

Lexical Reciprocity, Logical Symmetry, and Protopredicates

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July 7, 2016

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To appear in Christopher Piñón (ed.), *Empirical Issues in Syntax and Semantics 11*

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1 - Introduction

Types of predicates

Eventive verbs	<i>marry, meet, hug, kiss, argue</i>
Stative verbs	<i>match, rhyme, be in love, intersect</i>
Nouns	<i>partner, cousin, friend, enemy</i>
Adjectives	<i>similar, adjacent, equal, parallel</i>

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1 - Introduction

Lexical reciprocity

Morpho-semantic relation between:

- **binary** predicate
Sue *married* Dan
- **collective-unary** predicate
Sue and Dan *married*

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1 - Introduction

Challenges

- Semantic generalizations
- Analysis

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General properties

- Non-productive
#Sue and Dan praised
- No obvious relation to reciprocal quantifiers
Sue and Dan praised each other
- Cliticization/affixation – set aside

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Reciprocity and symmetry

- Two kinds of lexical reciprocity
- Correlate with (non) symmetry

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Plan

- Reciprocity-symmetry generalization
- Irreducible collectivity
- Searle's collective intentionality
- Protopredicates

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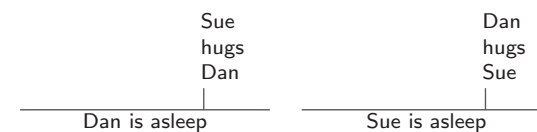
Two kinds of lexical reciprocity

Plain reciprocity (plainR):

- (1) Sue and Dan married
 \Leftrightarrow Sue married Dan and Dan married Sue

Pseudo-reciprocity (pseudoR):

- (2) Sue and Dan hugged
 \nrightarrow Sue hugged Dan and Dan hugged Sue



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Symmetric and non-symmetric predicates

Symmetric:

- (1) Sue married Dan
 \Leftrightarrow Dan married Sue

Non-symmetric:

- (2) Sue hugged Dan
 \nrightarrow Dan hugged Sue
- (3) Sue praised Dan
 \nrightarrow Dan praised Sue

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Short history

1960s: symmetry assumed for lexical reciprocals

Dong (1971): pseudo-reciprocity and non-symmetry

1970s-now: missing formal semantic generalizations

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Symmetry in logic and set theory

- **binary** predicates
- unrelated to reciprocity
- **non**-symmetry \neq **a**symmetry

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Reciprocity-Symmetry Generalization

	reciprocity	symmetry
MARRY	\Leftrightarrow	+
HUG	\nrightarrow	—
PRAISE	X	—

Generalization:

Plain reciprocity (\Leftrightarrow) correlates with **symmetry**.

Pseudo-reciprocity (\nrightarrow) correlates with **non**-symmetry.

Apparently new, but hinted at in Gleitman et al. (1996).

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Examples

Plain reciprocity & Symmetry:

<i>talk</i>	(with) <i>talk</i>	
(with)		<i>marry</i> (ACC)
<i>meet</i>	(with) <i>meet</i>	<i>match</i> (ACC)
(with)		<i>similar</i> (to)
<i>share</i> NP	(with)	<i>identical</i> (to)
<i>rhyme</i> (with)		<i>parallel</i> (to)
<i>collaborate</i> (with)		<i>neighbor</i> (of)
		<i>partner</i> (of)
		<i>sibling</i> (of)
		<i>cousin</i> (of)
		<i>twin</i> (of)

Pseudo-reciprocity & Non-symmetry:

<i>talk</i> (to) <i>talk</i> (to)		
<i>meet</i> (ACC) <i>meet</i>	<i>collide</i> (with)	<i>embrace</i> (ACC)
(ACC)	<i>hug</i> (ACC)	<i>pet</i> (ACC)
<i>fall in love</i> (with)	<i>kiss</i> (ACC)	<i>cuddle</i> (ACC)
<i>be in love</i> (with)	<i>fuck</i> (ACC)	<i>nuzzle</i> (ACC)

kiss with, hug with... (Hebrew, Greek...)

