Journal of Semantics 11: 215–230

Do Verbs Act as Implicit Quantifiers?

STEPHEN E. NEWSTEAD
University of Plymouth

Abstract

A number of studies suggest that verbs can act as implicit quantifiers on the subjects and objects of the sentences in which they are used; thus a sentence such as *Children like animals* has truth conditions which fall short of the universal. Furthermore, it has been claimed that the quantity implied varies as a function of the type of verb used, for example, whether the verb describes an observable event or a subjective state. The present research investigated this effect further by asking people to provide direct numerical estimates of the quantity implied. Experiments 1 and 2 indicated that there are differences between verb types, but that these are rather different from those obtained using other techniques. Experiment 3 showed that, with appropriate controls for the subjects and objects, there were no differences between the verb types. The results are interpreted as indicating that people base their estimates not on the quantity implicit in the verb but on the expected frequency of the activity described by the sentence. It is suggested that expected frequency, rather than the semantic properties of the verb, may help explain not only implicit quantification but also implicit causality in verbs.

1 INTRODUCTION

For a number of years now, psychologists have been interested in the possibility that verbs in sentences which are generalizations may carry with them certain assumptions about the quantities associated with the subject and object of the sentences. Consider, for example, the sentence *Nurses like accountants*. At first sight, it might appear that this is a universal statement, meaning that all nurses like all accountants. However, this is not necessarily the case, since it is by no means clear that the sentence would be rendered false if one or more nurses were found who did not like accountants. In other words, the sentence may imply only that most nurses like accountants. This will be referred to as implicit quantification. It is of considerable interest to know just what quantities are necessary for sentences of this kind to be true, and also what factors influence these quantities. For example, are different quantities implied by different verbs, or by different subjects and objects? Does the context in which the sentence occurs have any effect?

Implicit quantification was first investigated in a study carried out by Gilson & Abelson (1965) which is now largely neglected. Their study used a novel and unusual technique for studying people's willingness to accept generalizations

when these were implied rather than explicitly stated. For example, participants were told that there were just three types of tribe, Southern, Northern and Central, and that two of these liked paintings while the other did not. Participants had to judge whether or not this evidence rendered acceptable the claim that *Tribes like paintings*.

The strongest finding to emerge from this study was that the verb used in the sentence was the prime determinant of people's willingness to accept the generalisation. It was found that the episodic verbs *produce*, *buy*, *have*, and *steal* led to significantly more acceptances than the more subjective verbs *get angry with*, *understand*, *like*, and *avoid*, irrespective of what were the subjects and objects of the sentence. Subsequent research has replicated this finding many times (e.g. Abelson & Kanouse 1966; Kanouse & Abelson 1967; Kanouse 1972; Klemp 1974; Podeschi & Wyer 1976; Wyer & Podeschi 1978).

What is the explanation for these findings? The main line of research that has been pursued in trying to answer this question is that of categorizing verbs into types according to whether or not they permit generalizations to be made. A number of possibilities have been considered. Gilson & Abelson (1965) proposed a distinction between manifest and subjective verbs. Manifest verbs are ones which express unitary, usually observable relationships, while subjective verbs indicate less observable relationships, often ones involving sentiment or feeling. Manifest verbs are the ones which permit generalizations. This has since been supplemented by the addition of a distinction between positive and negative verbs, with positive verbs permitting more inductive generalizations (Kanouse & Abelson 1967; Kanouse 1972). Writers such as Peeters (1971) and Lewicka (1986) have claimed that this distinction, which they characterize as one between approach and avoidance, is in fact the principal determinant of generalization. Klemp (1974) explains the findings in terms of three distinctions: polarity (whether the verb is positive or negative); lexical markedness (whether the verb is marked or unmarked); and semantic type (whether the verb is a private one, expressing a relationship known only to the person themselves, or a state one).

Given the choice of possible distinctions, it might be thought that it would be a relatively straightforward matter to ascertain which provides the best fit to the data. This is not the case, partly because there are subtle differences in the generalizability of verbs in the various studies, but primarily because these distinctions are not as hard and fast as they at first sight appear. This is graphically illustrated by Kanouse (1972) who recategorized the verb *want* as a manifest verb primarily in order to explain the unexpected results that it produced in his study! It is probably fair to say that not one of the distinctions proposed provides a completely adequate explanation of all the findings.

