

LUCK ATTRIBUTIONS AND COGNITIVE BIAS

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Abstract: Philosophers have developed three theories of luck: the probability theory, the modal theory, and the control theory. To help assess these theories, we conducted an empirical investigation of luck attributions. We created eight putative luck scenarios and framed each in either a positive or a negative light. Furthermore, we placed the critical luck event at the beginning, middle, or end of the scenario to see if the location of the event influenced luck attributions. We found that attributions of luckiness were significantly influenced by the framing of the scenario and by the location of the critical event. Positively framing an event led to significantly higher lucky ratings than negatively framing the same exact event. And the closer a negative event was placed toward the end of a scenario, the more unlucky the event was rated. Overall, our results raise the possibility that there is no such thing as luck and thereby pose serious challenges to the three prominent theories of luck. We instead propose that luck may be a cognitive illusion, a mere narrative device used to frame stories of success or failure.

Keywords: luck, framing, cognitive bias, experimental philosophy.

Introduction

Luck plays an important role in several philosophical debates. In epistemology there is the issue of epistemic luck—how the presence of luck undermines the connection a belief has to the truth and thereby prevents the belief from becoming knowledge. In ethics there is the problem of moral luck, the matter of how to morally evaluate two agents who are in the same situation with the same intentions, but one agent's actions lead to bad consequences and the other agent's actions do not, when the sole difference is that the first was subject to bad luck. Political philosophers worry about luck egalitarianism, the view that injustice is to be partly understood as variations in luck in the social and genetic lotteries. There is also the luck problem in free will. Libertarians about free will hold that if an agent performs an action A, she might have performed action B instead, even given the same past and the laws of nature. The puzzle is that then the performance of A seems to be a matter of luck, since there was nothing that determined it. In the philosophy of science there is the matter of how to understand serendipity, and the role that it plays in the logic of scientific discovery.

Philosophers have developed three different theories of luck to help address these various concerns. The first is the probability theory, according to which an occurrence is lucky (or unlucky) only if it was improbable to occur (Bewersdorff 2005; Ambegaokar 1996; Rescher 1995). The second theory of luck is the modal theory, according to which an event is lucky only if it is fragile—had the world been very slightly different it would not have occurred (Pritchard 2005 and 2014; Levy 2011; Teigen 2005). The third theory of luck is the control view, which states that if a fact was lucky or unlucky for a person, then that person had no control over whether it was a fact (Mele 2006; Levy 2011; Greco 2010).

In this essay we argue that all three theories of luck face serious challenges from experimental psychology. In our own experimental work discussed below, we show that the luck attributions of naïve participants are shot through with various cognitive biases. We then argue that philosophical theories of luck cannot adequately accommodate these empirical results. If this is correct, then the existence of pervasive bias raises the possibility that there is no such thing as luck. It may be that attributions of luck are a form of post hoc storytelling, or even mythmaking; that they are merely a narrative device used to frame stories of success or failure. Perhaps luck is analogous to pareidolia, our innate tendency to find visual patterns in random data, and events are lucky to the same extent that automobiles have faces, or a grilled cheese sandwich looks like the Virgin Mary. A rejection of luck as a genuine fact of the world would have far-reaching consequences in various philosophical domains.

We developed three primary hypotheses. Our first hypothesis was that the luck attributions of naïve participants would be subject to the cognitive bias of framing. In this case, we are operationally defining “framing” as a change in the wording of a problem. The literature clearly indicates that changing the framing of a problem influences decision making. For example, Tversky and Kahneman (1981, 453) presented the following scenario to participants:

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs is as follows:

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is $\frac{1}{3}$ probability that 600 people will be saved, and $\frac{2}{3}$ probability that no people will be saved.

Which of the two programs would you favor?

