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Desirability Bias: Do Desires Influence Expectations? It Depends on How You Ask.

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DESIRABILITY BIAS: DO DESIRES INFLUENCE EXPECTATIONS? IT DEPENDS ON HOW YOU ASK.

by

Mark Biangmano

A thesis submitted in partial fulfillment of the requirements
for graduation with Honors in the Psychology

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Spring 2018

All requirements for graduation with Honors in the
Psychology have been completed.

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Toby Mordkoff
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This thesis has been reviewed and approved.

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Abstract

People's desires for an outcome might influence their optimism that the outcome will occur. This is called the desirability bias, or the wishful-thinking effect. The desirability bias occurs when people's expectations or hopes for an outcome override objectivity when making a prediction about an event. While many studies have shown a desirability bias when asking for dichotomous predictions, few studies have measured how changing the metric influences predictions. In the current study, three types of questions were asked to measure participants' predictions of the outcome of an endurance race, where participants were assigned one of two competitors. Participants were told if their assigned athlete won the race they would receive a candy bar. In a between-subjects design, participants answered either a dichotomous prediction, a dichotomous likelihood judgment, or a continuous likelihood judgment. We found evidence that the strength of the desirability bias varied between types of questions asked, specifically that there was no desirability bias in the continuous likelihood judgment condition and more desirability bias in the dichotomous prediction condition. This research suggests that the wording of a question has a large impact on conclusions about the desirability bias, which has implications for both scientific research and everyday decision-making.

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People make decisions based on their own predictions every single day. For example, a man might not bring an umbrella to a ballgame when there is a 60% chance of rain because he predicts it won't rain on him while at the game. Additionally, a young girl in school thinks her table will be the first table in the classroom to be allowed to go to recess as the teacher draws a random card one through five. Even though the man is more likely than not to encounter rain and the girl has a twenty-percent chance of being first to leave, they both predict the events will go in their favor. While both may think they are making a logical, objective decision, they are actually being biased by their desired outcome in the event they are making predictions about, which may cause them to think their wishes are going to come true.

The study of the *desirability bias*, when people expect that a desired outcome is more likely to occur because their desire influences their optimism, started with the famous marked card paradigm (Marks, 1951). In this study, cards with specific markings would dictate a participant gaining or losing points dependent on which marking was drawn from the deck. Participants also received the odds for which marking could be drawn. People exhibited what was termed a desirability bias by predicting that the marked card that gained points would be drawn, even when it was not the most likely option.

Studies of the desirability bias have shown that prompting a participant to give a prediction of an outcome produced significant findings in terms of a desirability bias (for a review see Krizan & Windschitl, 2007). Much of the research surrounding the desirability bias has used dichotomous predictions (e.g., what do you predict will happen, A or B?) when asking participants to report their expectations. These studies have found significant evidence for wishes impacting expectations.

However, research has suggested that using likelihood judgments removes the opportunity for bias because the wording and responses lend some uncertainty as they ask what is most likely to occur (Windschitl, Smith, Rose & Krizan, 2009). Taking away subjectivity could lead to less bias, and therefore no desirability bias when using a question that prompts a likelihood judgment. This idea has been show in past research (e.g., Bar-Hillel & Budescu, 1995) arguing that giving probability statements or likelihood judgments can remove a desirability bias. In one such study, participants were asked to report the probability, similar to a likelihood judgment, of how likely a tile that would gain them points would be pulled over a loss tile. Participants were incentivized if a certain tile on a grid was pulled, yet researchers found no evidence of a desirability bias even in conditions where gain tiles were almost equal to loss tiles (Bar-Hillel & Budescu, 1995). Participants being objective in judging which tile will be pulled, despite one type of tile benefiting them, shows that there is a distinct difference between asking for dichotomous predictions versus continuous probabilities or likelihood judgments when it come to the desirability bias.

With these past results in mind, (i.e. Bar-Hillel & Budescu, 1995; Krizan & Windschitl 2007; Marks, 1951), we wanted to test the difference in effect sizes for a desirability bias in three different question conditions. This will add to the literature on the differences in desirability bias about outcomes in prediction versus likelihood metrics.

