive.

(8) a. A   két   gyerek   jól   érezte   magá-t/*maguk-at.
         the   two   child   well felt.3SG   oneself-ACC/themselves-ACC
         'The two children felt well.'

     a. Néhány gyerek   jól   érezte   magá-t/*maguk-at.
         some   child   well felt.3SG   oneself-ACC/themselves-ACC
         'Some children felt well.'

In contradistinction to plural reflexives, reciprocals are fully grammatical with quantified antecedents. Examples (9a, c-d) are from the Hungarian National Corpus.

(9) a. A   szobában három kisgyerek   kergeti   egymás-t.
         the   room.in   three little.child chase.3SG each_other-ACC
         'Three little children are chasing each other in the room.'

     b. Néhány szomszéd gyerek nagyon   szereti   egymás-t.
         some   neighbour child much   love.3SG   each_other-ACC
         'Some children from the neighbourhood love each other very much.'

     c. Otthon mindenki szerette   egymás-t.
         home   everyone loved.3SG   each_other-ACC
         'At home, everyone loved each other.'

     d. A   sokaságban senki   se   keresi   egymás-t.
         the   crowd.in   nobody not   search_for.3SG   each_other-ACC
         'Nobody is searching for each other in the crowd.'

The antecedent is a quantified noun phrase in (9a-b), and a pronominal quantifier in (9c-d). Note that both the antecedent and the verb are singular in each sentence in (9), yet the reciprocal is grammatical across the board.[5]

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[5] Most examples of this construction include an antecedent with a numeral. Indeed, (9a) is the most natural way in Hungarian to talk about three kids chasing each other. Quantified phrases with non-numeral quantifiers are best as antecedents of reciprocals if they are d-linked (9b-d).

4.   Singular conjoined noun phrases and singular verbs

Two conjoined singular noun phrases can trigger either singular or plural agreement with the verb from a position in the left periphery:[6]

(10)   Kati és Éva látta/látták   a   képet.
        Kati and Éva saw.3SG/saw.3PL the   picture-ACC
        'Kati and Éva saw the picture.'

Such coordinate DP's can antecede a singular reflexive anaphor if the verb is singular, but a plural reflexive is obligatory if the verb is plural. Thus there must be an exact match in φ-features between the reflexive anaphor and the verb in this case.

(11) a. Kati és Éva   kihúzta   magát/*magukat.
        Kati and Éva   out.drew.3SG herself/themselves
        'Kati and Éva drew themselves up.'
    b. Kati és Éva   kihúzták   *magát/magukat.
        Kati and Éva   out.drew.3PL herself/themselves
        'Kati and Éva drew themselves up.'

Reciprocals, however, are not picky, as they are grammatical both with singular and plural verbs in this construction:

(12)   Kati és Éva látta/látták   egymás-t   a   tükörben.
        Kati and Éva saw.3SG/saw.3PL   each_other-ACC   the   picture-ACC
        'Kati and Éva saw each other in the mirorr.'

Thus coordinate DPs provide another context in which reciprocals can go with singular antecedents that trigger singular agreement with the verb, unlike reflexive anaphors, which require a plural verb form in this construction, too.

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[6] É. Kiss (2012) argues that plural agreement with the verb is in fact agreement with a resumptive plural *pro* associate of the coordinate DP.

5.   Singular collective nouns as antecedents

Collective nouns have been reported to be only marginally acceptable antecedents for reciprocals in the literature on English (see de Vries 2018 for an overview).[7] Hungarian collective nouns, when they truly denote a distributable plurality, can act as perfect antecedents for reciprocals. As an operative definition, I take those collective nouns to be fit for this purpose that can license plural cross-clausal anaphora, as in (13):

(13)   A   személyzet úgy   gondolta,   hogy ők   már   eleget   dolgoztak.
        the staff   so   thought.3SG that they already enough   worked.3PL
        'The staff thought that they had worked enough.'

Note that the main verb is singular in (13). Collective nouns never trigger plural agreement with the verb in Hungarian:

(14)   A   személyzet   fáradt   volt/*voltak.
        the staff   tired   was.3SG/were.3PL
        'The staff was tired.'

Thus collective nouns do not show any obvious sign of plurality in the local syntactic domain in Hungarian.

