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1 Introduction

A dyadic predicate R is said to be symmetric if for all x and y, appropriate arguments for R, Rxy is equivalent to Ryx. It has long been noted that such predicates exhibit an alternation between two forms, a monadic form, whose argument is a group, and a dyadic form. (For future reference 'The symmetric alternation'.) This is exemplified by the following:

(1) a. John met with Mary.

b. John and Mary met.

(2) a. John is similar to his father.

b. John and his father are similar.

(3) a. John stole the same number of books as Mary.

b. John and Mary stole the same number of books.

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There have been a number of diametrically different accounts of this alternation: these range from proposals that the dyadic form is basic,[1] to proposals that the monadic form is basic,[2] to a proposal that neither form is basic[3]. There is, nonetheless, one implicit assumption common to all previous approaches: the symmetric alternation is seen to be *one* phenomenon, which deserves a unified account.

In this paper I will argue that this assumption is false. The basic claim will be that there are at least two *different* classes of predicates participating in at least two *fundamentally* different 'alternations', which share a deceptive similarity of form. In section 2, I motivate the split among symmetric predicates. In section 3, I argue that the 'alternation' exhibited by one of the resulting classes is a special case of a phenomenon that relates group predication and and comitatives. In section 4, I provide an account of this phenomenon. Finally, section 5 discusses a different class of symmetric predicates, and how its 'alternation' should be analysed.

2 The split among symmetric predicates.

In this section, two, seemingly independent, properties will be proposed as heuristics with which to split the class of symmetric predicates (henceforth Symmpred). Two, rather than four, distinct classes will emerge and the first task will be to provide a characterization of these classes and why their defining properties converge.[4]

2.1 The feature 'r': felicity of a predicate with a reflexive argument

The first criterion pertains to the felicity of a given predicate with a reflexive argument:

A dyadic predicate P is –r (for 'reflexive') iff P(x,x) presupposes that x be viewed as possessing two different identities. Thus, all of the sentences in (4) require contexts in which the filler of the subject argument is to be viewed in a different capacity from the filler of the argument of the object of the preposition. The predicates are therefore –r:

(4) a. John played chess with himself.

b. Jill met with herself.

c. Fang collaborated with himself.

[1]This is the approach first advocated by Gleitman 1965 (followed by Stockwell, Schachter and Partee 1973, and by Fiengo and Lasnik 1974): the monadic form is then derived through reciprocalisation and deletion of the reciprocal.

[2]This is the approach of Lakoff and Peters 1966: the dyadic form is derived utilising the transformations of conjunct movement and preposition adjunction.

[3]This proposal was advanced in Dowty 1987: symmetric predicates yield two forms because both arguments possess essentially the same subject selection entailments and can therefore either fill the same syntactic argument, or be split into separate arguments.

[4]A small number of predicates do lie outside these two classes. These include 'resemble', 'have a non-empty intersection' and 'be in complementary distribution'. Such predicates will not be discussed below, although the existence of more than two subclasses of symmetric predicates will not be *precluded* by my account.

The sentences in (5) do not exhibit the need for such strange contexts. The predicates are therefore +r:

(5) a. This building is similar to itself. (Whatever oddness exists here is clearly a case of Gricean Quantity. Cf. continuing the above with 'In fact, it's identical to itself'.)

b. This line is parallel to itself.

c. This number is equal to itself.

2.2 The feature 'n': Null Complement potential

The second criterion relates to the capacity of a predicate to take Null Complements (NC), with respect to a given complement role:[5]

A dyadic predicate P is –n ('null complement') iff $P(\uparrow (x+y))$ cannot *mean* $P(\uparrow (x+y), z)$ for some contextually specified z. [6]

The sentences in (6), containing –n predicates, contrast with those in (7), containing +n predicates:

(6) a. John has strong opinions on a host of issues. Bill and Mary agree on most of the important issues.(Cannot have 'John' as NC. The only possible reading is 'reciprocal' between John and Mary.)[7]

b. John arrived late for the meeting. As a result, Mike and Bill could only meet for an hour. (Cannot have 'John' as NC. Must have a reciprocal reading.)

