

Linda M. Moxey and Anthony J. Sanford: *Communicating Quantities*. Lawrence Erlbaum, Hove (UK) / Hillsdale (USA), 1993. Pp. xii+144. £19.95 / \$37.50 (hardback).

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In this monograph, Moxey and Sanford (M & S) report on a series of psycholinguistic experiments on the subject of natural language quantification. Several of these experiments were published before in separate articles, but here M & S draw together the various strands in their research, and treat in more detail some of the issues raised by their earlier work.

Perhaps the most thoroughly explored psychological approach to quantification is based upon the *prima facie* plausible assumption that quantifying determiners correlate with points on a numerical scale. This assumption obviously makes sense for numerals, but intuitively it might also apply for quantifiers such as *few*, *many*, or *most*, for it evidently makes sense to ask how many *As* count as *few*, *many*, or *most As* (in a given context). Proponents of what M & S term the ‘psychometric’ approach have tried to answer precisely such questions, but M & S argue that the utility of psychometric investigations into the semantics of quantification is rather limited. In one experiment, M & S presented subjects with texts like the following (pp. 31f):

- (1) A survey has recently been carried out whether or not female students prefer to be examined by female doctors. *Q* [= *few*, *a few*, *many*, *not many*, ...] of the local doctors are female.

Subjects were asked to specify what percentage of the local doctors they thought were female, and these estimates were compared with baseline expectations determined in a prior test. As might be expected, the choice of *Q* affected the proportion reported, but M & S found this effect to be curiously restricted, as there turned out be no reliable difference between *few*, *very few*, *a few*, *only a few*, and *not many*. That is to say, if one supposes that these quantifiers simply serve to denote percentages, one is forced into the unlikely position that they all mean the same thing. M & S conclude from this, plausibly enough, that the prospects of the psychometric approach are dim.

Since the seminal work of Barwise and Cooper (1981), it has become widely accepted that quantifiers may be construed as relations between sets. (I prefer this relational perspective to the functional stance Barwise and Cooper adopt themselves, mainly because on a relational construal the connections between the semantics and the pragmatics of quantification become more transparent, as I will try to illustrate in the following. But in most respects these two perspectives

are mutually compatible, of course.) For instance, *some* is a relation that holds between two sets  $A$  and  $B$  iff  $A \subseteq B$ . A quantifier  $Q$  is monotone increasing (more accurately: monotone increasing in its second argument) iff, for all  $A, B, C$ , if  $Q(A, B)$  and  $B \subseteq C$ , then  $Q(A, C)$ ;  $Q$  is monotone decreasing iff, for all  $A, B, C$ , if  $Q(A, B)$  and  $C \subseteq B$ , then  $Q(A, C)$ . *All, most, some, a few, and many* are monotone increasing quantifiers; *no, few, not all, and not many* are monotone decreasing. The latter class of quantifiers are negative in the sense that they pass the standard negation tests; for example, they accept positive tag questions and license negative polarity items, such as *anything*:

- Few
- (2) ?A few of the suspects were proved to be guilty, were they?
- Not many lawyers are troubled by anything like a conscience.
- ?Many

One of the most interesting of M & S's findings is that, in addition to these negation-like properties, monotone decreasing quantifiers correlate with a distinctive pattern of anaphoric reference. I will discuss this point in some detail.

From a pragmatic point of view, the interpretation of a quantifying determiner typically involves one or two sets. On the one hand, most quantifiers may be interpreted, on a given occasion, as presupposing some domain of individuals. In Milsark's (1977) terms, a quantifier thus interpreted is 'strong'. When it is thus interpreted, the interpretation of a quantifier will generally involve a subset of this domain (what M & S call the 'refset'), which is made available for subsequent anaphoric reference. For instance, a token of

- (3) a. At least three volunteers were injured.

is most likely to be construed in terms of a contextually given domain of volunteers,  $A$ , and this sentence claims that there is some  $B \subseteq A$  such that the cardinality of  $B$  is 3 or more and that all members of  $B$  were injured. Once this sentence has been uttered, both the domain and the refset are available for anaphoric reference; for instance:

- (3) b. But they wouldn't give up.