It has been widely assumed that the differences between the verbs stem from differences in implicit quantification. It has been suggested (e.g. by Gilson &

Abelson 1965) that verbs impose subtle constraints on the number of entities that might be associated with their subjects and objects. For example, the verb *produce* in the sentence *Tribes produce magazines* is assumed to be true if only relatively few of the tribes do produce magazines. On the other hand, the verb *like* in the sentence *Tribes like magazines* is assumed to suggest a rather larger number. This explains quite readily why *produce* results in more inductive generalizations than *like*; in the situation where just one-third of the tribes provide positive instances, the threshold for acceptance of *produce* is more likely to be surpassed than is the threshold for *like*.

However, stated in these terms, implicit quantification is in effect simply a restatement of the findings. What is needed is independent support for the claim that verbs act as implicit quantifiers. Abelson & Kanouse (1966) asked their participants to provide quantifiers for a wide range of statements. They were asked to choose one of six quantifiers (*one or two*, *a few*, *some*, *many*, *most*, and *all*) to apply to the subject and the object of sentences such as *Artists avoid magazines*. The quantifiers were numerically encoded, with *one or two* being scored as 1 and *all* being scored as 6. As was expected, the verbs *have*, *buy*, and *produce* received lower scores than the verbs *like*, *understand*, and *avoid*; in other words, it requires less supportive inductive evidence to accept generalizations based on the former group of verbs. However, there are important qualifications to this finding. In particular, the differences between the verbs were found principally with respect to the sentence objects; there was very little difference in generalization between verbs when only the subjects were considered, and it is possible that this difference was not independently significant. Coupled with the fact that so few verbs were used, this means that these findings must be viewed with some caution.

Subsequent research has not served to resolve this issue. Kanouse (1972) confirmed the finding that verb type influenced the quantifier assigned to sentence objects (he did not look at sentence subjects), and also found that sentences were easier to recall when the quantifier used with the verb was consistent with that implicitly suggested. Podeschi & Wyer (1976) used a restricted range of quantifiers (*some* and *all*) and they too found that different verb types led to different choices of quantifier. They did not break down this effect by subject and object, but they suggest it held for both of these. Klemp (1974) used a similar task to that employed by Abelson & Kanouse (1966) and Kanouse (1972) to assess the implicit quantifiers of 32 verbs but found contrary results. There were no differences in the quantifiers selected for either sentence subjects or sentence objects as a function of the polarity, markedness and semantic type of the verbs. Since these were all factors that affected the tendency of people to accept generalizations, he concluded that verbs do not differ in the quantities that they suggest, at least not in a way that can readily explain performance in the Gilson & Abelson task.

The question, then, of whether verbs play a key role in implicit quantification, with different verbs playing different roles, has not been unequivocally answered, and certainly there is no agreed categorization of verb types. The purpose of the present research was to re-open the question of whether verbs play a controlling role in implicit quantification. As we have seen, the way in which this has been investigated previously has been by asking subjects to indicate which quantifier is the appropriate one to use with given verbs. This may not be the best technique to employ. For one thing, the scoring system used by authors such as Kanouse (1972), i.e. scoring the quantifiers 1–6, assumes that the quantifiers lie on an equal interval scale, a highly dubious assumption (Newstead & Collis 1987). Further, there are context effects in the interpretation of quantifiers, such that the same word may be taken to signify different things in different situations (Pepper & Prytulak 1974; Moxey & Sanford 1993). If, for example, the word *some* means something different when paired with *have* than when paired with *understand*, it is inappropriate to draw conclusions based on the frequency with which the quantifier is chosen with the two verbs.

In an attempt to overcome these problems, the present study used a more direct measure of implicit quantification in which participants were asked to give numerical estimates of the amounts signified.