(7) a. Jiangang likes ice cream. John and Mary are similar (in that respect.) (This has at least two readings: the first has a NC, e.g. 'Jiangang'. There is also a reciprocal reading.)

b. Stephi stole five books from the library. John and Mary stole the same number of books.(Two readings: a reciprocal reading and a deictic reading, where NC can be 'Stephi'))

2.3 The partitioning of the set of Symmetric Predicates

Symmpred is, in effect, partitioned by the two features r and n in two:

(-r,-n): **'group monadic'** predicates. In this class fall relations expressing joint activity such as fight, correspond, compete, copulate, coexist, collaborate, play chess, have an affair etc.

[5] The essence of the current formulation is due to A. Halpern.

[6] The notation '$\uparrow (x+y)$' is taken from Landmann 1989: it denotes a group with two members, x and y.

[7] It is important to emphasise that NC is possible for 'agree', with respect to the argument role of 'the proposition about which there is agreement'. This can lead to the impression that there are NC possibilities, with regards to an 'agreed with' entity. If, however, the former role is filled, as is the case for the second sentence in (6a), any lingering NC possibilties for the 'agreed with' entity disappear.

(+r,+n): **'singular dyadics'**. Predicates such as: similar, synonymous, different, near, adjacent, V-the-same-O (for any verb V, and object O), parallel etc.

The basic thesis which this paper argues for is as follows:

Group monadics are inherently *monadic* predicates whose single argument is a group. Singular dyadics are inherently *dyadic* predicates (neither argument of which need necessarily be a group.)

To conclude this section, I would like to indicate briefly how the proposal distinguishing the two basic classes accounts for the different values they have for the features 'r' and 'n'.

Multiadic predicates with optional complements should be able to exhibit NC behaviour with respect to those argument roles. Therefore singular dyadics can be +n.[8]

Assuming that a *filled* argument role cannot participate in NC,[9], group *monadics* should fail to exhibit NC behaviour. Hence, group monadics should be −n.

Moving on to the feature 'r': the semantics corresponding to 'x Gr with y', for a group—monadic Gr, will be shown to be equivalent to $Gr(\uparrow (x + y))$. Consequently, the semantics of a reflexivised group–monadic will be $Gr(\uparrow (x + S(x)))$, where S(x) denotes the reflexive of x. If x and S(x) are identical, then $\uparrow (x+S(x))$ is $\uparrow (x+x)$, which by definition is x. Thus, $Gr(\uparrow (x+S(x)))$ 'collapses' to $Gr(x)$, a group predicate applied to an atomic entity. The 'collapse' is avoided only if x and S(x) are not assumed to be identical. That is, informally speaking, they are split into two separate identities, which can form a group. Hence group monadics will be −r. For a dyadic predicate, no such problems arise. Hence the singular dyadics are +r.[10]

3 Group—Monadics and the Comitative Alternation.

In the previous section I provided motivation for assuming that, intrinsically, the predicates I dubbed 'group-monadics' are monadic predicates that apply to groups.

[8] The verb 'resemble' contrasts minimally with its close counterpart 'similar': the former does not license the optionality of its complement, while the latter does. 'Resemble' is a prime example of a symmetric predicate which is (+r,-n). The obligatoriness of the complement poses a problem for theories which derive all symmetric predicates from an underlying monadic group predicate, or which see the dyadic and monadic forms as equally generable.

[9] To explain why e.g. 'John ran' cannot *mean* 'John ran with some contextually specified entity.', or 'John and some contextually specified entity ran.'

[10] A more precise derivation of this result is dependent on a specific theory of the interpretation of reflexives, which might have to recognize more fine-grained distinctions than can be captured by 'co-referentiality', or 'co-parameterisation'. The outlines of one such proposal, suggested to me by Stanley Peters, would be to assume that reflexives, in contradistinction to pronominals, denote entities S(x), which are equivalent extensionally though not identical to the entity x, to which they are obligatorily anaphoric. That is, for any relation R, $R(x, y, z, \ldots) \leftrightarrow R(S(x), y, z, \ldots)$. Then a reflexivised group-monadic would be interpreted as $Gr(\uparrow (x + S(x)))$, which is a group consisting of two different 'identities' of x. $\uparrow (x + S(x))$ is a distinct and non-equivalent individual from $\uparrow (x + x)$, which is x. In contrast, a reflexivised dyadic predicate Dy would be interpreted as $Dy(x, S(x))$, which by assumption is equivalent to $Dy(x, x)$.