We tested this using a between-subjects design. The computer-based study included a step-by-step presentation of an extreme endurance race. Participants were shown pictures from each leg of the race (e.g., the racers carrying logs, scaling a mountain, etc.). After participants were walked through the race, but before they saw the ending, they were asked to predict which athlete would win the race. The desirability bias was measured through participants' optimism

about the outcome of the event (through predictions that their assigned athlete would win). We randomly assigned participants to both the athlete and one of three types of question asking their prediction of the winner. The three types of questions included a dichotomous prediction, a dichotomous likelihood judgment, and a continuous likelihood judgment. Our main hypothesis was that the presence of the desirability bias would differ depending on the question condition, regardless of which athlete participants were assigned to. We also hypothesized that the dichotomous prediction condition would have the most robust effect followed by the dichotomous prediction condition. We believed the continuous likelihood judgment would have a null effect. We believed this because, as past research has shown, the presence of the desirability bias is impacted based on the type of metric used.

Method

Participants and Design

200 undergraduate students (128 female, 72 male) at The University of Iowa participated in this study. Participants received credit toward a research exposure requirement in a number of Psychology courses within the University as well as a candy bar upon completion of the study. Participants completed the study at individual computers in the lab with up to four participants per half hour session. The design was a 2 (Athlete assignment: A or B) x 3 (Question type: dichotomous prediction, dichotomous likelihood judgment, or continuous likelihood judgment) between-subjects design.

Materials and Procedure

Participants responded to questions on a Qualtrics survey created for this study. After reading an informed consent and agreeing to participate, participants were given general rules and information about how a Spartan race operates. Participants then were instructed to choose

their athlete by clicking on a silhouette of athlete "A" or athlete "B". The participant was then shown the athlete they selected (Hobie Call or Cody Moat) and given brief information about both athletes. While participants thought they "selected" an athlete, they were actually randomly assigned. All participants learned the same information about "their" athlete to avoid any differences in the study besides which athlete they were assigned to or question type they responded to. Participants were told about the racers' age, day jobs, and various sponsors they had. After being reminded of the opportunity to earn candy, participants were shown the two athletes at various stages of the race. Pictures from a live event were used at each leg of the race to be more engaging, as well as to convey the back and forth nature of the race. The pictures end just before the final sprint when the two athletes are virtually tied. Prior to seeing the result of the race, participants were then asked one of three questions: (1) a dichotomous prediction, (*which competitor will win the race? Hobie Call will win / Cody Moat will win)*, (2) a dichotomous likelihood judgment, (*which competitor is more likely to win? Hobie Call is more likely to win / Cody Moat is more likely to win*) or (3) a continuous likelihood judgment, (*what best describes the likelihood of the possible outcomes for this race?)* The response options for the continuous likelihood judgment were a six-option set ranging from, 1= *Hobie Call is much more likely to win the race* to 6= *Cody Moat is much more likely to win the race.* These predictions functioned as our main dependent variable.

After being asked why they predicted the way they did, participants were asked recall questions to be sure they were paying attention while going through the survey. We also asked participants whom they hoped would win, how much they cared about the outcome, and their perceptions of the chance each athlete had to win (using a 0-100 scale). This was followed by questions assessing their prior knowledge of Spartan Races, either of the athletes, and/or the

outcome of the race shown. The participants were next informed that Hobie Call was the eventual winner, followed by questions about the participant's feeling in regard to the outcome, questions about what they thought the study was about, and any suspicions they might have. Finally, participants reported their demographic information before the debriefing. Participants were then given a big candy bar if their assigned athlete won and a small candy bar if their athlete did not win before being dismissed.

Results

For the purposes of this paper, only responses to the main dependent variable will be discussed. To simplify the discussion of the analyses, the information below will ignore which athlete a given participant was assigned. For the initial analyses, we treated all responses as dichotomous, which required recoding of the continuous likelihood condition. In other words, a given response was coded as the participant picking their assigned athlete to win or the participant picking the other (non-assigned) athlete to win. To test for the presence of an overall desirability bias, we conducted a binomial test examining if participants predicted their athlete to win irrespective of question condition. The binomial test revealed an overall desirability bias with a proportion of .67, which is significantly different compared to the chance rate of .50, ($p <$ .001 two-tailed). That is, participants predicted their assigned athlete would win approximately 67% of the time. This shows an overall desirability bias in the study, as participants were more likely than not to predict their assigned athlete to win the race.