Yet they make perfect antecedents for reciprocals, as in the following examples:[8]

(15) a. A   személyzet   riadtan   nézte   egymás-t.
         the staff   frigthened watch.3SG   each_other-ACC
         'The staff were watching each other frightened.'
      b. A   Facebookon   szidta   egymás-t   a   család.
         the Facebook.on   cursed.3SG   each_other-ACC the family
         'The family were cursing each other on Facebook.'

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[7] Plural agreement with the verb seems to be necessary. The following judgements are as in de Vried (2018), and see also Palmieri (2018: 14).

(i) The couple *loves/love each other.

[8] Such examples are also easy to find in corpora. The examples in (15) are slightly abbreviated versions of relevant hits found in the Hungarian National Corpus.

c. A   pár   az   interneten   találta   meg egymás-t.

the   couple   the   internet.on   found.3SG   PRT   each_other-ACC

'The couple found each other on the internet.'

The verb must be singular in each case here, too, as has been shown for (14). As we can now expect, only singular reflexive anaphors are licensed in this construction even if we try to force a distributive reading:

(16)   Az   egész   család   jól   érezte   magá-t/*maguk-at.

the   whole   family   well felt.3SG itself-ACC/themselves-ACC

'The whole family enjoyed themselves.'

This provides further support for the empirical generalisation that the paper describes: reciprocals may, plural reflexive anaphors may not take singular antecedents in Hungarian.

6.   Singular variable as a local antecedent

Consider finally the following sentence, modelled on a construction type much discussed in the literature on English reciprocals (see, among others, Heim et al. 1991):

(17) Péter és   Éva az-t   gondolja, hogy (*ő) szereti   egymás-t.

Péter and Éva that-ACC   think.3SG that (s)he love.3SG   each_other-ACC

'Péter and Éva think that they love each other.'

[Péter thinks he loves Éva and Éva thinks she loves Péter.]

Here the two conjoined singular noun phrases trigger singular agreement with the verb, and they antecede a singular *pro*-dropped subject in the subordinate clause. This subordinate subject, in turn, is the local antecedent for the reciprocal. This example has three interesting properties: (i) the local antecedent of the reciprocal is a singular variable, (ii) this antecedent cannot be an overt pronoun, and it must be *pro*-dropped[9], and (iii) the sentence only supports the broad-scope interpretation of the reciprocal as paraphrased below the example. Most importantly, it shows us once again that Hungarian reciprocals are fine with singular antecedents.

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[9] Hungarian is a *pro*-drop language.

For another like example, consider (18), a quote from the Hungarian writer Frigyes Karinthy.

(18) Álmomban   két   macska voltam,   és   (*én) játszottam egymás-sal.
      dream.POSS.1SG.in   two   cat   was.1SG   and   I   played.1SG each_other-with
      'I was two cats in my dreams and I was playing with each other.'

Arguably, this is an anecdotal example, and represents a creative use of the language rather than the norm. It does fit, however, the pattern that (17) shows inasmuch as the local antecedent of the reciprocal must be a *pro*-dropped 1SG pronoun, which cannot be spelt out. The intuition on the obligatory nature of *pro*-drop is quite clear, and (18) thus represents a genuine fact about how such reciprocals are licensed in Hungarian, alongside with the more regular example in (17).

7.   Summary

I hope to have shown in this paper that Hungarian provides obvious evidence for a genuine grammatical contrast between reciprocals and true reflexive anaphors: only reciprocals can take singular subject antecedents. Reflexive anaphors are only grammatical if their subject antecedent is plural and show plural agreement with the verb. This characteristic behaviour of reciprocals is manifest in four Hungarian constructions that we have discussed: (i) quantified antecedents, (ii) conjoined singular noun phrases showing singular agreement with the verb, (iii) collective nouns that denote distributable pluralities, and (iv) singular *pro*-dropped pronominal variables acting as local antecedents. Together these data make a strong argument for the claim that reciprocals do not necessarily require antecedents that have a morphosyntactically relevant plural feature. The plurality they feed on may come from outside of the strict bounds of the computational system.