In this section, building on this assumption, I will propose an account for the 'alternation' these predicates exhibit, as illustrated in (8) and (9)

(8) a. John quarrelled with Mary.

b. John and Mary quarrelled.

(9) a. The Senate cooperated with the House.

b. The Senate and the House cooperated.

My account for the presence of these two forms will be to *deny* that any alternation or ambiguity exists. Rather, I will argue that the dyadic form is a comitative construction, as evinced by the fact that the preposition is invariably 'with'. For these predicates, then, dyadification is just a special case of the general comitative construction— an alternate form available for expressing group action when one component of the group is 'focussed' above the other.

One of the most immediate dangers faced by an account of the type I propose is parochiality: the fact that the head of the PP in the dyadic form is invariably 'with', the preposition associated with comitativity, could be an accidental fact about English, which should not be utilized in a general grammatical treatment of group-monadics. There is, however, a stable cross-linguistic generalisation, based on evidence from Mandarin, Malay, Hungarian, Japanese, Hebrew, Chichewa, Korean and Modern Greek which supports the theory I propose here: the generalisation, consistent with English, is as follows:

The dyadic form of group monadic predicates, and of predicates modified by 'together', and the comitative all have identical forms.

Sample examples from Hebrew and Hungarian respectively follow:

(10) a. Eyal shitef–peula im Gal.
Eyal cooperate-sg. with Gal.
Eyal cooperated with Gal.

b. Eyal halax laxanut (yaxad) im Gal.
Eyal went-sg to-the-shop (together) with Gal.
Eyal went to the shop (together) with Gal.

c. Eyal harag et-Nissim (be)yaxad im Gal.
Eyal killed-sg Nissim-DO together with Gal.
Eyal killed Nissim together with Gal.

(11) a. Ja1nos megta1rgyalta az u2gyet Ma1ria1val.
John discussed-sg. the issue Mary-instr.
John discussed the issue with Mary.

b. Ja1nos Ma1ria1val (egyu2tt) ment a boltba.
John Mary-instr. (together) went-sg. to the store.
John went to the store together with Mary.

c. Jalnos Malrialval (egyu2tt) o2lte meg Billt.
John Mary-instr (together) killed-sg perfective-part. Bill-acc
John killed Bill together with Mary.

There are a number of arguments that can be made to establish that the PP of the group-monadics' dyadic form is an adjunct, syntactically and semantically, rather than, say, an argument with an incorporated preposition. These arguments apply equally to all comitative PP's.

First, the dyadic form of the group monadics contrasts in terms of its ability to pseudo–passivise and to form adjectival pseudo-passives with the small class of truly dyadic verbs in English, whose second argument is a PP.

(12) a. John can be relied on/ depended upon.

b. ??John can be met with/ competed with/ collaborated with.[11]

(13) a. John was a much talked about/ relied on person.

b. ?? Jiangang was a much discussed with / collaborated with / competed with friend.

Second, in common with other adjuncts (e.g. benefactives, instrumentals) the contribution of the PP is uniform semantically, roughly 'participated together with SUBJ in activity designated by V.'

Third, the 'with phrase' can be iterated, if somewhat clumsily, and different orderings result in different readings.[12] Thus, a predication 'A V'ed with B, with C.' predicates V of a group with the structure ((A+C)+B). This will result in different readings, if C and B are different:

(14) a. John collaborated with a group at MIT, with his students.

b. John collaborated with his students, with a group at MIT.

(15) a. Jane went to see the store with the visitors, (together) with her brother.

b. Jane went to see the store with her brother, (together) with the visitors.

4 A Formal Analysis of Group Monadics

In the previous sections, I demonstrated that a wide range of semantic and syntactic phenomena involving group—monadic predicates could be explained on the following two assumptions:

[11] That this is not some arbitrary fact about 'with' is shown by the following sentence, in which a verb whose argument PP is headed by 'with' can pseudo–passivise:
This topic can be dealt with in a separate paper.

[12] The clumsiness here is no worse than in examples involving iteration of benefactive adjuncts: 'John sang a song for Jane, for Jo-Ann.'

- Semantically, group—monadic predicates are monadic predicates, whose sole argument must be a group.
- The prepositional phrase of the dyadic form of group—monadic predicates is a comitative adjunct.