Next, we looked for signs of a desirability bias in each condition. In the dichotomous prediction condition, shown in figure 1, we found a strong desirability bias where participants chose their assigned athlete at a proportion of .81 versus a chance rate of .50, ($p < .001$, two-tailed). Figure 1 represents the proportion of participants that chose their athlete to win in the

dichotomous prediction condition. Participants in that condition were about four times more likely to choose their athlete to win (shown in black) than the other athlete. In the dichotomous likelihood judgment condition, shown in figure 2, we also found evidence of a desirability bias. However, it was not as robust as the dichotomous prediction with a binomial test showing a proportion of .65 chose their assigned athlete. This proportion is significantly different from the chance proportion of .50 *(p* = .023*,* two-tailed). Figure 2 shows participants were two times more likely to pick in favor of their assigned athlete (shown in black) than against him. Finally, in the continuous likelihood judgment condition, shown in figure 3, there was no sign of a desirability bias. Participants were equally as likely to choose their athlete as compared to the other athlete with a proportion of .53 being not significantly different from the chance proportion of .50 (*p* = .72, two-tailed). As shown in Figure 3, people were as likely to pick their athlete to win as they were to pick the other athlete to win. Even if the data from this condition is kept on a continuous scale, rather than dichotomized, there is still no sign of a desirability bias in this condition. Recall that the likelihood judgments in this condition were answered on a six-point scale ranging from 1=*Hobie Call is much more likely to win* and 6=*Cody Moat is much more likely to win.*The mean likelihood estimate of participants randomly assigned to have Hobie Call as their preferred athlete was 2.90, and the mean likelihood estimate of participants randomly assigned to have Cody Moat as their preferred athlete was 3.16. These means were not significantly different, $t(66) = -1.277$, ($p = .206$).

Finally, we looked for differences between the question conditions in the proportion of participants who chose their own athlete to see if optimism levels were significantly different from one condition to another. A Chi-square test found a significant effect: $\chi^2(2, N=200) = 12.33$, $p = .002$. A significant result shows there was a significant difference in optimism about

the outcome of the race between the three question-type conditions. This demonstrates that, as predicted, the effect was largest in the dichotomous prediction condition and smallest in the continuous likelihood judgment with significant differences between them.

After a participant responded to the main dependent variable, they were asked, *"Why did you answer the previous question in the way that you did?"* While no formal coding or analysis was performed on these responses, common themes showed that participants found reasons to predict their own athlete outside of overt team loyalty. Participants cited momentum of the racers in second or the lead of the person in first to justify choosing their own athlete in the conditions where a desirability bias was present.

Discussion

Much of the research done on the desirability bias has used a dichotomous prediction as the format of the dependent variable (Krizan & Windschitl 2007; Marks, 1951). This study expanded on that research by examining the use of different metrics when asking participants to report their expectation about the outcome. Following the techniques of past research, we used a dichotomous prediction question, but expanded by creating a dichotomous likelihood judgment and going beyond a dichotomous choice into a continuous likelihood judgment condition. After being assigned an athlete that would impact participant's chance of getting a reward (a candy bar), participants viewed snap-shots of a back and forth race between their assigned athlete and another competitor. Our hypothesis was that there would be a robust effect size in the dichotomous prediction condition, similar to what other studies on ambiguous events have shown. We also hypothesized that the dichotomous likelihood judgment would show signs of a desirability bias but it would not be as strong as the dichotomous prediction condition. Finally, we hypothesized a null effect in the continuous likelihood judgment condition. What we found

was congruent with the hypotheses we formed. The dichotomous prediction condition had the strongest effect followed by the dichotomous likelihood judgment with a less robust but significant effect. The continuous likelihood judgment condition showed no significant effect, as we had hypothesized prior to running participants.