Here the plural pronoun might be construed as referring back to either the domain or the refset. On the other hand, most quantifiers can also be construed without presuppositions, as in:

- (4) There were at least three volunteers.

In this case, *at least three volunteers* does not mean 'at least three of a contextually given domain of volunteers'. It therefore is interpreted here as a 'weak' NP, as Milsark would say. The interpretation of (4) involves just a single

set that may be picked up by a subsequent anaphor. In the following I confine my attention, as do M & S, to strong quantifiers, i.e. to quantifiers that are construed as presupposition inducers, and whose interpretation involves a domain as well as a refset.

From what we have seen in the following it is natural to conclude that a strong quantifier introduces two objects into the discourse, a domain and a refset. Once these are in place it is of course possible to derive a third object, which is the set-theoretic difference between the two, but there are reasons to assume that this ‘compset’, as M & S call it, is less accessible than either the domain or the refset. For instance, the following discourse is obviously incoherent, the reason being, intuitively speaking at least, that in order for this discourse to make sense, the anaphoric pronoun has to refer to an object which becomes available only on second thoughts:

(5) ?Most of the names on this list begin with a J. They begin with an M.

M & S’s principal result, and the centrepiece of the second half of their book, is that these observations are not valid for all varieties of quantification, because monotone decreasing quantifiers license, and sometimes even favour, anaphoric reference to the compset. This is shown by an experiment in which subjects were asked to continue text fragments like the following:

	Not many		
	Few		. They ...
(6)	A few	MPs were at the meeting	because they ...
	Only a few		
	...		

The outcome of this experiment was that, whereas monotone increasing *a few* induces subjects to refer back to the refset (i.e. the set of MPs that were at the meeting), monotone decreasing quantifiers like *not many* and *few* bias them towards the compset (i.e. the set of MPs that were not at the meeting). These results hold for the full stop as well as for the *because* condition. The quantifier *only a few* is the odd one out: while in the full stop condition it induces a preference for the refset, in the *because* condition subjects predominantly refer to the compset.

These data are surprising. Extrapolating from the behaviour of prototypical quantifiers such as *most*, one is prepared for quantifiers that draw subjects towards their domains or their refsets, but not to their compsets. A natural initial reaction, therefore, is to question the data. For instance, one might suspect that, although it appears as if subjects were referring to the compset of a quantifier, they were actually referring to its domain, albeit perhaps in a somewhat vague or

sloppy way. The idea is that, conceivably, when a speaker produces a discourse like the following,

(7) Few of the MPs were at the meeting. They were too busy. (p. 63)

he uses the pronoun to refer to the MPs in a quasi-generic manner, so that the speaker actually wants to convey that the MPs were 'generally' or 'mostly' too busy. M & S seek to discredit this account with three arguments. First, they observe that speakers themselves label their compset references as such, and that their assessment is confirmed by independent judges. Secondly, speakers often volunteer continuations with *instead*, like the following:

(8) Hardly any of the MPs attended the meeting. They were out at the pub or with their secretaries instead. (p. 64)

Such continuations surely count as genuine compset references. Finally, M & S report that compset references predominate even with the quantifier *not quite all*; for instance:

(9) Not quite all of the MPs were at the meeting. They stayed at home instead. (p. 64)

Presumably, the compset of a quantifier like *few* or *not many* will not be much smaller than its domain, so in these cases it is not unlikely that apparent compset references are in fact generalizing references to the quantifier's domain.

However, the domain of *not quite all* will typically be much larger than its compset, and yet M & S's subjects produce compset continuations 9 out of 10 times (in the full stop condition), which is more than for any of the other quantifiers M & S used in their studies.