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Notes

- ① RSG is lexical semantics, not logic
- ② Truth-conditional equivalence without pragmatic identity:
North Korea is similar to China \neq China is similar to North Korea
- ③ Unary predicates are either collective or mixed (Ginzburg 1990):
Sue and Dan met/kissed: collective
Sue and Dan talked/are in love: distributive/collective
- ④ Strawson symmetry (Schwarz 2006, Partee 2008):
Sue and Kim are sisters \Leftrightarrow Sue is Kim's sister and Kim is Sue's sister
Sue is Kim's sister \nRightarrow Kim is Sue's sister
Sue is Kim's sister \xrightarrow{S} Kim is Sue's sister

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Account of RSG

- ① Irreducible collectivity (Goodman, Searle)
- ② Collectivity-based symmetry (Lakoff & Peters)
- ③ Protopredicates – between conceptual level and lexical level

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Collective concepts

- (1) A, B & C are similar
 \Rightarrow A & B are similar, B & C are similar, and C & A are similar
 \nRightarrow A & B are similar, B & C are similar, and C & A are similar

Goodman (1951), Lasersohn (1995)

- (2) A, B & C agree
 \Rightarrow \nRightarrow A & B agree, B & C agree, and C & A agree
- (3) A, B & C are partners
 \Rightarrow \nRightarrow A & B are partners, B & C are partners, and C & A are partners

SIMILAR	\approx	"share a property"
AGREE	\approx	"share an opinion"
PARTNER	\approx	"share an asset"
SIBLING	\approx	"share a parent"
COUSIN	\approx	"share a grandparent, non-siblings" note 5

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Irreducibility of collective predication

Collectivity is a lexical primitive:

- simplex predicate ranging over sets
- not definable on the basis of other concepts

lexically reciprocal predicates = one species of irreducible collectivity

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The plainR Rule

x is cousin of $y \stackrel{\text{def}}{=} \text{COUSIN}(\{x, y\})$
 \approx x and y share grandparents

x is similar to $y \stackrel{\text{def}}{=} \text{SIMILAR}(\{x, y\})$
 \approx x and y share a property

The plainR Rule: $R = \lambda x. \lambda y. P(\{x, y\})$

Lakoff & Peters (1969):

- logical
- collective \mapsto binary
- symmetry with **plain** reciprocals – **part of RSG**

But how about **pseudo-reciprocals**?

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Some plain reciprocals

Collective		Binary
collaborate	\mapsto	collaborate with
talk	\mapsto	talk with
meet	\mapsto	meet with
similar	\mapsto	similar to
parallel	\mapsto	parallel to
identical	\mapsto	identical to
neighbor	\mapsto	neighbor of
partner	\mapsto	partner of
sibling	\mapsto	partner of
cousin	\mapsto	cousin of

The collective predicate is primitive; the binary predicate is derived

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The puzzle of pseudo-reciprocals

Logical derivation is impossible

- (1) Sue & Dan hugged
- (2) Sue hugged Dan and Dan hugged Sue

(2) \nRightarrow (1)

What does (1) “really mean”?

- Semantic relations between (1) and (2)?
- Does (1) entail (2)?

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A and B are hugging



?the woman is hugging the man

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A and B are hugging?



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Collective intentionality

A hug is an act of **collective intentionality**.

Searle (1990): "Collective intentional behavior is a primitive that cannot be analyzed as just the summation of individual behavior."

Sue and Dan hugged =

- There was a hugging **event**.
- Sue and Dan were **collectively responsible** for it.
- One of them hugged the other – **subentailment** (Dowty 1987)

Collective HUG is simple – not analyzed on the basis of simpler concepts, e.g. **binary hug**.

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More pseudo-reciprocals

(1) **Sue & Dan are in love**

≈ There's a collective-intensional love between Sue and Dan.
Subentailment: Sue is in love with Dan and Dan is in love with Sue (but this is not enough for (1) to hold).

Two uni-directional relations – not enough for collectivity!

(2) **sue ve-dan makirim** (Hebrew)

≈ There's an acquaintance relation between Sue and Dan.
Subentailment: Dan knows Sue and Sue knows Dan (but this is not enough for (2) to hold).

(3) **Sue & Dan are talking**

≈ There's a collective-intensional talking event between Sue and Dan.
Subentailment: One person (e.g. S) is talking to the other (D), and D is actively engaged in that act (talking to S as well, listening, ready to answer, etc.)

Two uni-directional relations – not necessary for collectivity!

Smells of polysemy...