EXPERIMENT 1

The aim of this experiment was to investigate whether verbs act as implicit quantifiers. The verbs used were either manifest or subjective and either positive or negative, giving four verb types altogether. It was expected, based on the results obtained by Kanouse & Abelson (1967) and others, that manifest verbs would lead to lower implied quantities than subjective ones and that positive verbs would lead to lower quantities than negative.

Participants

There were 16 participants, all of whom were undergraduate psychology students at the University of Plymouth and who participated for course credit.

Material

The following verbs were used:

Manifest positive:	buy, use, make, have
Manifest negative:	destroy, harm, damage, abuse

Subjective positive: love, admire, understand, enjoy
Subjective negative: hate, fear, avoid, ignore

These are the same as were used by Kanouse (1972) with the exception of *damage* (Kanouse used the verb *fight*). The reason for this change was that the verb *fight* leads to anomalous sentences when used with inanimate objects, as it was both in this study and that of Kanouse.

The verbs were combined with 16 possible sentence objects: sweets, pottery, bags, television sets, tablecloths, shirts, chairs, clocks, umbrellas, cars, board games, washing machines, magazines, paintings, cameras and bicycles. These 16 possible sentence objects were divided arbitrarily into four sets of four, and each set of four was rotated round the four verb types such that each object occurred equally often with each verb type. The subject of the sentences was always the same—the inhabitants of the imaginary town of Arcadia.

The sentences were put into a booklet for which the instructions began as follows:

> The town of Arcadia has a population of exactly 1000 people. In this booklet you will be presented with a series of statements describing the inhabitants of this town. Your task is to indicate how many people you think are indicated by each statement.
>
> You will first of all be asked to give a single whole number indicating the most likely number of people being referred to. Then you will be asked to give the *minimum* number of people who could be referred to given the statement presented; and also the *maximum* number of people who could be referred to.
>
> The statments will be similar to the following:
>
> If Arcadians like children, then . . . Arcadians like children.
>
> If you think this statement is most likely to refer to 740 Arcadians, then 740 is the number that you should enter in the space provided.

Similar instructions were then given about filling in the numbers for the maximum and minimum values that were to be indicated. Participants were asked to use only single whole numbers and to proceed through the items in the order in which they appeared in the questionnaire.

The 16 test items then appeared on separate pages of the booklet, in a different random order for each participant. On each page there was a statement and spaces in which to place the optimum, minimum and maximum values.

Procedure

The participants were run in a single group and were allowed as much time as they required to complete the booklet.

Results

The results can be seen in Table 1, where the mean typical, minimum, and maximum values are given for each verb. On the basis of previous research it would have been expected that manifest verbs would produce lower magnitude estimates than subjective ones. There was a slight trend in this direction on all of the scales, and for the minimum values this difference (25.1% vs. 31.0%) approached significance, $F(1,14) = 3.74$, $p = 0.074$. The difference was non-significant with typical and maximum values, $Fs = 2.01$ and 2.11 respectively, $p > 0.1$).

Table 1 Mean values, expressed as percentages, given in Experiment 1

	Typical value	Minimum value	Maximum value
Manifest positive			
Buy	63.1	33.8	83.2
Use	65.2	35.0	83.4
Have	63.3	41.4	85.1
Make	25.9	15.5	45.9
Mean	54.2	31.4	74.4
Subjective positive			
Love	55.1	32.7	82.2
Admire	62.4	35.4	78.0
Understand	59.8	39.9	74.8
Enjoy	60.8	38.8	78.9
Mean	59.7	36.7	78.7
Manifest negative			
Destroy	26.9	15.5	57.0
Harm	31.2	20.3	50.7
Damage	36.6	19.3	59.2
Abuse	27.6	20.4	56.0
Mean	30.1	18.9	55.7
Subjective negative			
Hate	37.7	26.7	60.9
Fear	32.6	25.1	55.3
Avoid	35.3	21.2	60.9
Ignore	37.7	34.0	50.5
Mean	35.8	26.8	56.9

It would also have been expected that positive verbs would produce lower estimates than negative ones, but in fact the difference went significantly in the opposite direction. On the minimum ratings, the mean for positive verbs was 33.3%, that for negative verbs 22.8%. This difference was statistically significant, $F(1,14) = 6.54$, $p < 0.05$, as it was also with the typical and maximum ratings,

$F(1,13) = 20.41$, $p < 0.001$ and $F(1,14) = 11.09$, $p < 0.01$ respectively. There was no significant interaction between these two factors on any of the ratings (all $Fs < 1$).

