Numerical Judgments with Unfamiliar Units: Reconciling Numerosity and Evaluability.

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LONG ABSTRACT

Suppose that you are traveling in a foreign country where people use units you are not familiar with. You may need to evaluate a container with volume 128X, a distance of 3,000Y, or a product priced at Z50. How do you reason when important numerical information is presented in unfamiliar units?

Two main streams of research provide inconsistent predictions. The literature on numerosity and the money illusion (e.g. Shafir, Diamond and Tversky 1997) found that people judge the unfamiliar information by its face value and over-use numerical information which may not be informative, demonstrating magnitude sensitivity. In contrast, research on evaluability (e.g. Hsee et al. 1999) found that people may make little inferences from numerical information with unfamiliar or hard-to-evaluate units when judging a single stimulus. In other words, they do not use such information even when it may be informative, and they show magnitude insensitivity.

In this research, we reconcile these inconsistent findings on magnitude sensitivity. Specifically, we provide an account of when it is that people do and do not incorporate absolute magnitude information that is displayed in unfamiliar units. We propose that whether or not the information is used depends on whether it is recognized as non-informative in the given units. In particular, if the decision maker's attention is focused on the unfamiliar unit, she becomes aware that the information is useless and will not incorporate the absolute magnitude in her evaluation. However, if the decision maker's attention is instead focused on the number, she proceeds as if the number per se were meaningful and will try to make sense of the absolute magnitude and incorporate it into her evaluation. Thus, whether or not the decision maker appears magnitude-sensitive depends on the relative attention paid to the numerical information or the units.

We tested our predictions in five studies involving different contexts (judgments of length, price and value), different dependent variables (direct and indirect evaluation of the target attribute), and involving both hypothetical scenarios and real bidding behavior. In four of the studies, we demonstrated that merely manipulating the font size of either the number or the unit (between subjects) can reverse people's magnitude sensitivity.

In one study, for example, research participants were told they would be bidding on an amount of a foreign currency, with the currency symbol denoted by 'X', and that they would find out the country of origin after bidding. In a 2x2 between subjects design, participants bid on either X6.83 or X0.69 (representing $1 in either Chinese Yuan or UK pounds, respectively). In the stimuli, either the 'X' or the number was written in a large font and the remaining information was in a small font. After participants gave their bid, the BDM procedure was used to pay them according to their bids. When the currency font size was large, there was no significant difference in bids for the two amounts, but when the currency font size was small and the numbers were in the large font, participants were magnitude sensitive and bid nearly $6 more for the larger-magnitude amount (X6.83) than for the small-magnitude amount (X0.69).

In another study, we used order of exposure (number and unit shown jointly vs. either number or unit shown first) to manipulate awareness of the lack of information conveyed by the unfamiliar units and demonstrated the same reversal of magnitude sensitivity. Across the studies, we ruled out alternative accounts of our findings, including lack of attention, anchoring and adjustment or the application of a salient unit of measure. We discuss implications for how the display of numerical information may impact purchase and consumption decisions.