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Intermediate summary

- RSG: plainR-symmetric vs. pseudoR-nonsymmetric.
- Lexical reciprocity: a subspecies of collectivity.
- Plain reciprocity and symmetry: a logical rule.
- Pseudo-reciprocity as polysemy: “softer” lexical restrictions – intensionality, weak distributivity.
- A formal account of RSG?

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Protoroles and protopredicates





Protoroles = “entailments of a group of predicates with respect to one of the arguments or each” (Dowty 1991)

	→	distinct from morpho-syntax
“group of predicates”	→	non-standard types (unary+binary)
thematic arguments	→	Davidsonian

Protopredicates = typed Davidsonian predicates without morpho-syntactic features

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Types of protopredicates

			agent	patient	collective
binary	DRAW		A	B	–
collective	SHAKE-HANDS		–	–	A,B
			A	B	A,B
binary/ collective	HUG		A,B	A,B	A,B

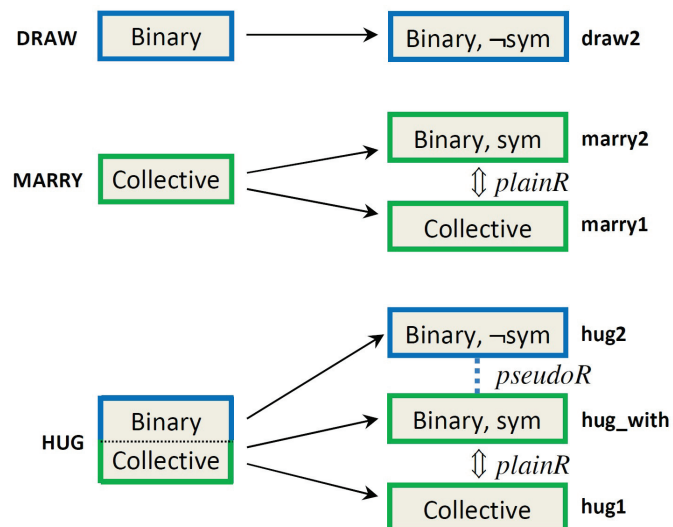
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Implications for RSG

Type p-predicate	Reciprocity	Symmetry?
b	X	–
c	plainR	+
bc	pseudoR plainR	– +

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Summary: Protopredicates and the RSG



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Acknowledgements

Joost Zwarts
 Sophie Chesney
 Heidi Klockmann

NWO VICI Grant 277-80-002

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Note 1: RSG is not logic, but lexical semantics

$*Xkiss_{iV} =$ "kiss each other (not necessarily simultaneously)"

plainR with **non**-symmetric $kiss_{tV}$

$*Xtalk_{tV} =$ " $\lambda x. \lambda y. x$ talks to y and y talk to x (without necessarily listening)"

symmetric but pseudoR with $talk_{iV}$

The RSG is not logically necessary – it is a **lexical** generalization.

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Note 2: symmetry and figure-ground effects

North Korea is similar to China \neq China is similar to North Korea

Sue collaborated with Dan \neq Dan collaborated with Sue

More generally:

The bicycle is near the house \neq The house is near the bicycle

Dr. Jekyll is Mr. Hyde \neq Mr. Hyde is Dr. Jekyll

Truth-conditional equivalence, despite difference in pragmatic import.

(Dowty 1991, Gleitman et al. 1996)

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Note 3: mixed predicates

Many reciprocal predicates are **mixed** (Ginzburg 1990):

Sue talked/married/shares a flat/is similar/in love...

Sue and Dan talked/married/share a flat/are similar/in love...

Sue and Dan are in love.

Distributive: Sue is in love and Dan is in love.

Collective: Sue and Dan share a love between them – their love to each other.

Until Xmas, Sue and Dan had shared a love between them. In Xmas, their love died out: Sue fell in love with another man, and Dan fell in love with another woman.

Since Xmas Sue and Dan are no longer in love.

True collectively, but false distributively.