The results found in this study have interesting implications for understanding how people form expectations about events for which a particular outcome is desired but the relevant evidence is ambiguous. Previous studies (reviewed in Krizan & Windschitl, 2007) that found a significant desirability bias could be more a result of the metric used, and not signs of an actual bias. Showing different levels of optimism based on the wording of the question alone raises interesting speculations about why this happens. One reason may be that because the race outcome is ambiguous, people are unsure about the outcome so the response options dictate how they choose. With the dichotomous prediction and likelihood judgment conditions having two response options, for or against their assigned team, participants may not be confident in the outcome but the responses push them towards showing a desirability bias. This idea is reinforced by the continuous likelihood judgment having a null effect, as unsure participants are able to choose that one athlete is only slightly more likely to win. This may allow for more participants to choose against their athlete because while they are picking against their assigned athlete, they are still giving them a chance to win.

At the beginning of each sports season people commonly go through and predict their record for the season. People tend to go through each game and predict a win or loss for each matchup for the entire season. Without fail, every year, people predict their team to win even when that is not objectively the best choice (Simmons & Massey, 2012). This may be because at the start of the game it seems like anyone's game, so people are unconsciously more likely to

think their team will pull it off. With the results of this study in mind, it may seem like people are being objective when in reality their stake in the team's success and their happiness makes them more inclined to choose their favorite team. Many decisions in people's day-to-day lives have ambiguity and some form of reward associated with each decision. In everyday life it may be an increase in happiness, money, or other factors, so it may be hard for people to be objective if asked to predict almost anything. However, if you were to ask someone what the likelihood is that they get their dream job, they may be more accurate in their response. While someone predicting their favorite team to win may seem completely confident, a likelihood judgment may show they only believe their team has a slightly larger than chance opportunity to win.

This research also has societal implications on how people perceive and process information in their daily lives. The notion that people could see the same information but process it in two different ways is the catalyst for many problems we see today, such as the ones in politics. Having desirability for an outcome can unconsciously guide people to conclusions that may not be the most logical option. In this study, the desire showed in the form of the reasoning for choosing the winner the way they did. People reported that their athlete had more momentum because they were behind, or were sure to win because they had the lead shows that two people on opposing sides believe they are using the facts to be objective. In reality, their stake in the matter clouds their interpretation of the facts given. For example, snow in May could be used as a sign of climate change to one person, or a sign of a cold summer to another. While both feel the same weather and have the same information, the way they process this event is biased by the explanation that is desirable for their platform.

One possible drawback of the findings would be the wording of the continuous likelihood judgment. The exact wording was, "*What best describes the likelihood of the possible outcomes*

for this race?" The awkward wording on the question could have confused participants as to what they were actually being asked to report. However, I believe a re-wording would find similar results because the nature of the continuous likelihood judgment question warrants a more objective and careful analysis of the information about the race.

Future research on this topic, ideally, would focus on the specific wording of all three question conditions, especially the continuous likelihood judgment condition. One possible change could be making the continuous likelihood judgment question the same as the dichotomous likelihood question wording, but still using the 1-6 scale. Another possible way to build on this study could be altering the stake that the participant has in the event. In this study we assigned them a team and gave them the chance of winning candy. An extension where the participant is only assigned to a team with no external reward could be more accurate to what occurs in daily decision-making. This type of study would provide the reward of happiness if their athlete wins which is the most common reward associated with predictions made.

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Table 1

Number of participants in each condition who predicted either their athlete or the other athlete to win

	Which competitor will win?	Which competitor is more likely to win?	Which best describes the likelihood?	Total
Expected other athlete	13	22	32	67
Expected their own athlete	56	41	36	133
Total	69	63	68	200

Table 1. Number of participants in each condition who predicted either their athlete or the other athlete to win