These results are difficult to reconcile with previous research. The finding that in the present study positive verbs produced much higher estimates than did negative verbs is directly contradictory to all previous studies (Abelson & Kanouse 1966; Kanouse 1972; Podeschi & Wyer 1976; Wyer & Podeschi 1978). What is more, essentially the same verbs were used as in one of the earlier studies, that of Kanouse (1972). Previous studies required participants to select appropriate quantifiers while the present experiment used direct estimates of quantity, but it is far from clear why this change should lead to such different results. One difference between the present and previous studies which might explain the discrepancy is that the present study looked at quantification of subjects, while most earlier studies have looked at quantification and generalization of objects. The only other study to look specifically at generalization over subjects was that of Abelson & Kanouse (1966), and that too found only a small difference between manifest and subjective verbs (it did not look at the effects of negation). It is possible that implicit quantification does not occur to any great extent over subjects, despite the regularity with which this assumption has been made.

In order to investigate this possibility further, a second study was carried out which looked at quantification of both subjects and objects. Furthermore, in order to check that the results were not an artefact of the specific subject term used, a different term was used in Experiment 2. As a further check on the generality of the findings, a slightly different task was used, one requiring participants to give their responses as percentages rather than absolute numbers.

EXPERIMENT 2

This study investigated participants' direct estimates of the quantities implied by verbs in both the subjects and objects of the sentence.

Participants

There were 16 participants, all of whom were psychology students at the University of Plymouth who took part in the experiment for course credit. None had taken part in Experiment 1.

Materials

The same verbs were used in this study as had been used in Experiment 1. The subject term was always *people* and the object term was always *magazines*; these were chosen as fairly neutral terms which made reasonable sense with each of the verbs used in the experiment.

Booklets were prepared containing the test items. The instructions to the booklet asked participants to consider only the information contained in the statements, and asked them to assume that they did not know the people to whom the sentences referred, nor anything about what they did to magazines. Each test item was similar to the following example:

People ignore magazines

This is most likely to indicate that ____% of people ignore magazines
As a minimum, this indicates that ____% of people ignore magazines

The test items differed in the verb used, and also as to whether participants were asked to rate the quantity associated with the subject of the sentence (as in the above example) or the object of the sentence. For half of the participants the 16 test items involving the rating of the subject appeared first, in random order, followed by the 16 items involving the rating of the object; for the remaining participants this order was reversed.

Participants were asked to provide both the percentage which the statement was most likely to indicate and the minimum percentage that could be indicated, using a single whole number between 1 and 100. They were not asked to provide a maximum percentage. This omission simplified the task, and lost little since the results obtained in Experiment 1 with this task simply reflected those obtained from asking participants to estimate the most likely and minimum quantities.

Results

The findings of this study are presented in Table 2. Looking first at the minimum ratings, there was no difference between the overall ratings given to subjects and objects, $F(1,14) = 2.07$, $p < 0.1$, and just one significant interaction involving this factor, a two way interaction with the positivity/negativity of the verb, $F(1,14) = 5.82$, $p < 0.05$. Objects seemed to give higher values than subjects with negative verbs but not with positive verbs. In other respects, the results were virtually the same as those obtained in Experiment 1: there was no difference between manifest and subjective verbs, $F(1,14) = 0.01$, $p > .1$, but positive verbs produced significantly higher ratings than negative ones, $F(1,14) = 14.35$, $p < 0.01$. There was no significant interaction between these