In this section, I will provide a more detailed analysis of the syntax and semantics of group—monadic predicates which builds upon these assumptions. In particular, it will be shown how the analysis proposed here for 'with' can be incorporated in a general analysis of comitatives.

Specific properties of group—monadics:

- Both 16 and 17 exhibit the following contrast: the (a) sentence, insofar as it is acceptable[13], requires implicit reference to an additional entity with which collaboration took place. The (b) sentences are perfectly acceptable and *lack* such possibilities.

(16) a ? Jill collaborated.
b The group collaborated.

(17) a ? Jill collaborated.
b Jill collaborated with John.

General properties of comitatives:

- The sentences in (a) and (b) are truth conditionally equivalent:

(18) a. John and Mary collaborated /went to the store. (On a collective reading)
b. John collaborated/went to the store with Mary.

- **'Hierarchical iterativity'**: iterated 'with phrase's, as in 14 and 15 above, yield differing interpretations depending on their order.

For the semantic component, I will be using a version of Situation Semantics (cf. Barwise and Perry 1983, Gawron and Peters 1990.), complemented by a framework for dealing with group predication, such as developed by Link (Link 1983) and extended by Landmann (Landmann 1989), which distinguishes between individuals, groups and sums. For the syntactic component I assume a lexicalist framework such as HPSG (Pollard and Sag 1987), or LFG (Bresnan 1982), though the solution proposed could probably be reformulated quite easily in a GB framework.

It is clear that group-monadic predicates are predicates that describe situations that, in some sense, necessarily require the participation of groups. How then do we account for the contrast in (17), where the presence of a comitative PP does license a *singular* subject.

In fact, if the truth conditional equivalence exhibited in (22) is to be captured, this already provides quite a strong constraint on the denotation of the

[13] See below for discussion of this point.