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Note 4: weak symmetry

SISTER:

Sue and Kim are sisters \Leftrightarrow Sue is Kim's sister and Kim is Sue's sister

Sue is Kim's sister \nRightarrow Kim is Sue's sister

Weak symmetry ("Strawson symmetry": Schwarz 2006, Partee 2008):

Sue is Kim's sister and Kim is **female** \Rightarrow Kim is Sue's sister

CROSS (INTERSECT):

Road A and road B cross \Leftrightarrow Road A crosses road B and road B crosses road A

The road crosses the town \nRightarrow #The town crosses the road

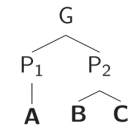
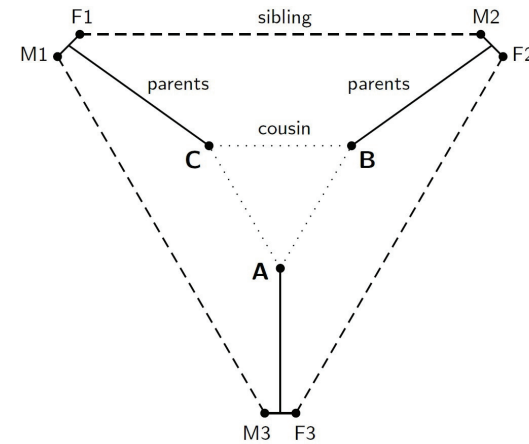
The road crosses X and X is a road (an elongated object)

\Rightarrow X crosses the road

Hebrew: A&B cross – CLV ("cross"); A crosses B – XCH ("divide")

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Note 5: "A, B and C are cousins" – irreducibly collective



A, B and C share a grandparent, but B and C aren't cousins

each of A, B and C is a cousin of the other, but they don't share any grandparent

COUSIN \approx "share a grandparent, non-siblings"

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Note 6: comitative constructions in Hebrew

Siloni (2012) classifies Hebrew *im* ('with') constructions as "discontinuous reciprocals".

- (1) *Amy hitnaSka* ("kiss-sg") *im* ("with") *Dan*
 \Leftrightarrow *Amy ve-Dan hitnaSku* ("kiss-pl")

Siloni tries to define a compositional meaning for *im* as a plainR mapping. However – in general *im* may also lead to pseudoR alternations:

- (2) *Amy hitya'aca im Dan* ("sought-sg. advice from")
 \nRightarrow *Amy ve-Dan hitya'acu* ("conferred-pl.")

histaxbek (im) – act friendly to/act friendly to each other

hitxaSben (im) – do bookkeeping with/do bookkeeping with each other

Conclusion: Similarly to English (*meet with* vs. *collide with*), Hebrew comitatives don't support compositional reciprocity either.

For further research: Greek (Dimitriadis 2008).

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Note 7: Hugs on internet...



"bride and groom are hugging on stairs"



"young couple looking at the camera as they are hugging"



"weasels are hugging, love is everywhere"



"two grey elephants are hugging by their trunks"

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Lexical Reciprocity as a Typicality Preference: Experimental Evidence

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Joint work with Imke Kruitwagen and Eva Poortman

July 7, 2016
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To appear in *Proc. of Cognitive Structures*, September 15-17, 2016,
Heinrich-Heine-University Düsseldorf

Reciprocal verbs

Focus: verbs like *hug*, *kiss*, *collide*

Two usages:

A and B hug

A hugs B

Old assumption:

Reciprocity = Symmetric Participation

A and B hug \leftrightarrow A hugs B and B hugs A

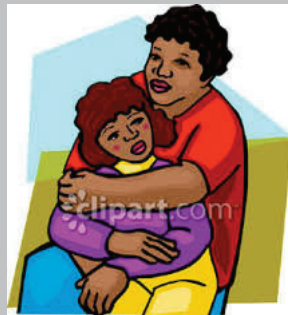
Newer assumption:

Reciprocity *entails* Symmetric Participation

A and B hug \rightarrow A hugs B and B hugs A

Claim: Neither assumption is correct. The two entries are logically independent, but related through typicality.

“They are hugging” in Google Images



Hypothesis: for *A&B hug*, and with many other verbs, symmetric participation is not required.

Aim

Examine whether a substantial percentage of speakers accepts reciprocity without symmetric participation above chance level, for a substantial number of reciprocal verbs.

Materials - Verbs

knuffelen – “hug”

botsen (tegen) – “collide (with)”

appen – “send WhatsApp message to (each other)”

praten (tegen) – “talk (to)”

spreeken (tegen) – “speak (to)”

kletsen (tegen) – “chat (to)”

roddelen (tegen) – “gossip (to)”

vechten (tegen) – “fight (against)”

Why not “talk with” etc.?