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Acknowledgement

A unified analysis of the semantic licensing conditions for *huxiang* in Chinese[1]

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Abstract

The present study is an investigation into the semantic licensing conditions of the reciprocal adverb *huxiang* ("mutually") in Chinese. Starting with an old claim in literature about the restricted use of *huxiang* with symmetric predicates, we explore the circumstances under which this restriction could be relaxed and identify those factors that contribute to the improved use of *huxiang*. A close examination and comparison of the improved and stubborn cases reveals that the acceptability of *huxiang* is sensitive to the number of reciprocants, logical properties of predicates and partitions, which boil down to a "distinctness of relations/events" constraint that we seek to define in terms of entailment patterns and mereological structures. With this semantic requirement for distinctness of relations/events, the contribution of *huxiang* should be considered as non-trivial. We do not observe the same kind of licensing conditions for English pronominal *each other* and Chinese pronominal reciprocal markers. The way the reciprocal adverb *huxiang* differs from reciprocal pronominals may provide insights for further discussion on semantic variation and the relationship between morphosyntax and semantics in the domain of reciprocity.

1. Introduction

Reciprocals exhibit great diversity across languages (Nedjalkov 2007). Devices used across languages denoting reciprocity can be found in virtually all syntactic positions and take up various forms ranging from morphemes to clausal constructions (Evans 2007).

Whereas languages like English encode reciprocity in terms of pronominals, Chinese often makes use of adverbs (Liu 2015). Formal semantic approaches to reciprocals have a long tradition of investigating the English *each other*-type of structures (Heim et al. 1991, Dalrymple, et al. 1998, among others). The present paper discusses one of the less well-studied encoding forms of reciprocity——the adverb *huxiang* ('mutually') in Chinese.

The paper is structured as follows. In Section 2, we start with an old claim in the literature about the restricted use of *huxiang* with symmetric predicates. We then proceed in Section 3.1 with a discussion of the extent to which this restriction applies. By extending our discussion to cases with more than two reciprocants, we are able to reach a more comprehensive picture of the use of *huxiang*, revising previous claims about the possible and impossible uses. The logical property of transitivity, in addition to symmetry, exerts influence on the use of *huxiang*, as we observe in Section 3.2. Partitions, as noted in Section 3.3, could also be a relevant factor. We then boil down the heterogeneous factors to one constraint, i.e. distinctness of relations/events, which is defined in terms of entailment patterns and mereological structures in Section 4. Considering the informational contribution of *huxiang*, a non-triviality account is in place in Section 5. Section 6 is the conclusion. We highlight the semantic licensing conditions for *huxiang* by comparing it with English pronominal *each other* and Chinese pronominal reciprocal markers, with the hope of shedding light on cross-linguistic semantic variation and syntax-semantics transparency in the domain of reciprocity.

2. The symmetry constraint

A typical *huxiang* sentence is illustrated by (1), which is truth-conditionally equivalent to the conjunction of two propositions with a permutation of the arguments, i.e., Zhangsan complained about Lisi and Lisi complained about Zhangsan.

(1) *Zhangsan he   Lisi huxiang maiyuan*.

Zhangsan and Lisi mutually complain

"Zhangsan and Lisi complained about each other."

It has long been noted in literature that some symmetric predicates do not co-occur with *huxiang* (Zhu 1982, Liu 1986, Guo 2013, among others). The term "symmetric" is used in the logical sense, i.e., let R be a binary relation on a set A, for all x,y∈A, if xRy, then yRx. The predicate *liaotian* ("chat") in (2) is a symmetric predicate in this sense.

(2) *Liang ge laotou zai (*huxiang) liaotian.*

    two   CL old man PROG   mutually   chat

    "The two old men are chatting (with each other)."

Symmetric predicates, however, do not necessarily preclude the use of *huxiang*. In what follows, we will study the improved cases of *huxiang* that are otherwise unacceptable, whereby we identify the factors that contribute to the improvement and arrive at a unified analysis of the semantic licensing conditions for *huxiang*.

Factors leading to improved cases of *huxiang* with symmetric predicates, as I will argue below, include the number of reciprocants, logical properties of predicates, and partitions.

3. *Huxiang* with symmetric predicates

3.1 Number matters

The number of participants (reciprocants) matters for the (non)use of *huxiang*. This is a dimension that has not been explored before in the literature. The increase in the number of reciprocants improves the use of *huxiang* with symmetric predicates, as we can see by comparing (3a) and (3b).

(3) a. *Tamen liang ge (*huxiang) shi pengyou*.

    (literally, "They two are mutually friends.")

  b. *Tamen ji ge huxiang shi pengyou*.