prepositional phrase 'with NP', or equivalently on 'with'. 'with NP' will be assumed to be a VP modifier: the main independent motivation for this comes from the hierarchical iterativity property, which can then be derived quite directly from the semantics assigned to 'with'.[14]

```
Cat:P
Subcat:<NP,VP>
Content: [x | <<WITH, VP',x, NP';1>>]
Phonology: with
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This lexical entry for 'with' asserts, following the general line advocated in Categorial Grammar and HPSG(Pollard and Sag (forthcoming)), that comitative 'with' subcategorises for its object, and the VP it modifies. The Situation Theoretic content provided represents a property, roughly 'being an x such that the WITH relation holds between x, the interpretation of the VP, and the interpretation of the prepositional object. The constraint placed on the relation 'WITH', corresponding to the preposition 'with' will be the following:

$$\langle\langle \Longleftrightarrow \{R, x, y\}, \langle\langle WITH, R, x, y; 1\rangle\rangle \langle\langle R, \uparrow (x + y); 1\rangle\rangle; 1\rangle\rangle$$

This constraint asserts that for any situation which can be classified as one in which the 'With' relation obtains between the entity x, the entity y and the relation R, there exists another (possibly larger) situation in which the Relation R holds of the group consisting of x and y. Thus, this constraint ensures that, *truth conditionally*, comitatives are equivalent to a group predication. Since Situation Theoretic propositions have finer grain than just truth conditions, uttering the sentences 'John and Jill collaborated' and 'John collaborated with Jill' will express different propositions, given below in (19); yet although the types of the situations they describe are different, necessarily any situation of one type is of the other too: 'COLLABORATED WITH JILL' is predicated of an individual, John, while 'COLLABORATED' is predicated of the group comprising 'John and Jill'.

(19) a. $(s \models \langle\langle [x|\langle\langle COLLABORATED, x; 1\rangle\rangle], \uparrow (jill + john); 1\rangle\rangle\ )$

b. $(s \models \langle\langle [y|\langle\langle WITH, [x|\langle\langle COLLABORATED, x; 1\rangle\rangle], y, jill; 1\rangle\rangle], john; 1\rangle\rangle\ )$

Simple consequences of this constraint are the hierarchical iterativity property and the contrast in (17). The property corresponding to the verb phrase 'collaborated with B, with C' will be

$[x|\langle\langle WITH, [y|\langle\langle WITH, [z|\langle\langle COLLABORATED, z; 1\rangle\rangle], y, B; 1\rangle\rangle], x, C; 1\rangle\rangle]$. This is necessarily equivalent to $[x|\langle\langle COLLABORATE, \uparrow (\uparrow (x + C) + B)); 1\rangle\rangle]$

The latter denotation represents predication of 'COLLABORATE' on a group consisting of two elements: the first, a group composed of the subject argument, together with the object of the outermost 'with', the second being the

[14] That 'with NP' cannot *always* be a VP modifier is illustrated by sentences like 'Jill killed Bill with Phil', on its reading where 'Phil' is a co-killee. For lack of space, I cannot enter into a discussion of the proper way to analyze this type of example, which would undoubtedly be needed in a more extended treatment of comitativity. Lasersohn 1988, which contains a careful and detailed analysis of 'together' and comitative 'with', treats such uses of 'with NP' as transitive-verb modification. The semantics of this latter type of modifier are derived by type-raising the corresponding VP modifier.

object of the innermost 'with'. This is exactly what is needed to capture the fact that in a sentence such as 'Jill collaborated with the MIT group, with her students', the collaboration is seen to be between Jill and her students, on the one hand, and the MIT group on the other.

We have seen that the sentence in (17b) describes the type of a situation which is necessarily equivalent to the group predication exhibited in (16b). Thus, whatever explanation accounts for the contrast in (16), will apply equally well for (17). How then are we to account for the contrast in (16) ?

One possible approach would be to specify all group-monadic predicates as *sortally* requiring group arguments. Yet, the linguistic data does not clearly support such a solution: there is great variability in the acceptability of sentences containing group monadic predicates with singular subjects. Many, and perhaps most, are quite acceptable ('Jill shared a house', 'Jason played chess' 'Belinda co-taught the course.'); some are quite marginal (?? 'Jared met', ?? 'Joe quarrelled'.). Even the latter type seem incomplete, rather than *ill-formed* in a way which obvious sortal violations like 'Jim is smaller than the square root of 2' do. [15]

Given that in principle, group monadics *can* be acceptable with singular subjects, I will choose not to *build in* the sortal specification as a general feature of the account; if no explanation can be found for the variability, one could decide to proceed in a non-unified fashion, sortally specifying some, but not all of the group monadics as requiring group arguments.[16] The alternative solution I propose here will be to specify group-monadic relations as indicating that a group is participating in an event which they help describe, even without *asserting* that that is the case. This will be achieved by through use of the following constraint:

$$\langle\langle \Longrightarrow, \{Gp, x\}, \langle\langle Gp_{\langle\langle GROUP-PREDICATE, Gp\rangle\rangle}, x_{\langle\langle ATOMIC-INDIVIDUAL, x\rangle\rangle}; 1\rangle\rangle$$
$$\exists y \langle\langle Gp, y_{\langle\langle PROPER-PART, y, x; 1\rangle\rangle}; 1\rangle\rangle; 1\rangle\rangle$$

Thus, for any situation which supports the fact that a group-predicate Gp holds of an atomic individual x, there must exist a (possibly larger) situation which supports the fact that Gp holds of a group containing x as a proper part. Why then does the need for implicit reference arise in (16a) ? Since 'Collaborate' is a group-predicate, the (a) sentence describes a situation of the type represented in the antecedent of the constraint. Because of the constraint, the existence of a group within which collaboration took place is necessitated. No such inference applies to the (16b).

The approach here assumes that the contrast exhibited in (16), and in (17) for that matter, is not caused by some form of *linguistic* ellipsis, which is recognized when attempting to resolve a sortal inadequacy, but rather by an inference based on knowledge concerning group predicates. In particular, this approach entails

[15] A possible direction for an explanation would be that although all group-monadics are predicates which describe events in which *groups* necessarily partake, some predicates are more amenable than others to focus on one individual's participation in such an event. Support for this explanation comes from the possibility of modification by the adverb 'together', in its collectivising sense: the more strongly group-oriented predicates seem to resist such modification. Presumably, because in such cases, the predication 'together' supplies is somehow *more redundant.*

[16] One would then have to show how modification by 'WITH' helps override this restriction. This is quite straightforward: the property created by 'WITH' is a property of a (possibly atomic) individual, which relates it to a group-property and another individual. The restriction provided by that group property does not apply anymore.

that in quantified sentences containing such predicates, the quantification can be intrinsically over atomic individuals, and over groups only by implication. Thus,

(20) No one in West Palo Alto shares a house.

is taken to *assert* that no *individual* in West Palo Alto is such that he shares a house and to *entail* that for no individual x is there a group of which x is a proper part and which shares a house. Truth conditionally, this is equivalent to an approach in which the domain of quantification would vary over groups. Thus, as yet I see no clear empirical differences between the approaches.

5 Singular Dyadic Predicates

In section 2, the distinction between group-monadics and singular dyadics was motivated. The assumption that singular dyadics are intrinsically dyadic predicates provides an explanation for their felicity under reflexivisation. Furthermore it predicts that when such predicates are licensed to occur without their complement, a reading where this complement is inferred from context should be available. This prediction is clearly borne out, as the examples (7), repeated below, showed. Viewed as dyadic predicates, the interesting property that many of these predicates exhibit when their complement is missing, is an additional reciprocal reading, which non-symmetric dyadic predicates such as 'taller than' lack.[17]

(21) a. Jiangang likes ice cream.

John and Mary are similar (in that respect.) (This has at least two readings: the first has a NC, e.g. 'Jiangang'. There is also a reciprocal reading.)

b. Stephi stole five books from the library. John and Mary stole the same number of books.(Two readings: a reciprocal reading and a deictic reading, where NC can be 'Stephi'))

c. Sam is 6 feet tall. John and Mary are taller. (Must mean 'John and Mary are taller than Sam'.)

It is worth pointing out at this point that symmetry per se is not a sufficient condition for the existence of the additional reading. All the sentences below, even though they contain symmetric predicates, lack a reciprocal reading; the complement must be inferred from context.[18]

(22) a. Ventura Hall and Cordura Hall are near.

[17] My use here of a group subject comprising two individuals collapses what might be a further ambiguity within the 'reciprocal' reading. 'J, M and B are similar' could be taken to mean that J,M and B are similar, *as a group*, which is stronger than asserting that they are pairwise similar. This distinction is at the heart of an argument, attributed by Langendoen 1978 to Leonard and Goodman, against a (syntactic) derivation of monadic 'similar' from a reciprocalised dyadic 'similar'. While the two readings certainly describe logically distinct situations, it is far from clear that *linguistically* the stronger reading actually has an independent existence. If it would, this would predict that 'J,M and B are similar to each other, although they are not similar' should have a non-contradictory reading. This does not seem to be the case, and is clearly not the case for a predicate like 'stole the same number of books'.

[18] These facts appear to be valid on a wider cross-linguistic basis: they definitely hold for Hebrew, as well as for Hungarian (Andrals Kornai-p.c) and Greek (Cleo Condoravdi-p.c.).

b. Vladivostok and Ulan Bator are remote.

c. Jersey City and Albany are four miles away.

d. Jake and Moria are within reach.