Even though the outcomes of Program A and B are statistically equivalent, 72 percent of participants chose a guaranteed gain (Program A) compared to the risk of saving none (Program B, chosen by only 28 percent of participants). In this case, and many other examples like it,

people often fail to notice that the two outcomes have identical deep structures, and they are influenced instead by the surface features of the scenario. Likewise, we expected the same to be true when participants judged the luckiness of scenarios with a single deep structure but different surface features (see table 1 for scenarios). That is, positive framing of the scenario (for example, Tara **hit five** out of six numbers in the lottery) would be considered more lucky than negative framing of the same exact outcome (e.g., Tara **missed one** out of six numbers in the lottery).

Framing of a problem can also involve altering the background information or context of a scenario. Again, seminal work by Kahneman and Tversky (1984) showed how problems with the same deep structure will be judged differently based on the framing of their contexts. Consider these two problems from Kahneman and Tversky (1984, 347):

Problem 1: Imagine that you have decided to see a play and paid the admission price of \$10 per ticket. As you enter the theater, you discover that you have lost the ticket. The seat was not marked, and the ticket cannot be recovered. Would you pay \$10 for another ticket?

Problem 2: Imagine that you have decided to see a play where admission is \$10 per ticket. As you enter the theater, you discover that you have lost a \$10 bill. Would you still pay \$10 for a ticket for the play?

In both problems, there is a loss of \$10. Yet, only 46 percent of participants would purchase a new ticket in Problem 1, while 88 percent would purchase a new ticket in Problem 2. The framing of the context influenced participants' decision making. Likewise, we expected that changing the

TABLE 1. Luck framing in short vignettes. Words in **bold** signify the lucky versions, and *italic words in parentheses* signify the unlucky versions

Vignette 1	Tara Cooper hit five (<i>missed one</i>) out of six numbers in the Megabuck\$ lottery.
Vignette 2	Mark Zabadi, new to the game of basketball, shot ten free throws and made five (<i>missed five</i>) of them.
Vignette 3	A severe snowstorm hit the town. Half of the town's residents never lost (<i>lost</i>) their power.
Vignette 4	Vicki Mangano, a casual bowler, almost bowled a perfect three hundred game. She hit eleven strikes in a row (<i>missed two pins in the last frame</i>) to end with a 298.
Vignette 5	Derek Washington walked away without a scratch (<i>was nearly killed</i>) when his car was destroyed by a 150-pound tractor-trailer tire.
Vignette 6	A tornado swept through an Oklahoma town, leaving many buildings in shambles. Half the shops on main street were spared (<i>destroyed</i>).
Vignette 7	James Goldberg's car slid on an icy road and just missed hitting (<i>nearly hit</i>) a pedestrian.
Vignette 8	In the first baseball game of the season, José Ramirez had four chances at bat and got on base (<i>out</i>) twice.

context of the luck scenarios would change perceptions of luckiness. We created short, one-sentence vignettes but also created long, four- or five-sentence vignettes with more context built in to them (see table 2). Therefore, our second hypothesis was that the longer vignettes, with more background information regarding the scenario, would show a greater framing effect and lead to stronger “lucky” ratings for positively framed scenarios and stronger “unlucky” ratings for negatively framed scenarios.

The third hypothesis we tested regarded the location of the positively or negatively framed information in the long vignettes. In one version of each long vignette, the positively or negatively framed statement was at the start and was followed by background information. In the other two versions, the positively or negatively framed statement was in the middle or at the end of the vignette (see tables 3 and 4). Based on the serial position effect (Rundus 1971), information presented at the beginning (primacy effect) and end (recency effect) of a sequence is remembered better than information presented in the middle of a sequence. Therefore, we expected that the critical positively and negatively framed events would have their greatest impact on perceptions of luckiness when presented at the beginning and end of a long vignette.