    (literally, "They several are mutually friends.")

A corpus search[2] has revealed that most of the symmetric predicates[3] that have been considered as unacceptable with *huxiang* in the literature, no matter it is verbal predicates like *liaotian* ('chat'), *chaojia* ('quarrel'), *dazhang* ('fight'), *bisai* ('compete'), adjectival predicates like *butong* ('be different'), or nominal predicates like *shi pengyou* ('be friends'), do occur with *huxiang*, only that they all involve plural subjects denoting more than 2 participants.

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[2] The CCL Corpus of Chinese Texts (Available online at the website of Center for Chinese Linguistics of Peking University, http://ccl.pku.edu.cn:8080/ccl_corpus)

[3] The stubborn cases will be mentioned in the following discussion.

Increasing the number of participants, however, does not guarantee the improved use of *huxiang*. Although we see the impact of number on the use of *huxiang* in example (4) with symmetric predicate *butong* ("be different"), we fail to see the same kind of impact in (5) with *yiyang* ("be the same").

(4) a. Zhe *liang zhang zhaopian* (**huxiang) butong.*

    (literally, "The two pictures are mutually different.")

  b. Zhe *ji zhang zhaopian huxiang butong.*

    (literally, "The several pictures are mutually different.")

(5) a. Zhe *liang zhang zhaopian (*huxiang) yiyang.*

    (literally, "The two pictures are mutually the same.")

  b. Zhe *ji zhang zhaopian (*huxiang) yiyang.*

    (literally, "The several pictures are mutually the same.")

What is it that contributes to the improved acceptability of *huxiang* in examples like (3b) and (4b)? Why do not all cases improve (such as (5b))? These are the two puzzles I will address in the following section.

3.2 Logical properties of predicates

A natural direction to look for a solution is the logical properties of predicates. The line of thinking is that if the logical property of symmetry contributes to the use of *huxiang* with two reciprocants, it wouldn't be totally unreasonable to think that transitivity, the logical property that applies to 3 or more arguments, may have a role to play when the case involves more than two reciprocants.

The canonical definition of transitivity is this: let R be a binary relation on a set A, for all x,y,z ∈A, if xRy and yRz, then xRz.

Entailment relations reveal that *yiyang* ('be the same') is a symmetric and transitive predicate, while *shi pengyou* ('be friends'), *butong* ("be different"), *chaojia* ('quarrel'), *dazhang* ('fight'), *bisai* ('compete'), *liaotian* ('chat') are symmetric and nontransitive predicates. Take *yiyang* ('be the same') for example: if a is the same as b and b is the same as c, then it follows that a is the same as c. In this sense, *yiyang* is a transitive predicate. *butong* ("be different") behaves differently: if a is different from b and b is different from c, a is not necessarily different from c. *butong*, therefore, is a nontransitive predicate. The diverging results of entailment relations dovetail with the diverging results of the acceptability judgment: while symmetric and transitive predicates totally exclude the use of *huxiang*, symmetric and nontransitive predicates are more tolerant.

Qualifications, however, need to be made for the use of *huxiang* with symmetric and nontransitive predicates, lest the reader should be misled into thinking that symmetric and nontransitive predicates will definitely improve the cases —— this is the generalization we abstain from. While a symmetric and transitive relation always leads to an unacceptable use of *huxiang*, a symmetric and nontransitive relation presents a more complicated picture. The fact with example (6b)-(10b) is that they MAY improve with an increased number of reciprocants under certain circumstances.

(6) a. *Wang he Li (*huxiang) chaojia.*

    (literally, "*Wang and Li* mutually quarreled.")

  b. *Wode ji ge tongshi huxiang chaojia.*

    (literally, "My several colleagues mutually quarreled.")

(7) a. *Na liang ge guojia (*huxiang) dazhang.*

    (literally, "*The two countries mutually fought.*")

  b. *Na Ji ge guojia huxiang dazhang.*

    (literally, "*The several countries mutually fought.*")

(8) a. *Zhe liang zhi qiudui jingchang (*huxiang) bisai.*

    (literally, "*The two teams often mutually compete.*")

  b. *Zhe ji zhi qiudui jingchang huxiang bisai.*

    (literally, "*The several teams often mutually compete.*")

(9) a. *Tamen liang ge zai (*huxiang) liaotian.*

    (literally, "*They two are mutually chatting.*")

  b. *Tamen ji ge zai huxiang liaotian.*

    (literally, "*They several are mutually chatting.*")

(10) a. *Tamen liang ge (*huxiang) shi tongbantongxue.*

    (literally, "They two are mutually classmates.")

  b. *Tamen ji ge huxiang shi tongbantongxue.*

    (literally, "They several are mutually classmates.")