Table 2 Mean values, expressed as percentages, given in Experiment 2

	Subject		Object	
	Typical value	Minimum value	Typical value	Minimum value
Manifest positive				
Buy	78.6	41.8	68.3	39.3
Use	65.2	26.2	59.7	22.0
Have	74.9	36.6	56.2	18.0
Make	23.3	4.8	58.2	41.5
Mean	60.5	27.3	60.6	30.2
Subjective positive				
Love	69.6	32.6	60.8	22.4
Admire	46.8	20.6	50.8	17.3
Understand	80.1	41.9	84.6	45.1
Enjoy	77.8	42.8	79.4	37.5
Mean	68.5	34.5	68.9	30.6
Manifest negative				
Destroy	51.9	25.8	63.4	33.1
Harm	30.8	11.7	36.2	13.8
Damage	46.6	19.9	48.8	22.7
Abuse	32.3	10.5	46.3	21.8
Mean	40.4	17.0	48.0	22.9
Subjective negative				
Hate	33.1	16.9	41.3	15.6
Fear	21.1	8.6	21.4	11.9
Avoid	34.1	10.4	47.9	28.4
Ignore	45.8	16.2	59.1	31.4
Mean	33.5	13.0	43.1	21.8

two factors, $F(1,14) = 1.26$ $p < .1$. Visual inspection of Table 2 reveals that this pattern of results clearly holds both for sentence subjects and for sentence objects.

A similar, but not identical, picture emerges for the typical ratings. There was no main effect of subject/object, $F(1,14) = 2{,}60$, $p > 0.1$, nor, in this case, any significant interactions involving this factor. There was no overall difference between manifest and subjective verbs $F(1,14) = 0.01$, $p > .1$, but positive verbs gave significantly higher ratings than negative ones, $F(1,14) = 24.76$, $p < 0.001$. There was also an interaction between these two factors, $F(1,14) = 5.77$, $p < 0.05$, with subjective verbs producing higher ratings than manifest when the verbs were positive but the opposite way round when the verbs were negative. This weak interaction has no easy explanation and has not been found in any previous studies nor in the present Experiment 1.

In general, the findings of this experiment indicate that the pattern of results obtained in Experiment 1 was not due to the fact that the quantification was over subjects, since an almost identical pattern of results emerged with ratings over objects. Furthermore, the use of a different subject term seemed to have minimal effects, as did the change from asking participants to give their estimates using percentages rather than absolute numbers. It seems reasonable to conclude that the results of Experiment 1 are robust, at least using this set of verbs, and very different from those obtained in previous studies using different techniques. There is a slight complication in that two interactions emerged in Experiment 2 which are not easy to explain; however, the fact that they emerged with only one of the types of ratings suggests that they may not be strong effects.

Both Experiments 1 and 2 used a restricted number of subjects and objects. Experiment 1 used the subject term *Arcadians* throughout, while Experiment 2 used only the subject term *people*. There was more variety with the object terms, at least in Experiment 1, but it remains a possibility that the obtained effects are attributable in part to the particular subject and object terms selected. It is important to know whether the verb effects obtained are more general than this. Hence in Experiment 3 completely arbitrary, abstract material was used: the subjects and objects were all randomly chosen letters of the alphabet. If the estimates remain the same, this would indicate that the verbs are powerful determinants of quantification, albeit in a rather different way than might have been assumed on the basis of previous research. If, however, the estimates change, this would suggest that the verbs are not the only factor in quantification but that subjects and objects can also have an influence.

EXPERIMENT 3

The aim of this study was to investigate implicit quantification over the same set of verbs as used in the previous studies but using neutral, abstract material.

Participants

There were 25 participants, all of whom were psychology students at the University of Plymouth who took part for course credit. None had taken part in either of the two previous experiments.

Materials

Booklets were prepared in which the 16 verbs were paired at random with letters of the alphabet as subjects and objects. Each test item involved

participants giving a typical and minimum estimate of quantity, expressed as a percentage. The following is a typical test item:

Qs buy Zs

This is most likely to refer to ____% of Qs and ____% of Zs
As a minimum, this refers to ____% of Qs and ____% of Zs

Participants were told that the letters referred to two sets of entities (people, things or objects) but that they did not know which. They were asked to fill in the percentages that they thought were indicated by each statement. They were told that there were no right and wrong answers, and that it was their personal judgement that was of interest. Each verb occurred just once in the booklet, and the order in which the verbs appeared was varied.