These arguments, the last one in particular, have convinced me of the fact that compset references exist, but they still leave room for doubts about the extent of the phenomenon. It seems to me that in some cases at least, it may be held that what appears to compset reference is in fact a kind of *collective* reference to the domain of a quantifier (this is similar to, but not quite the same as, the view M & S argue against). It is common practice to distinguish between collective and distributive uses of plurals and (other) quantifiers.

(10) a. Each of the pirates had a wooden leg.  
b. The pirates attacked the galleon.

(10a) only has a distributive reading, according to which the predicate 'had a wooden leg' applies to each pirate individually. (10b), by contrast, favours a collective reading, according to which the pirates attacked the galleon as a group. On this reading, not all and perhaps not even a majority of the pirates need have been involved in the attack; a group may be responsible for an action

implemented by some of its members only. Now, although the collective/distributive distinction is intuitively sound, it does not by any means yield a clearcut dichotomy. Consider, for instance:

(11) The pirates were fishing.

If all the pirates were fishing, then an utterance of (11) is obviously true. But is it to be construed collectively or distributively? This question may be hard if not impossible to decide. If the individual instances of fishing pirates are wholly unrelated (for instance, if the speaker is referring to pirates that live in different parts of the world, who, purely coincidentally, all happened to be fishing at a given point in time), then a distributive reading might seem more likely. But otherwise there may not even be a fact of the matter.

M & S apparently take it for granted that the subjects in their continuation tasks always had distributive interpretations in mind. But perhaps this assumption is not as innocuous as it may seem. It is easily conceivable that the subject (call her 'Betsy') who produced the continuation in (7) intended the pronoun to refer collectively to 'the MPs'. 'They were too busy' was therefore intended to mean that, taken as a group, the MPs were too busy — which does not exclude the possibility that some of them had time to spare. Now suppose Betsy is asked to specify to which of the following the plural pronoun in her own continuation referred (p. 61):

(12) MPs in general

All MPs

MPs who were at the meeting

MPs who were not at the meeting

Other (please state)

Then she should conclude that none of these matches her original intention, if she doesn't want to use the escape hatch provided by 'other' — which she may not want to use because it is not clear to her what she should say. For, as I have argued in the foregoing, the content of 'the MPs taken as a group' (which is what Betsy should have said, *ex hypothesi*) is somewhat elusive, and not always clearly distinct from 'all the MPs'. In such a situation it is understandable that Betsy should decide to slightly shift away from her original intention and decide that she was referring to the MPs that were at the meeting. This is not to claim that Betsy doesn't know what she was saying, since for all practical purposes, what she said coincides with what she claims to have said. It is just that Betsy's reports on her own intentions cannot simply be taken at face value — which is surely not a controversial point.

I believe that this story is a plausible one, and that M & S's counterarguments are not sufficient to prove that something along these lines didn't happen in at

least some instances of what they call ‘compset reference’. If this is correct, potential problems arise in more than one way. First, it may be that M & S’s data are distorted to a greater or lesser degree, the actual number of domain references being higher than reported, and the actual number of compset references proportionally lower. Secondly, in the light of the foregoing observations about the distributive/collective distinction, it may even be that this kind of experimental setup is ill suited to separate reference to a quantifier’s domain from reference to its compset. Thirdly, M & S’s theoretical account of compset reference may be in jeopardy (see below).

In order to explain their findings, M & S propose a model on which compset references are caused by two factors. First, and foremost, they hold that quantifiers such as *few* or *not many* focus upon their compsets. If this is correct, the context representation of such quantifiers not only involves compsets — they highlight their compsets, to boot. In combination with the widely held view that anaphors prefer to pick up referents that are at the focus of attention, this assumption explains how, say, *few* directs subjects towards its compset. The second factor involved in compset reference, according to M & S, is of a thematic nature. Analyzing the content of the continuations produced, they find that there is a correlation between compset reference and the content of a continuation. The following example is a typical one:

- (13) Few of the fans went to the football match. They all watched the game on the television instead. (p. 74)

Here the plural pronoun refers back to the compset of monotone decreasing *few*, and the continuation explains why few of the fans went to the football match. This is in fact the general pattern: if a sentence of the form  $[[Q\ N]\ VP]$  invites continuations with compset references, then these continuations will typically seek to explain why *VP* is true of *Q N* only. It is intuitively obvious that some such connection must exist. In reporting that *few As* are *Bs* a speaker conveys that the size of  $A \times B$  is smaller than expected. It seems natural that subjects should want to explain why this expectation was disappointed, and in doing so they will almost necessarily concentrate their attention on the *As* that are not *Bs*, i.e. they will concentrate the compset. This line of explanation is confirmed by M & S’s finding that, while a sentence like (14a) yields hardly any compset references at all, (14b) invites compset references in the majority of cases (p. 81):

- (14) a. Only a few of the MPs were at the meeting.  
b. Only a few of the children ate their ice-cream.

M & S explain this by assuming that, taken by itself, *only a few* does not bias the hearer towards its compset, and that it is the difference in content which makes the difference: as compared to (14a), the state of affairs reported by (14b) is

definitely remarkable, and therefore it is more likely that subjects will want to 'account' for (14b) than for (14a), with a larger proportion of compset references as a concomitant.

At this point one may wonder if not all instances of compset reference can be explained along these lines. *Ceteris paribus*, such an account would be more attractive than M & S's two-factor theory, for at least two reasons. First, it would obviously be simpler. Secondly, if compset reference could be explained in purely thematic terms, it would not only be unnecessary to suppose that certain quantifiers focus on their compsets: one could even get by without the assumption that the context representation of these quantifiers involves compsets at all. For then we could return to the 'naive' view outlined earlier, according to which quantifiers are uniformly represented in terms of domains and refsets — compsets being derivable only if needed. M & S consider this alternative, and argue on the basis of experimental evidence that an independent focus effect must be assumed. M & S presented subjects with sentences that reported a quite unexceptional state of affairs, and therefore did not seem to call for an explanation. As it turned out, subjects indeed produced very few reason-giving continuations, and yet the proportion of compset references remained high. M & S give the following example:

- (15) Few of the children hated Santa Claus. They left him plenty of milk and cookies. (p. 67)

M & S conclude from this that compset references do not always arise because subjects want to explain the situation reported in the opening sentence, and that it must be assumed, in addition, that a quantifier such as *few* focuses upon its compset. Judging solely on the basis of this example (which is the only one given by M & S), however, I don't see that this conclusion is inescapable, because I am not convinced that (15) must be classified as an instance of compset reference. Indeed, the most obvious interpretation of (15), to my mind, is the one on which the plural pronoun refers collectively to 'the children', and the continuation provides evidence for the truth of the first sentence, as suggested by the following paraphrase:

- (16) The children left Santa plenty of milk plenty of milk and cookies, which shows that few of them hated him.

Clearly, *the children* in (16) which is the counterpart to the plural pronoun in (15), is used here collectively. It is impossible for me to tell whether (15) is typical of the results obtained by M & S, but it is obvious enough, I think, that the case for or against their two-factor model will have to be based upon a more detailed content analysis of their data.

In my opinion, *Communicating Quantities* is a most welcome addition to the already impressive bibliography of natural language quantification. To begin with, this monograph charts a new and evidently fruitful approach to the mental processing of quantification. Secondly, and perhaps most importantly, it presents a range of intriguing data which should be relevant to the concerns of everybody with an interest in the pragmatic aspects of quantification. Thirdly, although I do not (yet) agree with it in all respects, as the foregoing remarks should have made clear, I do believe the theory M & S propose merits serious consideration. Finally, *Communicating Quantities* testifies to the fertility of the interdisciplinary approach to natural language, an approach that is preached by many, yet practised by so few.

## **R e f e r e n c e s**

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