A considerable body of research shows that the psychological proximity of facts or information has lasting effects on judgment and choices. One of the best-known examples is that of the availability heuristic, in which information that is especially vivid or memorable outweighs statistical data in decision making (Tversky and Kahneman 1973). People are more afraid of being the victim of a homicide than being the victim of a suicide, even though (in the United States) the latter is three times as likely. The National Institutes of Health spends more than three times as much to prevent breast cancer in women as it does to prevent prostate cancer in men, even though only 1.3 women die from breast cancer for every man who dies from prostate cancer (National Institutes of Health 2013). The World Health Organization reports that between two hundred and fifty thousand and five hundred thousand people die annually from influenza, and only a few hundred die each year from terrorism (World Health Organization 2003; National Consortium for the Study of Terrorism and Responses to Terrorism [START] 2012). Nevertheless, the fear of terrorism, and the effort to prevent it, far outstrips analogous concern over influenza. The influence of highly visible advocacy groups or frightening and dramatic stories in the media exceeds the power of cold statistics.¹

Other instances of the serial position effect can lead to counterintuitive and inconsistent preferences, as in the case of the peak-end rule.² Robust

¹ The locus classicus is of course Tversky and Kahneman 1973, but see also the succinct overview of more recent work in Kahneman 2011, esp. chaps. 12 and 13.

² A good overview of this research is in Ariely 2008.

TABLE 2. Luck framing in long vignettes. Words in **bold** signify the significant critical event. All other words are identical between positively and negatively framed vignettes

	Positively framed long vignette	Negatively framed long vignette
Vignette 1	<p>“I hit five out of six! I’ve never come anywhere close to hitting the big jackpot before! It was just unbelievable,” Cooper exclaimed, still stunned. Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God!”</p>	<p>“I missed the jackpot by one lousy number! Story of my life. It was just unbelievable,” Cooper exclaimed, still stunned. Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God.”</p>
Vignette 2	<p>“I hit half my shots from the free throw line! Not bad for a beginner, huh?” Mark exclaimed with a grin. Even though he was one of the tallest kids in his class, Mark Zabadi had never picked up a basketball before. “I dunno,” he said, “Guess I’m more of a gamer—not much of a team sports guy.” But when some of his friends found themselves short a player for a pickup game, they convinced Mark to play.</p>	<p>“Yeah, I missed half my shots from the free throw line. Not great, huh?” Mark said with a frown. Even though he was one of the tallest kids in his class, Mark Zabadi had never picked up a basketball before. But when some of his friends found themselves short a player for a pickup game, they convinced Mark to play. “I dunno,” he said, “Guess I’m more of a gamer—not much of a team sports guy.”</p>
Vignette 3	<p>“Half of the residents never lost their power,” reported the mayor. “It could have been a lot worse. We dodged a bullet.” Roads were slick for morning commuters, and icy trees knocked out electrical lines after a major winter storm blanketed the area in snow and ice this past weekend. Forecasters had predicted that the town would take the brunt of the worst storm of the season.</p>	<p>“Half of the residents lost their power,” reported the mayor. “It can’t get much worse. We weren’t able to dodge this bullet.” Roads were slick for morning commuters, and icy trees knocked out electrical lines after a major winter storm blanketed the area in snow and ice this past weekend. Forecasters had predicted that the town would take the brunt of the worst storm of the season.</p>
Vignette 4	<p>Last night Vicki Mangano bowled a 298 by hitting eleven strikes in a row, by far her best game ever. Her teammates, The Rolling Rocks, were taking her out for pizza and beer afterward to celebrate. “I just couldn’t miss!” she exclaimed. “I was totally in the zone.” One of Vicki’s teammates joked, “I just wish some of that lightning would strike me too.”</p>	<p>Last night, Vicki Mangano just missed out on bowling a perfect game after missing two pins in the last frame. Her teammates, The Rolling Rocks, were taking her out for pizza and beer afterward to try to cheer her up. “I just couldn’t miss,” she said disappointedly. “I was totally in the zone.” Said one of Vicki’s teammates, “I just hope some of that lightning doesn’t strike me too.”</p>