If the (b) sentences above are not always acceptable, what, then, are the factors at play? Take (9b) as an example. The use of *huxiang* is acceptable only if there are separate chatting events. Suppose {a,b,c} is the set of all participants in the context of utterance, then the use of *huxiang* is felicitous if a chats with b, b chats with c, and a chats with c. In this case, *huxiang* is much like a pluractional marker which denotes a plurality of events (Newman 1990, 2000).

    The multi-event interpretation is necessary for the felicitous use of *huxiang* in all

the (b) sentences in (6)-(9): there have to be separate events of quarrelling, fighting, competing, and chatting for *huxiang* to be felicitously used. The use of *huxiang* in (6b)-(9b) is incompatible with the "together" situations: quarrelling, fighting, competing, chatting taken as single events. Given that "together" is a so-called "collectivizing adverbial" typically associated with collective readings (Lasersohn 1995), the discussion of the felicitous and infelicitous use of *huxiang* in (6b)-(9b) seems to suggest the direct relevance of the collectivity/distributivity distinction. However, I will refrain from making use of this distinction. One of the reasons is to avoid confusion in the use of the term "collectivity". Some authors define collectivity as involving coordination of actions only——joint action or joint responsibility (Lasersohn 1995, Landman 2000, Champollion 2010). Other authors such as Kratzer argue that spatial proximity of the agents, temporal closeness of actions also establish actions as collective in addition to coordination of actions (Kratzer 2003). Besides the difficulty of judging what is joint action, we find the notion of collectivity not useful enough, as we would also need to account for relations such as *be the same, be classmates* which have little to do with agentivity and hence the thematic entailment of joint action or joint responsibility could hardly apply.

If multi-event interpretation is the key in distinguishing those acceptable cases of *huxiang* from those unacceptable cases in example (6b)-(9b), what then are the constraints for the use of *huxiang* in examples like (10b)? Could the constraints on the use of *huxiang* in (10b) be accounted for in comparable terms? It turns out that if a and b, b and c, a and c are classmates respectively (i.e., classmates of different periods of time or classmates involving different classes), (10b) is allowed. The use of *huxiang* is ruled out only under the circumstance that a,b,c are of the same class. Based on our discussion of example (6b)-(10b), we come to the generalization that construal of two/multiple relations (events) seems to be essential for the acceptable use of *huxiang*.

3.3 Partitions

The third factor we identify that may contribute to the improved use of *huxiang* is partition. The notion of partition is closely related to that of cover.

(11) C is a cover of P if and only if:

    1. C is a set of subsets of P.

    2. Every member of P belongs to some set in C.

    3. Ø is not in C.

C is a partition of P if, and only if, C covers P and no two members of C overlap.

A point that I would need to clarify immediately is that it is not partition itself that affects the use of *huxiang* but the related notion of inter-partition. There are two kinds of interpretations that can be assigned to reciprocal sentences where two or more separate groups can be discerned in the interpretation of the subject of predication: partitioned interpretations that involve reciprocal relations within two or more disjoint sets (but not between sets) (Sabato & Winter 2010), and inter-partition interpretations that involve reciprocal relations between two or more disjoint sets. *Huxiang* sentences with symmetric predicates improve only under circumstances of inter-partition interpretations.

Let's take *shi fuqi* ("be a couple") as an example. *shi fuqi* is a stubborn case which almost never allows the modification of *huxiang*: on the one hand, it is a symmetric predicate; on the other hand, the possibility of an increased number of reciprocants and multiple relations does not exist because it is difficult to imagine people participate concurrently in two or more "Couple" relations.

(12) *Xiaozhang he Xiao Wang (*huxiang) shi fuqi.*

(literally, "Zhang and Wang *are mutually a couple.*")

Inter-partition interpretations could serve as an escape hatch for those unacceptable *huxiang* sentences. Example (13) is acceptable because it can be conceived as expressing a reciprocal relationship between the two subpluralities: [[this pair of twins]] and [[that pair of twins]].