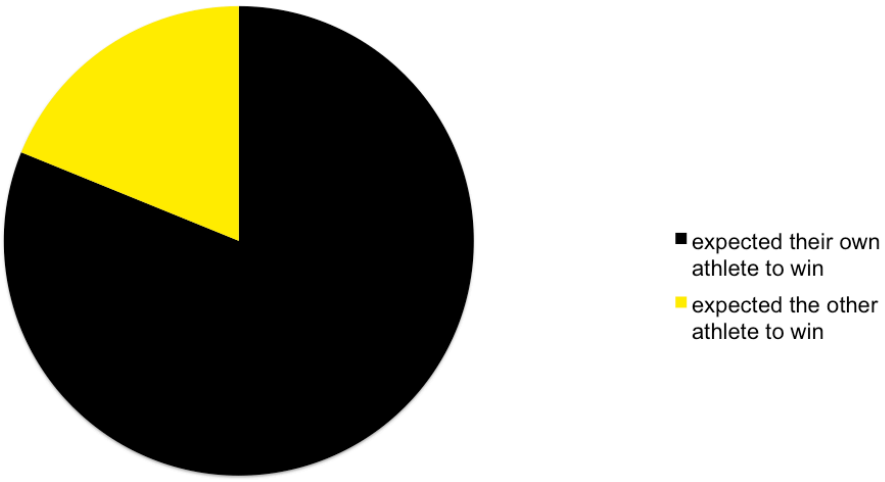

Fig 1. Proportion of people who predicted their athlete to win versus those who did not in the dichotomous prediction condition.

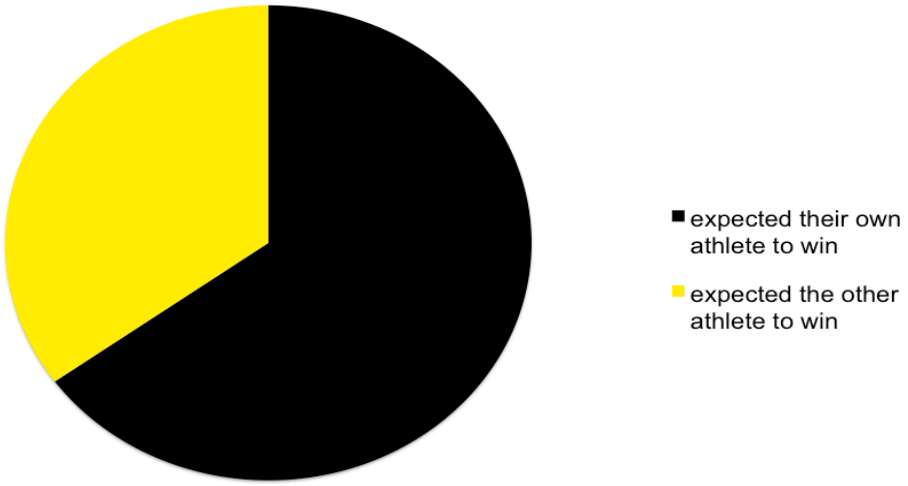

Fig 2. Proportion of people who predicted their athlete to win versus those who did not in the dichotomous likelihood judgment condition.

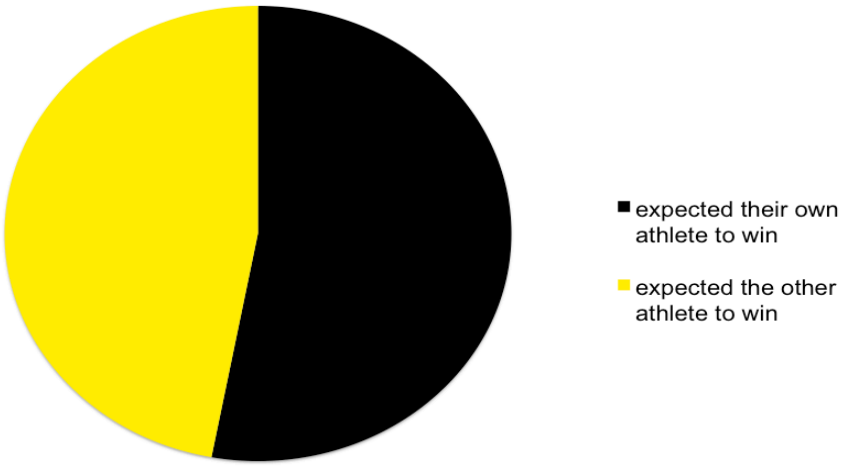

Fig 3. Proportion of people who predicted their athlete to win versus those who did not in the continuous likelihood judgment condition.

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