Deriving collective uses from binary relations
Supplementary file to Sentence-internal *different* and lexical reciprocity

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Recap

Following Winter (2018), I argue that collective uses cannot be reduced to binary relations, based on examples like (1-2):

(1) a. Mark, Raymond and Donovan are similar.
Interpretation: Mark, Raymond and Donovan share feature *x*.

b. Mark is similar to Raymond, Raymond is similar to Donovan, and Donovan is similar to Mark.
Interpretation: Mark and Raymond share feature *x*, Raymond and Donovan share feature *y*, Donovan and Raymond share feature *z*.

(2) a. *p*, *q* and *r* are consistent.
Interpretation: there is a situation *s* where *p*, *q* and *r* are true.

b. *p* is consistent with *q*, *q* is consistent with *r*, and *r* is consistent with *p*.
Interpretation: there is a situation s_1 where *p* and *q* are true, there is a situation s_2 where *q* and *r* are true, and there is a situation s_3 where *r* and *p* are true.

The collective use in (1a) is logically stronger than the conjunction of transitive uses in (1b). (1a) must be interpreted as Mark, Raymond and Donovan all sharing the same feature or features. In contrast, (1b) may attribute a different shared feature to each of the three pairs, e.g. shared looks to Mark and Raymond, shared interests to Raymond and Donovan, and shared values to Donovan and Mark. Similarly, the collective use in (2a) is logically stronger than the conjunction in (2b). For instance, (2a) is false whereas (2b) is true when $r=p\rightarrow\neg q$.

Winter (2018) points out that it's not clear how the strong interpretations of collective uses like (1a) and (2a) could even be expressed in terms of binary relations. Here I outline two proposals that attempt to do that, and point out their limitations.

Proposal 1: Binary relation with a covert argument

One might propose to capture the strong interpretation of (1a) by assuming that *similar* takes an obligatory, possibly covert argument *x* representing shared features. Thus, (1a) would be analyzed as (3a) below, which is reducible to the conjunction in (3b).

(3) a. Mark, Raymond and Donovan are similar ~~in *x*~~.
b. Mark is similar to Raymond ~~in *x*~~, Raymond is similar to Donovan ~~in *x*~~, and Donovan is similar to Mark ~~in *x*~~.

Since *similar* is context-dependent (see Alrenga 2010), it makes sense to assume a covert feature argument for it, especially considering that such an argument has an overt counterpart, as in *Mark and Raymond are similar in appearance*. However, other lexically-reciprocal adjectives, such as *consistent*, are not context-dependent in this way. If we were to assume that *consistent* takes a covert argument, it isn't clear what sort of values would even be assigned to this argument.

Moreover, *consistent* – at least on its technical definition – has existential force, whether one uses a definition based on situations (i.e. "there is a situation in which *p* and *q* are true"), models (i.e. "there exists a model which makes *p* and *q* true"), possible worlds (i.e. "*p* and *q* can be true together"), etc. Importantly, the existentially bound variable (i.e. the situation/interpretation/possible world) is not an argument of the predicate. Like any existential claim, (2a) says nothing about any particular value of the bound variable; only that there exists some such value that verifies the open formula.

Additionally, I don't see how one would guarantee no variance across a conjunction of existential claims, as in (2b). If there was a free variable in each conjunct, one could propose to bind all instances of the variable from outside the conjunction. But with a conjunction of existential claims, the variables are all already bound, each in its conjunct.

In fact, Winter (2018, fn. 17) assumes that *similar* too has an existential component, which means that this explanation may not work for it after all. This assumption is shared by at least one formal analysis of similarity predicates, which incidentally also includes a contextually-filled feature argument (Alrenga 2010).

Proposal 2: Binary relation between complementary parts of the argument

One might propose to capture the strong interpretation of (2a) as a binary relation between complementary subparts of the plural argument, which may themselves be pluralities; see (4a). Thus, (2a) would be analyzed with a binary relation between complementary parts of the plurality *p*, *q and r*, as in (4b). It could then be derived from the transitive use in (4c), which gives the correct interpretation.

(4) a. $\textsc{consistent}_{\textsc{coll}} = \lambda A.\forall x \sqsubset A$: $\textsc{consistent}_{\textsc{trans}}(x, A\text{-}x)$
b. $\textsc{consistent}_{\textsc{trans}}(p, q \wedge r)$
c. *p* is consistent with $q \wedge r$.

This analysis works for (2b) because a plurality of propositions (assuming that it's formed via logical conjunction) is itself a proposition, and therefore the correct type of argument for *consistent*. But for many other pluralities, this is not the case: a plurality of persons is not itself a person, a plurality of lines is not itself a line, etc. Therefore, analogues of (4b) would fail to account for predicates like *cousin(s)* and *intersect*, which take persons and lines as arguments, respectively. For example, (5a) cannot be analyzed with a binary relation between a person and a plurality of persons as in (5b), due to semantic mismatch. Note that the transitive use in (5c) can only be interpreted distributively, hence it doesn't force the same logically strong interpretation as (5a).

(5) a. Mark, Raymond and Donovan are cousins.
Interpretation: Mark, Raymond and Donovan share a grandparent.

b. COUSIN.OF(*Mark*, *Raymond*+*Donovan*)

c. Mark is a cousin of Raymond and Donovan.
Interpretation: Mark and Raymond share a grandparent, and Mark and Donovan share a grandparent (not necessarily the same grandparent).

Even for predicates which are not as limited as *cousin(s)* in the type of arguments they can take, the proposal outlined above may result in the wrong interpretation. Consider that (1a), repeated below as (6a), would be analyzed with a binary relation between an individual and a plurality, as in (6b). We can imagine that pluralities might have features not shared by their subparts, e.g. *can lift a piano*, in which case (6b) could express something other than the logically strong interpretation of (6a).

(6) a. Mark, Raymond and Donovan are similar.
Interpretation: Mark, Raymond and Donovan share feature x.

b. $\textsc{similar}_{\textsc{trans}}$(*Mark*, *Raymond+Donovan*)