In the face of well known examples contrasting the acceptability of 'The bicycle is near the church' with the putatively infelicitous 'The church is near the bicycle', it might be claimed that 'near' and other such spatio-temporal predicates are not indeed symmetric. *Truth conditionally*, such predicates certainly are symmetric, as shown by the contradictory nature of the assertion ' Ventura Hall is near Cordura Hall, but Cordura Hall is not near Ventura Hall'. Rather than assume that the *predicates* are not symmetric, it seems more correct to say that certain arguments can induce perspectival asymmetries. Such asymmetries exist for predicates which do possess both readings, as shown by the relative infelicity of 'Ronald Reagan is similar to my father in law', as contrasted with 'My father in law is similar to Ronald Reagan'. In such a case, the monadic predicate is still ambiguous, if slightly odd: 'Ronald Reagan and my father in law are similar'. I, thus, conclude that perspectival asymmetry cannot be the cause of the non-existence of the reciprocal reading.[19]

How then could we characterize the class of dyadic predicates which have the property of possessing a reciprocal reading, *in addition to a (NC) deictic reading,* when (surface-syntactically) intransitivised ? Given the syntactic diversity of this set, it would be nice if we could relate on a purely semantic level the reciprocal reading to the deictic reading. In what follows, I will first derive some simple mathematical results which provide a partial characterization of the set of predicates for which the deictic and reciprocal readings are actually equivalent. I will then show how this characterization can be utilized to relate the deictic and the reciprocal readings.

An obvious candidate for a characterizing property would be the following: ('Deictic Reciprocal Equivalence', DRE, for short), which for expository simplicity is given here for a sum of three individuals.

(DRE) $\exists z R(x+y+u,z) \leftrightarrow (Rxy \wedge Ryx \wedge Ruy \wedge Ryu \wedge Rxu \wedge Rux)$[20]

That is, the property of being a relation R such that three elements stand in the relation R to some arbitrary element z, if and only if they stand in the relation R to each other. What sort of relations satisfy this property ? Interestingly enough, it turns out that the class of relations that satisfy DRE contains within it as a proper subset the class of equivalence relations, that is relations that satisfy symmetry, transitivity and reflexivity. Moreover, transitivity and symmetry turn out to be necessary conditions for a relation to satisfy DRE (modulo nonreflexivity.) The proofs for these facts appear in the footnote below.[21]

[19] The existence of spatio-temporal predicates which do possess the reciprocal reading, such as 'adjacent', provides yet more fuel against the claim that such predicates are inherently asymmetric.

[20] Sums in the ontology of Landmann 1989 are used strictly for generating distributive readings. Thus, the left hand side here is shorthand for $\exists z(R(x,z) \wedge R(y,z) \wedge R(u,z))$.

[21]

Lemma1 Sym, Trans, Refl $\models$ DRE

Proof: Assume $\exists z(Rxz \wedge Ryz \wedge Ruz)$. By symmetry, Rzy and Rzu. So Rxy and Rxu follow by transitivity. By symmetry Ryx, and therefore by transitivity Ryu. Using symmetry once more yields the desired result. Assume now $(Rxy \wedge Ryx \wedge Ruy \wedge Ryu \wedge Rxu \wedge Rux)$, then by Refl Rxx, for example, and the result follows.

In other words, the following inclusions hold between the class of equivalence relations (EQREL), the class of relations satisfying DRE (DRE), the class of symmetric and transitive relations (SYMMTRANS), and the complement of the class of reflexive relations (REFL):

$$EQREL \subset DRE \subset SYMMTRANS \cup REFL^c.$$

We see that DRE contains a natural class of relations, the equivalence relations. This could suggest the following account. Since for equivalence relations the reciprocal reading is equivalent to the deictic reading, the former rather than the latter is the actual interpretation. The deictic reading would occur when the first argument is an individual or group, the reciprocal reading, when the first argument is a sum, which is distributed over. Notice that many of the symmetric singular dyadics are actually equivalence relations: similar, synonymous, V-the-same-O (for any verb V and object O), equivalent, parallel etc. In addition, it is worth noting that all the symmetric relations in (23) above which *lack* the reciprocal reading *do not* satisfy transitivity. Since the reciprocal to deictic equivalence exploited above does not hold for these predicates, this could be taken as offering an explanation for the lack of the reciprocal reading.

However, a purely reductionist account of the existence of the reciprocal reading, based on the property of DRE, cannot ultimately be sufficient. For one, there exist a small number of 'simplex' singular dyadics, which are not transitive, but do possess the reciprocal reading:

(23) a. Amaranta Avenue and Cereza Street are adjacent.

b. Line A and line B are perpendicular.

Moreover,a stronger limit on any deictic-reciprocal reduction seems to exist: the class of singular dyadics which do possess the reciprocal reading is closed under internal and external negation,[22] intersection and restrictive modification:

(24) a. Jill and Bill are dissimilar.

b. Jill and Bill are not similar.

c. Jill and Bill are similar and were born on the same day.

d. Jill and Bill are fairly similar.