(13) *Zhe dui shuangbaotai he na dui shuangbaotai huxiang shi fuqi.*

this pair twin and that pair twin mutually BE couple

(literally, "This pair of twins and that pair of twins are mutually couples.")

Inter-partition readings of *huxiang* sentences are sensitive to the type of plural NP subjects. Unlike the adverb *fenbie ("respectively")* which allows partitioning of all kinds despite the type of plural NP subjects, *huxiang* has to resort to the partitioning determined by the type of plural NP subjects. Comparing (14) and (15), we are able to see the contrast. Unlike the case with (14) which allows my parents being classmates and his/her parents being classmates (which is the preferred reading), (15) is acceptable under very constrained circumstances, i.e., the reciprocal relation "be classmates" has to hold BETWEEN the two subpluralities [[my parents]] and [[his/her parents]].

(14) *Wo bama he ta bama fenbie shi tongbantongxue.*

my   parents and his/her parents respectively BE   classmate

(literally, "My parents and his/her parents are classmates, respectively.")

(15) *Wo bama   he   ta   bama huxiang   shi tongbantongxue.*

my parent and his/her parent mutually BE classmate

(literally, "My parents and his/her parents are classmates, mutually.")

The multi-relation constraint we propose in the preceding section also holds with subpluralities. (15) can not be accepted if my parents and his/her parents are all of the same class. There has to exist more than one "Classmates" relation, for example, my father and his father being of the same class and my mother and his mother being of the same class.

4. Distinct relations/events, entailment patterns, and mereological structures

The preceding discussion has led us to the conclusion that a single relation/event reading would preclude the use of *huxiang*. The felicitous use of *huxiang* associates only with multi-relation/event interpretations. The problem is how to determine whether we have distinct relations/events or one relation/event in formal terms.

Compared with relations, events are more difficult to delimit. It has been a thorny issue in linguistics and psychology to define events—— whether events should be conceived of forming a superordinate whole or single separate events in themselves. Although it is now widely accepted that events are individuated by the space-time regions they occupy (Zacks & Tversky 2001, Bohnemeyer et al 2007), the topic of the mereological structure of relations/events has not been well studied. The use of *huxiang* provides an opportunity to look into the issue.

The inquiry into this question would also involve seeking a unified analysis for *huxiang* in cases with two and more reciprocants, i.e., what the constraints with symmetric predicates (in the case of two reciprocants) have in common with those with symmetric and transitive predicates (in the case of three or more reciprocants).

Let's start with sentences with symmetric predicates involving two reciprocants. What makes these sentences different from those with non-symmetric predicates is that they involve two-way relations of which one is derived from the other. As we can see in (16), "Picture A is the same as Picture B" entails "Picture B is the same as Picture A", and vice versa. The truth of one relation is entailed by the other.

(16) *Zhe liang zhang zhaopian (*huxiang) yiyang.*

(literally, "The two pictures are mutually the same.")

This is not the case with *renshi* in (17).

(17) *Tamen liang ge huxiang renshi.*

(literally, "They two mutually know.")

If A knows B, B does not necessarily know A; If B knows A, A does not necessarily know B. Neither relation is entailed by/derived from the other. Considering the entailment patterns of the two relations, *renshi* encodes two distinct relations, whereas *yiyang* encodes a single relation.

What, then, do we mean by distinctness of relations when there are 3 or more reciprocants? Suppose we have two situations: Same (a,b), Same (b,c). How do we tell whether they stand for distinct relations or part of a single relation? As *yiyang* ('be the same') is a transitive predicate, given that Same (a,b) and Same (b,c), it follows necessarily that Same (a,c), and from that we have Same ({a,b,c})[4].

This should remind us of the notion of "cumulativity"[5] and its dual "divisiveness" which have been used in discussion of mereological structures in the nominal and the verbal domain (Higginbotham 1994, Moltmann 1997, Križ 2015):

(18) $CML(P) \leftrightarrow \forall x,y[P(x) \wedge P(y) \rightarrow P(x \oplus y)]$

A predicate P is cumulative if and only if, whenever P applies to any x and y, it also applies to the sum of x and y.