TABLE 2, continued

	Positively framed long vignette	Negatively framed long vignette
Vignette 5	<p>“I walked away without a scratch! I must have a guardian angel. All my friends told me I should buy a lottery ticket tonight,” said accident survivor Derek Washington. Washington was driving down the interstate when a loose tractor-trailer tire barreled into oncoming traffic. The massive 150-pound tire peeled back the roof of his Camry like a tin can and shattered his windshield.</p>	<p>“I was nearly killed! I’m driving to work, minding my own business, and my car is totally destroyed in some freak accident,” said victim Derek Washington. Washington was driving down the interstate when a loose tractor-trailer tire barreled into oncoming traffic. The massive 150-pound tire peeled back the roof of his Camry like a tin can and shattered his windshield.</p>
Vignette 6	<p>“Half of my buildings look like nothing happened at all. They survived without losing a shingle,” said Michelle Simmons. “There’s no rhyme or reason to it. It’s weird how the tornado just seemed to dance around.” Simmons is a fifth-generation Oklahoma resident who owns several commercial rental properties right in the bull’s-eye of the tornado’s 220-mph winds. The governor of Oklahoma declared a state of emergency for the central part of the state after yesterday’s F4 twister.</p>	<p>“Half of my buildings have been completely flattened. There’s nothing but some shattered framing and pipes left,” said Michelle Simmons. “There’s no rhyme or reason to it. It’s weird how the tornado just seemed to dance around.” Simmons is a fifth-generation Oklahoma resident who owns several commercial rental properties right in the bull’s-eye of the tornado’s 220-mph winds. The governor of Oklahoma declared a state of emergency for the central part of the state after yesterday’s F4 twister.</p>
Vignette 7	<p>“I fishtailed and just missed hitting into this guy walking to the pizza place. He moved out of the way just in time,” said local driver James Goldberg. Drivers are well advised to look out for black ice, especially on the minor roads. The light drizzle on top of below-freezing ground temperatures has made the roads as slick as Teflon. The weather is expected to improve tomorrow.</p>	<p>“I hit a patch of black ice and practically killed this guy who was walking to the pizza place. One minute the road is fine and the next I almost run over a guy,” said local driver James Goldberg. Drivers are well advised to look out for black ice, especially on the minor roads. The light drizzle on top of below-freezing ground temperatures has made the roads as slick as Teflon. The weather is expected to improve tomorrow.</p>
Vignette 8	<p>“I’m feeling good about this season,” said center fielder José Ramirez, who got on base twice in four at-bats yesterday in the season opener against Cleveland. “First game of the year. I trained so hard in the off-season. For whatever reason the pitches all looked slow to me today. It was like playing t-ball again. I can’t believe it!”</p>	<p>“I should have done better,” said center fielder José Ramirez, who got out twice in four at-bats yesterday in the season opener against Cleveland. “First game of the year. I trained so hard in the off-season. For whatever reason the pitches all looked slow to me today. It was like playing t-ball again. I can’t believe it.”</p>

TABLE 3. Examples of positively framed long vignette with critical event moved from beginning to middle to end

Vignette 1 (long version) Positive event at beginning	Vignette 1 (long version) Positive event in middle	Vignette 1 (long version) Positive event at end
<p>“I hit five out of six! I’ve never come anywhere close to hitting the big jackpot before! It was just unbelievable,” Cooper exclaimed, still stunned. Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God!”</p>	<p>Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I hit five out of six! I’ve never come anywhere close to hitting the big jackpot before. It was just unbelievable.” Cooper exclaimed, still stunned, “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God!”</p>	<p>Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God!” Cooper exclaimed, still stunned. “It was just unbelievable. I’ve never come anywhere close to hitting the big jackpot before! I hit five out of six!”</p>

TABLE 4. Examples of negatively framed long vignette with critical event moved from beginning to middle to end

