Almost There? The Role of Absolute vs. Relative Error in Perceived Progress Towards an Accuracy Goal

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This paper investigates how distance from an (accuracy) goal is evaluated relative to the magnitude of the goal. Equally-sized absolute errors are judged as less severe for larger actual values but equal percentage errors are seen as more severe. These judgments reflected a shifting weighting of absolute and proportional goal-discrepancies, inconsistent with psychophysical theories.

Long Abstract:

Recent research on goal progress has investigated the impact of people's perceptions of distance from a goal (e.g. Kivetz, Urminsky and Zheng 2006, Koo and Fishbach 2008). In this paper, we use the context of prediction accuracy to explore how people perceive differing degrees of progress to a goal. How do people determine when a prediction is closer to the accuracy goal (e.g. more or less accurate relative to the actual value)?

When people make a series of such assessments, the perceived discrepancy from the accuracy goal is primarily driven by attempting to assess and incorporate two salient pieces of information: the absolute and the proportional (percentage) error. Specifically, participants judgments exhibited what we term *quasi-proportionality*: the same absolute error will be evaluated as worse when the actual value is relatively small, while the same relative error will be evaluated as worse when the actual value is large. Furthermore, the relative weight on absolute vs. proportional distance in forming a distance judgment is systematically affected by the magnitude of the actual value. In particular, more weight is put on absolute error for large true values and more weight is put on proportional error for small true values.

In an initial study (N=40), which of a pair of election predictions is seen as more accurate is significantly affected by framing the outcomes in terms of the winning candidate's share (large true numbers) or the losing candidate's share (small true numbers), impacting how proportional errors are perceived.

In the second study, 111 participants evaluated a series of (16) pairs of predictions of different students' test scores, choosing the one they saw as more accurate. Participants' assessments exhibited quasi-proportionality, incorporating both absolute and proportional error, and the weights placed on each type of error in turn depended on the scale of the numbers (e.g. the average of the two actual values). The effects are shown not to be explainable by heterogeneity, not to vary based on beliefs about the distributions of scores and not to be affected by the participants' own mathematical ability.

The third study (N=116) extends the findings to three additional contexts: election outcomes, weather predictions and salesperson's outcomes. In particular, in assessing predictions of how many cars a salesperson will sell in a given time period, expressing the same rate expressed with small numbers over a shorter interval (one month) or with larger numbers over a longer interval (10 months) affects whether absolute errors or relative errors have more of an effect. When the same monthly rates for the sales predictions and outcomes are expressed as 10 month totals, participants place more emphasis in their judgments on absolute discrepancies relative (rather than proportional discrepancies).

The fourth study presented participants with a series of judgments designed specifically to distinguish between competing accounts of accuracy judgments. For example, in one task, 68% of participants evaluated a prediction of 20 vs. 24 actual as better than a prediction of 60 vs. 72 actual. In a separate task, only 36% of the participants evaluated a prediction of 68 vs. 72 actual as better than a

prediction of 204 vs. 216 actual, a significant difference (p=.04). Note that in both tasks, the proportional errors are equal for both predictions (20% in the first task and 6% in the second task) while the absolute errors are the same in the first option for both tasks (12) and and in the second option for both tasks (4). Thus, neither proportional nor absolute distance can explain the pattern of choices. In contrast, quasi-proportionality (specifically the shifting-weights account of incorporating absolute and proportional discrepancies) was consistent with the findings. Furthermore, the patterns of choices could not be explained by the established view of the psychophysics of difference judgments (e.g. Marks and Cain 1972) or by a simple averaging model (Wright 2000).

The implications of the proposed account of accuracy judgment for choices among available agents are discussed. The implications of quasi-proportionality, beyond the specific context of accuracy goals, are discussed. In particular, perceptions of general goal progress are proposed to be governed by quasi-proportionality, such that the the perception of distance to the goal is determined by both absolute and relative distance remaining, with relative emphasis on absolute vs. relative determined by the scale of the numbers under consideration. The implications for motivation are discussed.