(19) $DIV(P) \leftrightarrow \forall x,y [P(x) \wedge y<x \rightarrow P(y)]$

A predicate is divisive if and only if whenever P applies to x, it must also apply to any y properly included in x.

As this paper tackles reciprocal relations, the two notions which target one-place predicates are not ready to apply here. But the idea of part-whole structure exemplified by the two notions is useful for the present discussion.

The entailment pattern we capture for Same in the preceding discussion is schematized below:

(20) $R(x,y) \& R (y, z) \rightarrow R (\{x,y,z\})$.

The representation in (20) is similar to cumulativity in that it goes upwards from a part to the whole: if the predicate applies to some members of a set, then it applies to all members of the set.

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[4] Same ({a,b,c}) is a one-place predicate that holds of a set of individuals that stand symmetrically and transitively in that relation, which differs from the two-place predicate Same that holds between individuals.

[5] The term "cumulativity" is used in literature in two ways: to refer to the property of a predicate or to the property of an entire proposition. Here we make use of the idea of cumulativity defined in the first sense (cf. Quine 1960, Krifka 1986).

The notion of divisiveness is closely related to that of cumulativity. If a predicate is divisive, it means P applies down to each member of the set of participants. The question in our case is whether the relation *Same* goes downwards from the whole (applying to all members of a set) to the part (to any two members of the set). The answer is yes. If a, b, c are the same, then any two members of {a,b,c} are the same.

(21) Same ({a,b,c}) → Same (a,b) & Same (b,c) & Same (a,c)

The entailment pattern we capture for Same in (21) is schematized as (22):

(22) R ({x,y,z}) → R(x,y) & R (y, z) & R (x, z)

The entailment pattern we have in (22) applies not only to transitive predicates but also to non-transitive predicates. Take the non-transitive predicate *shi tongbantongxue* ("be classmates) as an example. If a,b,c are classmates (in the sense of being all three in one and the same class), then it is necessarily the case that Classmates (a,b), Classmates (b,c), and Classmates (a,c):

(23) Classmates ({a,b,c}) → Classmates (a,b) & Classmates (b,c) & Classmates (a,c)

In other words, if we go downwards from the whole to the part, transitive and non-transitive predicates make no difference.[6]

However, if we go upwards from the part to the whole, we do observe a difference in entailment patterns between transitive and non-transitive predicates. To illustrate, (24) is the entailment pattern for the case of Classmates. Given that Classmates (a,b) and Classmates (b,c), it does not necessarily follow that Classmates ({a,b,c}).

(24) Classmates (a,b) & Classmates (b,c) /→ Classmates ({a,b,c}).

The entailment from the part to the whole, as illustrated in (24), does not hold, unlike the case with Same and other transitive predicates. With the part-to-whole inference, Same (a,b) and Same (b,c), two independent relations otherwise, are inevitably construed as part of the larger relation Same ({a,b,c}). As part of the larger relation, the two relations Same (a,b) & Same (b,c) are no longer distinct.

Events, with temporal and spatial dimensions, are more complicated than relations. We do not go into details here, but the general idea we propose here should also be applicable to events (Dimitriadis 2008, Winter 2018).

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[6] Winter (2016) distinguishes between "rhyme" type of predicates and "hug" type of predicates and characterizes them respectively as plain reciprocals (pR) and pseudo-reciprocals (psR), based on consideration of whether the unary-intransitive usage of the predicate has symmetric correlates. The discussion here shows that divisiveness holds for plain reciprocals. If the members of a set A are the same, then every two members of A are the same. Along with logical symmetry, divisiveness does not seem to hold for pseudo-reciprocals. If the members of a set A hug, it is not necessarily the case that every two members of A hug.

5. A non-triviality account

In what follows, we compare sentences with and without *huxiang* to see how *huxiang* contributes to the sentence. To illustrate, let's consider the following pair of sentences:

(25) a. *Tamen   ji   ge shi hezuohuoban*.

they   several CL be working partners

(literally, "They several are working partners.")

b. *Tamen ji   ge   huxiang shi hezuohuoban*.

they several CL mutually BE working partners

(literally, "They several are mutually working partners.")

Suppose that {a,b,c} is the set of all participants in the context of utterance of (25). Sentence (25a) may appropriately be used in the following contexts: 1) a and b are working partners on Project A, b and c are working partners on Project B, a and c are working partners on Project C; 2) a,b,c are working partners on the same project.