EQREL and DRE are closed under intersection and external negation. However, neither of these classes is closed under internal negation or restrictive modification. Thus, while the existence of the reciprocal readings in (b) and (c) can

Lemma2 DRE $\models (Symm \vee \neg Refl)$
Proof: Assume DRE and Refl hold. And let Rxy be given. By Refl, Ryy holds. So by DRE, Ryx holds.
Lemma3 DRE $\models (Trans \vee \neg Refl)$
Proof: Assume DRE and Refl hold. Assume Rxy and Ryz. By Refl, Ryy, so Rzy. So by DRE, Rxz.
Lemma4 DRE $\models ((Trans \wedge Sym) \vee \neg Refl)$
Proof: From lemmas 2 and 3.

[22] By 'internal' negation I refer to complementation of a predicate. By 'external' negation, I refer to negation of propositions.

be accounted for by the reduction suggested above, this does not account for the reciprocal readings in (a) and (d).

Thus, it seems fairly clear that the deictic-reciprocal reduction in and of itself cannot serve as an account for the existence of the reciprocal reading. It can, nonetheless, be used a *basis* for a complete account. Instead of trying to make one predicate provide both the deictic and the reciprocal readings, two predicates will be assumed to exist: a dyadic for the deictic, and a group-monadic for the reciprocal. The task of relating the two predicates can be accomplished as follows: a mapping 'recip' (for 'reciprocalisation') from a class of dyadic predicates D to the class of group monadic predicates G is defined:

$$recip : D \mapsto G,$$

$$R^{recip}(g) =_{def} \bigwedge_{x \neq y (atomic g} R(x,y)$$

This mapping assigns to a dyadic relation R in D, a new *group monadic* relation R^{recip} whose meaning on a group g is 'g R's each other'. In order to be explanatory, we have to find a characterization of the set D, which is the domain of this operation. Given what we have seen above, a plausible hypothesis is that D can be constructed from DRE, or EQREL, by using a restricted set of operations. EQREL could thus be seen as the 'prototype' of deictic-reciprocal equivalence, which these elementary operations 'extend'. More specifically, a clear difference between EQREL and the class of singular dyadic predicates possessing the reciprocal reading is that the latter, but not the former, is closed under internal negation and restrictive modification. Thus, a reasonable conjecture would be the following:

$$D = CLOSURE_{Compl,restr-modif}(\textbf{EQREL})$$

That is, D is the closure of EQREL under complementation and restrictive modification. In other words, it is, the smallest set which contains EQREL and is closed under internal negation and restrictive modification.

There are a number of reasons which make this conjecture plausible: first, the resulting set has a natural structure as a Boolean algebra, just like the class of singular dyadics which exhibit reciprocal readings. In addition, this closure of EQREL contains relations which are not transitive, and relations which are not reflexive. However, all the relations in it satisfy symmetry. This jibes well with the empirical generalisation that it is symmetry which seems to be a necessary condition for the existence of the reciprocal reading. Nonetheless, since this closure of Eqrel is strictly contained in the class of all symmetric relations, it leaves open the possibility that certain symmetric relations will *not* get a reciprocal reading. This is consistent with the existence of examples like (24) above.

This proposal leaves two open questions:

1. Do all relations in $CLOSURE_{Compl,restr-modif}$(EQREL) actually exhibit a reciprocal reading ?

2. Can one provide a principled account for the reciprocal reading exhibited by relations such as 'perpendicular' or 'adjacent' (ex. 26 above), which are not derived from relations in EQREL, or even DRE ?

6 Conclusions

In this paper, I have illustrated the advantages that can be accrued by *dropping* the assumption that the Symmetric Alternation, an alternation between a monadic form, whose argument is a group, and a dyadic form, is a unified phenomenon. Two phenomena which were previously conflated can each receive simple and non-stipulative accounts. The first concerns monadic predicates, which I have called 'group monadics', whose arguments are inherently groups. For these predicates, dyadification is just a special case of the general comitative construction— an alternate form available for expressing group action when one component of the group is 'focussed' above the other. The second phenomenon involves relations, which I have called 'singular dyadics', which seem to be inherently dyadic: when the predicate is (syntactically) intransitive a deictic-null complement reading arises. What distinguishes these relations from run of the mill dyadic relations is the emergence of an additional, reciprocal reading, when the argument of the predicate is a group. I have demonstrated that for predicates which are equivalence relations, there is a strong sense in which this reciprocal reading could be analysed as parasitical on the deictic reading. However, this demonstration also reveals that, intrinsically, there are singular dyadic relations for which such a reduction is not possible. The conclusion this leads to is the need to recognize two different adicities which the singular dyadics manifest. Motivation has been provided for the conjecture that the singular dyadics can all be constructed from equivalence relations, using essentially Boolean operations. Thus, at the heart of a symmetric alternation is a semantic fact about equivalence relations.

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