2014 Russell Ackoff Doctoral Student Fellowship Proposal
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Why and When does Question Specificity affect Prediction Quality?

Project Background. The ability to make accurate predictions about future events is extremely desirable for both individuals and organizations. Improved prediction accuracy often directly translates to monetary gains, increased contingency preparedness, advantages over competitors, and other beneficial outcomes. Consequently, there is a wealth of research devoted to identifying psychological factors that affect prediction accuracy (e.g., Bastardi & Shafir, 1998; Dijksterhuis et al., 2009; Dunning, 2007; Georgoff & Murdick, 1986; Halberstadt & Levine, 1999; Hall et al., 2007; Mellers et al, in press; Nisbett et al., 1981).

Recently, the forecasting literature has discovered a peculiar phenomenon called the *prediction specificity effect*, which describes how people are better at predicting uncertain outcomes when the question is framed as a general prediction than when it is framed as a more specific version of the same prediction (Yoon et al., 2013). For example, suppose you want to predict which team will win an upcoming baseball game. There are multiple ways you can elicit this prediction: You could simply ask people to select which team they think will win (this is the *general prediction*) or you could them to predict the final score of the game, from which you can determine who they think will win (this is the *specific prediction*). Although both types of predictions reveal who they think will win the game, predicting the final score is more specific than predicting the winning team only.

At its core, the prediction specificity effect demonstrates that different ways of asking for the same prediction can affect prediction quality. Importantly, the fact that specific questions can yield worse predictions is counterintuitive to many. One might assume that more specific predictions should lead to greater accuracy because they force people to think more carefully about the problem and consider additional factors that might influence outcomes. However, the prediction specificity effect demonstrates that this is not always the case. Knowing how question specificity will affect accuracy for a certain type of prediction can have important implications for how to structure the prediction task.

The Present Research. Although we know that the prediction specificity effect exists, there is limited evidence as to why it occurs. Further, so far the effect has only been studied in the domain of sports predictions. Knowing the mechanism behind the effect is essential to accurately generalize the predictions it generates to other domains and for understanding boundary conditions. In other words, it would be incredibly difficult to successfully apply this knowledge to improving other types of predictions unless we understand why and when the prediction specificity effect occurs.

The goal of our research is to develop a theory explaining why and when specific questions make predictions worse, and to show that this theory generalizes to many different types of predictions. Currently, we have data from several experiments that suggest potential mechanisms for the prediction specificity effect. For example, we have found strong evidence suggesting that specific questions cause people to consider additional, non-diagnostic information about the focal event, adding random error to their predictions. However, we still need to provide direct evidence of this mechanism by showing a)

what types of information are being considered by people making specific and general predictions and b) exactly how this information is used or misused during the decision process.

We have also identified a few boundary conditions for the prediction specificity effect. For example, prediction specificity does not affect prediction quality when predictions are extremely unpredictable (equivalent to a coin flip) or extremely predictable (known with near certainty). Also, specific predictions will not affect prediction quality unless they are related to the focal event. However, our data suggests that there may be additional boundary conditions that we have yet to identify. For example, the effect might only happen for events where people can easily mentally simulate alternative outcomes. Knowing this would be important for understanding what types of predictions will be affected by question specificity.

Finally, it should be noted that our current studies and past research on the prediction specificity affect study it in the domain of sports predictions. One of our primary goals is to prove that our theory pertains to a fundamental decision process by showing it generalizes to many other forecasting domains such as finance, political forecasting, etc..

Methods and Analysis. To continue exploring the mechanism and boundary conditions for the prediction specificity effect, we will conduct several controlled experiments. In these experiments, we will manipulate the type of predictions participants make (e.g., *general* vs. *specific* predictions) and the information available while making them and observe how this affects prediction quality, what information is considered, and how that information is used. We will also conduct experiments to verify whether these findings generalize across multiple domains.

In these experiments, each participant will make a series of predictions (typically 30 to 45) about outcomes of future events. Participants will be paid a fixed amount for participating in the experiment plus bonus payment based on the number of correct predictions they make to incentivize accuracy. We will also collect additional measures such as their knowledge about the target event(s), their confidence in their predictions, their motivation to make good predictions, their demographic information, etc. to explore potential mechanisms and moderators, and to aid in building predictive models of choice.

Participants will also write open-ended responses explaining how they made their predictions so that we can gain insight into their decision processes and compare the types of information being considered across conditions. Independent raters blind to our hypotheses will code these responses for the frequency that various types of considerations are mentioned as part of their predictions.

Our primary analyses will use t-tests and ANOVA tests to compare average prediction quality between conditions. This will allow us to draw inferences about how the variables we manipulated affect prediction quality. Additionally, we will use Ordinary Least Squares and Logistic regression analysis to build predictive models of choice and to compare the relative weight of information in determining their predictions. We will also use Ordinary Least Squares regression to model how the magnitude of the prediction specificity affect varies based on features of the events, such as predictability. This event-level analysis will help us explore boundary conditions of the prediction specificity effect.

Why funding is being sought. Funding is being sought to partially cover the costs of participant compensation for several new studies, and for the doctoral student P.I. to travel to one conference to present this research to the academic community.

Explanation of Budget:

      Participant Payment. Each participant in our experiments is paid 50 cents for completing the survey and 5 cents for every correct prediction they make. Participants make between 30-45 predictions per study and have an average accuracy rate of ~60% based on previous experiments. A typical properly-powered experiment requires 600 participants, and we plan to run at least five new experiments. Based on these costs, we expect to spend ~$5,000 on participant payment. We request $3,500 to help cover these costs.

      Conference Travel. We request funding for the doctoral student P.I. to travel to one conference to present these research results to the academic community. The target conference is the Behavioral Decision Research in Management Conference (www.bdrm.org) hosted by the London Business School in London, UK from July 17th through July 19th, 2014. The associated costs include the registration fee ($200), a round trip flight from the Philadelphia area to London (~$1,500), and accommodations at the conference hotel ($260 per night for 3 nights split between two students = $390). The total cost is estimated to be around $2,090, and we are requesting $500 to help cover these costs.

Alternative Sources of Funding:

      PhD Student Travel Fund. PhD students in the Operations and Information Management Department are given $800 each academic year to pay for conference travel. However, these funds have already been spent presenting research at the Society for Judgment and Decision Making conference in Toronto, ON, Canada in November 2013.

Budget summary:

Expense	Amount Requested
Participant payment	$ 3,500
Conference travel	$ 500
Total	**$ 4,000**

Primary Faculty Advisor: Joseph P. Simmons

Signature: _____

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