Method

Participants were run in small groups of varying sizes. They were allowed as much time as they required to complete the test items.

Results

The results are summarized in Table 3. With respect to the minimum ratings, an analysis of variance involving the factors of subject/object, manifest/subjective and positive/negative showed no significant effects on any factor, nor were there any interactions between factors. The three-way interaction between all the factors approached significance, $F(1,23) = 4.10$, $p = 0.055$, but no other effects were even marginally significant.

With the typical ratings, there was just one significant effect, again the three-way interaction involving all the factors, $F(1,23) < 5.54$, $p = 0.005$. The source of this interaction seemed to be a slightly lower rating for the manifest negative verbs when they were the objects of the sentences. It is not easy to devise any plausible explanation as to why this should be the case.

The results of this experiment indicate that when abstract terms are used, differences between the verb types, and indeed between the individual verbs as well, tend to disappear.

GENERAL DISCUSSION

Taken together, the results from these three studies point to a very clear conclusion but one which is surprising in the context of previous research: verbs do not dominate quantity assignment. The first two experiments

Table 3 Mean values percentages given in Experiment 3

	Subject		Object	
	Typical value	Minimum value	Typical value	Minimum value
Manifest positive				
Buy	60.4	36.6	53.6	36.8
Use	63.8	34.0	63.9	37.9
Have	73.1	45.5	63.9	42.2
Make	62.8	36.7	68.8	45.2
Mean	65.2	38.0	62.2	40.1
Subjective positive				
Love	74.4	45.6	62.0	36.9
Admire	69.6	43.4	59.3	39.5
Understand	52.1	28.6	56.7	34.2
Enjoy	66.8	37.2	67.6	40.0
Mean	65.7	38.7	61.4	37.7
Manifest negative				
Destroy	58.6	31.6	50.7	27.5
Harm	65.3	37.0	52.6	26.6
Damage	60.5	34.9	58.8	36.9
Abuse	53.8	28.9	44.6	22.6
Mean	59.5	33.1	51.7	28.4
Subjective negative				
Hate	62.8	38.1	70.2	48.2
Fear	58.8	36.6	63.0	43.1
Avoid	59.0	33.2	59.2	35.4
Ignore	58.1	32.9	57.7	41.2
Mean	59.7	35.2	62.5	42.0

indicated a small but nonsignificant difference between manifest and subjective verbs, in the direction predicted on the basis of previous research, and a large and highly significant difference between positive and negative verbs but in exactly the opposite direction to what had been predicted. Most dramatically, when completely abstract material was used in Experiment 3, there were no differences whatsoever between verbs of these two types. It seems clear that the subjects and objects are exerting an influence on the ratings given in Experiments 1 and 2. The most likely explanation seems to be that participants were responding on the basis of the expected frequency of the complete scenario depicted by the subject–verb–object combination.

It is easy to see how people might respond in accordance with their prior expectancies based on their own experience. Experiment 1 required participants to indicate the number of inhabitants of an imaginary town who behaved

in various ways. It seems likely that participants brought with them to this task expectancies as to how many of the inhabitants of any town would behave, for example, how many of them might buy television sets. And, if this is a fairly typical British town, this proportion is likely to be quite high. Similarly, participants might have expectancies concerning the number of inhabitants of a town who would destroy television sets and this number might intuitively be expected to be somewhat lower. If these expectancies are similar with other entities (such as the number of people who might be expected to buy or destroy chairs, cars, or shirts), this could readily explain the result that was obtained, that *buy* gave consistently higher ratings than *destroy*.

Subsidiary findings lend some support to this explanation. It is clear from inspection of Tables 1 and 2 that the verbs in each category are not a homogeneous group. This is perhaps best illustrated with the manifest positive verbs. The verb *make* seems very different to the other three verbs, consistently producing lower quantities than them. For example, in Experiment 1 the typical value accorded to *make* was 25.9%, while the lowest value accorded to any of the other manifest positive verbs was 63.1%. Perhaps, with the decline of manufacturing industry in the UK, there is an expectancy that very few things are likely to be made by anyone.