Materials – target items



One side is **active**; the other side is (visibly) **passive**.
Passive side shows **collaboration**.

Truth-judgement task for two sentences:

Collective – *het meisje en de vrouw knuffelen*

“the girl and the woman hug”

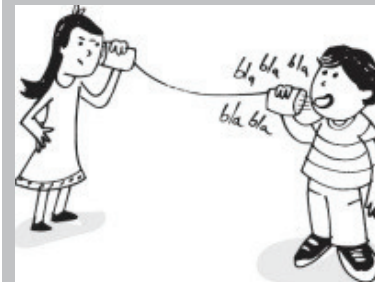
Binary – *het meisje knuffelt de vrouw*

“the woman hugs the girl”

Materials – more target illustrations



Materials – more target illustrations



Materials - Fillers

8 target verbs

X 2 sentences (collective + binary)

= **18** target items

+ **30** fillers, of two types – to hit balance between expected true/false ratios:

1. Collective/binary sentences, in situations where they are clearly true
2. Other types of sentences, in situations where they are not clearly true/false

Procedure

- 48 Dutch speakers (female 37, age M=23)
- Trials on a screen in a pseudo-random order (Open Sesame)
- green key for “true” and a red key for “false”

Control task

Appendix – 9 control items

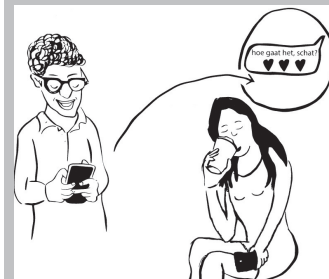


Only collective sentences:

“the girl and the woman hug”

“the boy and the girl talk”

More control drawings



More control drawings



Results summary

verb	col+	bin+	col+bin-	ctrl.col+
<i>hug</i>	79%	31%	48%	19%
<i>collide</i>	98%	2%	96%	65%
<i>appen</i>	94%	8%	85%	44%
<i>talk</i>	46%	4%	42%	13%
<i>speak</i>	69%	13%	56%	33%
<i>chat</i>	98%	17%	81%	27%
<i>gossip</i>	90%	6%	83%	46%
<i>fight</i>	73%	15%	58%	23%
MEAN	81%	12%	69%	34%

Results summary

verb	col+	bin+	col+bin-	ctrl.col+
<i>hug</i>	79%	31%	48%	19%
<i>collide</i>	98%	2%	96%	65%
<i>appen</i>	94%	8%	85%	44%
<i>talk</i>	Changed their mind: 24-66%, M=40%		42%	13%
<i>speak</i>			56%	33%
<i>chat</i>	98%	17%	81%	27%
<i>gossip</i>	90%	6%	83%	46%
<i>fight</i>	73%	15%	58%	23%
MEAN	81%	12%	69%	34%

Pilot – video clips

knuffelen – “hug”

botsen (tegen) – “collide (with)”

appen – “send WhatsApp message to (each other)”

praten (tegen) – “talk (to)”

vechten (tegen) – “fight (against)”

After showing the film, the sentence was:

“Violet and Mark hugged/collided/apped/talked/fought”

Or: “Mark hugged/... Violet”

Results summary

Verb	Col+	Bin-	Col+Bin-	Ctrl.Col+
<i>hug</i>	64%	28%	36%	24%
<i>collide</i>	92%	0%	92%	76%
<i>appen</i>	20%	0%	20%	8%
<i>talk</i>	48%	4%	48%	8%
<i>fight</i>	48%	4%	48%	8%
MEAN	54%	7%	49%	25%

Discussion

- Symmetric participation is not required with collective verbs that are traditionally classified as “reciprocal”
- Attitude of passive side matters: collaboration positively affects collective judgement

Outline of theory:

For pseudo-reciprocal predicates P, an event e is *typical* for P proportionally to two values:

- **Participation**, e.g. number of hugs
- Evidence for **collective intentionality**

The higher the typicality value is, the higher the chance is that the event passes the speaker threshold for “truth”.

Acknowledgements

Support: NWO VICI grant Winter

Illustrations: Ruth Noy Shapira

Mark: Hilbert Dijkstra

Violet: Lianne Zandstra

Ideas & judgements: Joost Zwarts, and many other colleagues and students