VAGUENESS AS COST REDUCTION: AN EMPIRICAL STUDY

1. Introduction

Keefe and Smith (1996) give what can be regarded as a widely accepted definition of vagueness: "vague predicates have borderline cases, have fuzzy boundaries, and are susceptible to sorites paradoxes" (p. 4). A canonical example is the concept *tall*.

Lipman (2009) argues that a limitation of standard game-theoretical models of communication is that they are unable to explain why so much of everyday language is vague.

Van Deemter (2009), *inter alia*, argues that benefits of vagueness can accrue when, e.g., vagueness reduces costs for speaker or hearer. We test this empirically here for the first time to our knowledge.

NLG systems that generate text from numerical input must decide between alternative linguistic forms of the same numerical content, including how vague to be. Such systems include Goldberg, Driedger, & Kittredge (1994) in the domain of weather forecasting; Hunter et al. (2008) in the domain of medical decision support.

Currently there is little empirical data to support NLG decisions about vagueness. Mishra, Mishra, & Shiv (2011) demonstrated that vague (but not precise) feedback can be distorted by the hearer in such a way as to help the hearer achieve his own goals better. However, their vague condition took the form of an exact range of values (e.g., 30–35, compared with a single value e.g, 30 in the precise condition) and thus lacked borderline cases.

Peters et al. (2009) assessed the impact of adding vague evaluative categories to numerical quality of care information in the rating of hospitals, but it is unclear whether the effects were due to the mere addition of information, or to adding *vague* information.

2. Experiments

We used a forced choice paradigm to elicit response times and error rates. Participants were presented with two squares on screen that contained different numbers of dots; and an instruction in the form of a referring expression to select one square based on how many dots it contained (Figure 1). We manipulated whether the referring expression used a vague or a precise quantifier.

A pilot experiment that used small numbers of dots (less than 10 in each of two squares) found that when both numbers of dots were above the subitizable range (Trick & Pylyshyn, 1994), vague quantifiers (e.g., *many dots*) attracted faster accurate response times than precise quantifiers (e.g., *nine dots*), but only when they identified the larger of the two numbers.

A second experiment used larger numbers of dots and two squares in a similar experiment. Pairs of numbers were: (5,25) (10,25) (15,25) (20,25) (30,25) (35,25) (40,25). The results indicated that vague quantifiers attracted faster accurate response times and fewer errors than did the precise quantifiers, for all the combinations of numbers that we used.

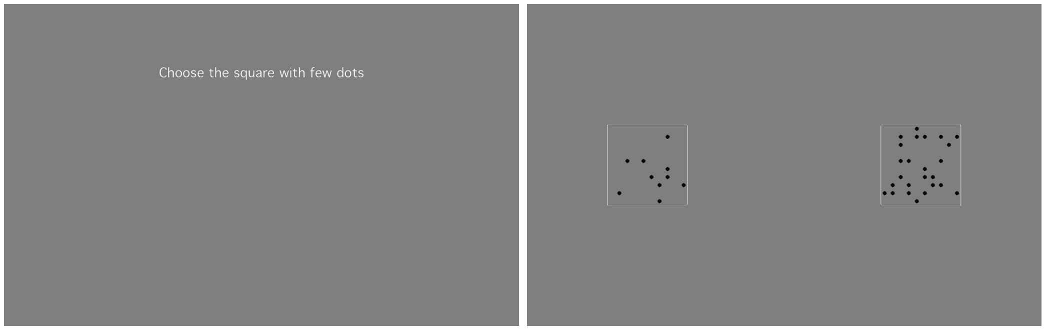

FIGURE 1. Trial sequence for second experiment: instruction; stimulus

These two experiments used *few* and *many* as the vague quantifiers. These quantifiers have the potential for vagueness in the sense of Keefe & Smith (1996). However, this potential for vagueness was not realised because the quantifier uniquely identified a single square and there were no borderline cases.

Also, the vague instructions used quantifiers that did not contain a number (*few, many*), whereas the precise instructions did contain numbers (e.g., *five* in experiment one, *30* in experiments two and three), and so there was a potential confound of vagueness with the absence of a number in the instruction.

In a third experiment we set out to address these concerns. Firstly, we used three squares, and indefinite articles in the instructions in the vague conditions. For example, an instruction like *please choose a square with many dots* was used in the context of three squares (e.g., (6,15,24)), where two plausibly contained 'many' dots, but one contained more dots and was therefore considered to be a better match for the instruction, leaving the other as a borderline case.

Secondly we used both vague and precise versions of instructions that specified numbers, and of instructions that did not specify numbers.

We found faster responses in the 'no-number' conditions than the 'number' conditions; but no main effect of the vague / precise manipulation; and no interaction, suggesting that when the instructions allowed the potential for vagueness to be realised, vagueness did not exert a beneficial influence on response times.

3. Conclusions

Vagueness in a referring expression is a combination of the referring expression's potential for borderline cases; and the specific situation in which the referring expression is used. We found that expressions with the potential for vagueness attracted faster response times than expressions without; but only when the referent set did not allow the possibility of borderline cases. When the referent set did allow borderline cases, we found differences between expressions that used numbers and those that did not, but no differences between vague and precise expressions in either case. Although our experiments were limited in focussing on vagueness in descriptive noun phrases only, and although they did show up advantages for certain vague expressions, they do more to cast doubt on the cost reduction hypothesis than to confirm it.

References

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