In addition, there was also some evidence that the quantities implied varied as a function of the object term used. This could only be investigated in Experiment 1, since this was the only study to use different object terms, and even here each verb was used with only four different objects. Nevertheless, there did seem to be some interesting findings. For example, the typical value chosen for *use* was 51% for pottery, 81% for cars; the typical value for *have* was 42% for cameras, 84% for chairs. Intuitively, these differences seem to correspond to differences in expected frequency, since we would probably expect more people to use cars than pottery in a typical town, and more to have chairs than cameras. These differences cannot be properly tested for statistical significance, and it would be wrong to read too much into them, but they are at least suggestive.

However, perhaps the most compelling argument for the role of prior expectancies is that the use of abstract material in Experiment 3 completely removed any difference between different verb categories or indeed beween individual verbs. The most plausible explanation for this is surely that this abstract material led to no prior expectations and that in the absence of these there were no differences between verbs.

If the present explanation is correct, then the quantities attached to subjects and objects derive from prior expectancies about the scenarios involving the combination of subject, verb, and object in the sentence. The verb might be especially influential in determining the scenario, but it is by no means the only factor.

There are instances where the same verb seems to lead to very different expectancies depending upon the subject and object it is used with. Examples of this have been presented already, and there are likely to be even more dramatic differences in the expected frequency attached to the verb *make* in *People make ice cubes* (high frequency) as opposed to *People make television sets* (low frequency). Hence one would expect participants to attach very different quantities to both the subject and object in such sentences.

It is of course true that the present studies differed in a number of ways from others which have been used to investigate implicit quantification. The present research used direct numerical estimates of the quantity indicated in the sentence subjects and objects, while previous studies (e.g. Kanouse 1972) have asked participants to assign verbal quantifiers. Since quantifiers can change their meaning as a function of context, while numerical values presumably do not, it seems likely that the present studies are less flawed than previous ones; hence it would be ill advised simply to dismiss the present results as being due to some experimental confound.

In fact, it seems likely that studies using quantifiers rather than numerical estimates also reveal more about expected frequencies than about implicit quantification. In other words, the reason that people think that *Helen likes dresses* means that *Helen likes* MANY *dresses* (Kanouse 1972) may derive from prior expectations. It may be that people expect women to have a liking for dresses in general. Alternatively, it may be that the statement is interpreted as meaning that Helen has a greater than expected liking for dresses, and hence that she will like more dresses than the average person. Either way, the quantity derives from prior expectancy rather than any inherent properties of the verb. *Helen likes snakes* might lead to a very different estimate.

This same line of reasoning can also explain other research on implicit quantification which has used the Gilson & Abelson (1965) technique rather than direct estimates of the quantifier or quantity. It will be remembered that Gilson & Abelson found that, in the light of just one-third positive instances, participants would much more readily accept generalizations using verbs such as *have* than ones using verbs such as *understand*. The differences between verbs were seemingly consistent, being found across different subject and object terms. According to the expected frequency explanation one might expect that variations in the terms used would lead to changes in expected frequency and hence to variations in generalizability. It is, however, possible that such variations did occur but did not show up in Gilson & Abelson's analysis, since they did not investigate interactions between particular verbs and subjects/objects, only main effects. Since the verb is obviously an important determinant of the overall scenario it is also possible that the differences between expected frequencies were relatively small. It thus remains a real possibility that expected frequency can provide an explanation for the findings.

In recent years, the work of Gilson & Abelson has been followed up principally in research on implicit causality. It has been claimed that some verbs (e.g. *hit*) lead to the inference that the subject of the sentence is the causal agent, while other verbs (such as *like*) put the causality in the object. To illustrate, *John hits Jim* suggests that the John is the cause of the hitting, while *John likes Jim* suggests that Jim is the cause of the liking (see Semin & Fiedler, 1992, for a recent review). Categorization of verbs into different types has become more and more refined but the divisions bear much in common with the categorization schemes attempted with respect to implicit quantification, as the authors of such schemes readily acknowledge. Nor is this similarity coincidental since, as Kanouse (1972) and Manetti & de Grada (1991) point out, implicit quantification is one possible explanation of causal attribution. A verb which suggests that the activity is carried out by only a small number of people might lead to a greater tendency to accept the subject as the causal agent, as this will make the subject more distinctive as a potential causal agent.