The discussion of reciprocals within the framework of formal semantics is mostly concerned with the truth conditions of reciprocal relations. The reciprocal relations described in the above-mentioned two situations belong to what is termed as "strong reciprocity", i.e., the reciprocal relation *shi gongzuohuoban* ("be working partners") holds between any two members of the three participants.

Sentence (25b) doesn't differ from sentence (25a) in terms of reciprocal relations: the addition of *huxiang* does not alter the fact of strong reciprocity. This reminds us of the possibility of a triviality account, according to which the addition of information results in a sentence informationally equivalent to the original sentence (cf. Spector 2007, 2014, Katzir & Singh 2015). If the triviality account applies to this case, the use of *huxiang* would then be redundant.

This, however, is not the case with (25b). The use of *huxiang* may be trivial in the sense that it doesn't contribute to the sentence truth-conditionally, but we should note that the addition of *huxiang* does contribute to the sentence, because sentence (25b) rules out context 2 (i.e., a,b,c are working partners on the same project) as a possible context of utterance.

Context 2 differs from Context 1 in how we construe the mereological structure of reciprocal relations: Working partner (a,b), Working partner (b,c) and Working partner (a,c) are part of the larger relation Working partner ({a,b,c}) in Context 2, but not in Context 1. In Context 2, the truth of Working partner (a,b), Working partner

(b,c) and Working partner (a,c) is entailed by (and in this sense, derived from) the truth of the larger relation Working partner ({a,b,c}), whereas in Context 1, the truth of Working partner (a,b), of Working partner (b,c), and Working partner (a,c) stand by themselves. In terms of whether the reciprocal relations are independent relations or part of a larger relation, the addition of *huxiang* does contribute to the original sentence nontrivially. A non-triviality account correctly predicts the difference in interpretation between sentences like (25a) and (25b).

6. Conclusion

The present paper studies the varied acceptability of the reciprocal adverb *huxiang* with symmetric predicates. Starting from a well-noted observation that symmetry imposes constraints on the use of *huxiang*, we extend our discussion to sentences involving more than two reciprocants and thereby gain access to situations of use much more complicated than could have been handled by symmetry alone. A close examination of the acceptable and unacceptable use of *huxiang* reveals that the acceptability of *huxiang* is sensitive to the number of reciprocants, logical properties of predicates and partitions, which boil down to a "distinctness of relations/events" constraint. With this semantic requirement for "distinctness", the contribution of *huxiang* should be considered as non-trivial.

We seek to define distinctness of relations/events in terms of entailment patterns and mereological structures. If a relation is entailed by another relation, then the two relations are not distinct. In the case of symmetric predicates, $R(x,y)$ entails $R(y,x)$, and vice versa. The requirement for the distinctness of Rs is not met and hence the oddness of the use of this reciprocal marker.

To determine the independence of relations involving three or more reciprocants is more complicated. $R(x,y)$, $R(y,z)$ are two different relations involving different participants. With symmetric and transitive predicates, it immediately follows from the conjunction of $R(x,y)$ and $R(y,z)$ that $R(\{x,y,z\})$. The fact that $R(x,y)$ and $R(y,z)$ are a part of the larger relation $R(\{x,y,z\})$ deprives them of their independent status as distinct relations. The singularity of a relation hence clashes with the semantic requirement of *huxiang* to operate over distinct (multiple) relations.

Although the judgment of distinctness of relations in the case of two reciprocants and in the case of multiple reciprocants has its own criterion, what unifies the constrained use of *huxiang* in the two cases is the same semantic licensing condition: distinctness of relations/events.

Unlike the verbal reciprocal *huxiang*, pronominal reciprocals are not subject to similar constraints. This applies to the English pronominal *each other* and Chinese reciprocal pronominal markers like *xiang* ("the other") and *bici* (literally, "that this").

Huxiang and the pronominal reciprocal markers fall, respectively, under the two broad categories of nominal and verbal strategies of reciprocity defined in König & Kokutani (2006). Although this paper settles for a more modest objective than to reveal the general semantics of the nominal and verbal category of reciprocity, the way the reciprocal adverb *huxiang* differs from reciprocal pronominals may provide insights for further discussion on semantic variation, and on the relationship between morphosyntax and semantics in the domain of reciprocity.

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