This raises the question, then, as to whether these classificatory systems, too, owe more to prior expectations than to inherent properties of the verbs themselves. Context can undoubtedly have an effect, since the extent to which we believe that Jim is the causal agent in *John likes Jim* will depend in part on how well liked Jim is by other people and also on how inclined John is to like people in general. What is not known, however, is the extent to which implicit causality is determined by such context-dependent expectations rather than by properties of the verbs themselves. The general tenor of the arguments put forward in this paper bears more in common with writers such as Corrigan (1988) who have argued that verb effects can vary as a function of context. If implicit causality is indeed primarily determined by the scenario created by the entire sentence, it will be necessary to re-evaluate the extensive research which has focused almost exclusively on the verb.

Acknowledgements

The author would like to thank Penny Armstead for her assistance in collecting and analysing the data reported in this paper, and Tony Sanford and two anonymous referees for their helpful comments on an earlier version of this paper.

STEPHEN E. NEWSTEAD
Department of Psychology
University of Plymouth
Drake Circus
Plymouth PL4 8AA
UK

Received: 06.12.93
Revised version received: 10.02.94

REFERENCES

Abelson, R. P. & Kanouse, D. E. (1966), 'Subjective acceptance of verbal generalisations', in S. Feldman (ed.), *Cognitive Consistency: Motivational Antecedents and Behavioural Consequents*, Academic Press, New York.

Corrigan, R. (1988), 'Who dun it? The influence of actor-patient animacy and type of verb in the making of causal attributions', *Journal of Memory and Language*, **27**, 477–65.

Gilson, C. & Abelson, R. P. (1965), 'The subjective use of inductive evidence', *Journal of Personality and Social Psychology*, **2**, 301–10.

Kanouse, D. E. (1972), 'Verbs as implicit quantifiers', *Journal of Verbal Learning and Verbal Behavior*, **11**, 141–7.

Kanouse, D. E. & Abelson, R. P. (1967), 'Language variables affecting the persuasiveness of simple communications', *Journal of Personality and Social Psychology*, **7**, 158–63.

Klemp, G. O. (1974), 'The influence of selected verb characteristics on the acceptance of generic assertions', *Journal of Verbal Learning and Verbal Behavior*, **13**, 355–64.

Lewicka, M. (1987), 'Do verbs obey De Morgan's Laws?' *Polish Psychological Bulletin*, **17**, 101–10.

Manetti, L. & Grada, E. de (1991), 'Interpersonal verbs: implicit causality of action verbs and contextual factors', *European Journal of Social Psychology*, **21**, 429–43.

Moxey, L. M. & Sanford, A. J. (1993), 'Prior expectation and the interpretation of natural language quantifiers', *European Journal of Cognitive Psychology*, **5**, 73–91.

Newstead, S. E. & Collis, J. M. (1987), 'Context and the interpretation of quantifiers of frequency', *Ergonomics*, **30**, 1447–62.

Peeters, G. (1971), 'The positive-negative asymmetry: on cognitive consistency and positivity bias', *European Journal of Social Psychology*, **1**, 455–74.

Pepper, S. & Prytulak, L. S. (1974), 'Sometimes frequently means seldom: context effects in the interpretation of quantitative expressions', *Journal of Research in Personality*, **8**, 95–101.

Podeschi, D. M. & Wyer, R. S. (1976), 'Acceptance of generalizations based upon inductive and deductive evidence', *Journal of Personality and Social Psychology*, **34**, 496–509.

Semin, G. R. & Fiedler, K. (1992), 'The inferential properties of interpersonal verbs', in G. R. Semin & K. Fiedler (eds), *Language, Interaction and Social Cognition*, Sage, London.

Wyer, R. S. & Podeschi, D. M. (1978), 'The acceptance of generalizations about persons, objects and events', in R. Revlin & R. E. Mayer (eds), *Human Reasoning*, Winston, Washington, DC.