Vignette 1 (long version) Negative event at beginning	Vignette 1 (long version) Negative event in middle	Vignette 1 (long version) Negative event at end
<p>“I missed the jackpot by one lousy number! Story of my life. It was just unbelievable,” Cooper exclaimed, still stunned. Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God.”</p>	<p>Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I missed the jackpot by one lousy number! Story of my life. It was just unbelievable,” Cooper exclaimed, still stunned. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God.”</p>	<p>Berwick bakery worker Tara Cooper stopped off at her usual place for a breakfast coffee and bagel, Brewed Awakening, and decided to pick up a lottery ticket before heading to first shift. “I don’t usually play Megabuck\$, and don’t know why I did today.” After work, she checked her numbers online. “I was like, oh my God.” Cooper exclaimed, still stunned, “It was just unbelievable. Story of my life. I missed the jackpot by one lousy number.”</p>

experimental evidence shows that a person's overall evaluation of a recently ended event (for example, immersing one's hand in cold water, a colonoscopy, watching a feel-good television commercial, and receiving gifts) is not determined by the total utility of the experience. Instead, the person's judgment relied on two factors: how good (or bad) the experience was at its peak, and how well (or poorly) the experience ended. One study found that participants preferred sixty seconds of immersion in 14°C ice water followed by thirty seconds of immersion in 15°C ice water to sixty seconds of 14°C ice water alone (Kahneman 2011, chap. 35). Another study found that people retrospectively report lower levels of overall pleasure for a desirable gift if a positive but less desirable gift is added to it, even though the addition of this second gift objectively increases the total worth (Do, Rupert, and Wolford 2008). Nevertheless people will insist that they prefer less pain to more, and more valuable goods to fewer.

Upon testing our hypotheses, we found that the first hypothesis, the existence of a framing effect, was strongly confirmed. Indeed, the framing effect was so powerful that it trumped the length of the vignette; we attained a null result for the second hypothesis. The third hypothesis was interestingly split: where in a vignette the *positive* information was presented did not matter at all in the assessment of its overall luckiness, but the location of *negative* information did matter. In the negative condition, the third hypothesis was confirmed. One possibility is that the lack of a recency effect in the positive vignettes was due to an overall positivity bias among the participants, but we have done no further testing to confirm or disconfirm this additional hypothesis.

Method

Participants. 197 students (61 percent female) enrolled in two Introductory Psychology courses were compensated with extra credit to participate in this study, which most of them completed in ten minutes. Most participants were freshmen (76 percent) with a median age of 19 years (age range 18 to 29 years). We chose this sample in order to represent a population of interest naïve to higher-level concepts in Philosophy and Psychology. Based on participants' responses to the sixteen-item Belief in Luck and Luckiness Scale (Thompson and Prendergast 2013), only 9 percent of our sample had "no belief in luck." We hoped to capture laypeople's perceptions of luck. Permission to conduct this research at Bloomsburg University of Pennsylvania was obtained from the local Institutional Review Board. All data were collected anonymously.

Materials. We first created eight short vignettes that could be judged as lucky or unlucky depending on the framing of the scenario (see table 1). A pilot study confirmed our intuition about the perceived luckiness of the vignettes. In all cases, the outcome of the scenario was equivalent. For example, Tara Cooper could **hit five** out of six numbers in a lottery

(considered lucky because framed in a positive light) or Tara Cooper could **miss one** out of six numbers in a lottery (considered unlucky because framed in a negative light). Either way, the actual outcome of the event was the same. Yet we hypothesized that the perceived luckiness of the vignette would change depending upon how the scenario was framed. Those framed in a positive light would be perceived as luckier than those framed in a negative light.

To determine the influence of length of the vignette on perceptions of luck, we created two long versions of each of the eight vignettes, one positively framed and one negatively framed (see table 2). The information included in the positively and the negatively framed vignettes was identical except for the information about the critical event.

To test the primacy-recency effect, we created three versions of each of the positively framed long vignettes (see table 3) and three versions of each of the negatively framed long vignettes (see table 4). Again, all versions of the long vignettes contained the same exact words except for the critical event.

The study was a between-subjects design. Each participant answered only one question about each vignette (eight questions total). However, the vignettes were arranged so that each person experienced each of the eight versions. For example, twenty-five participants completed a survey including the short positive version of Vignette 1, short negative version of Vignette 2, long positive (event at beginning) version of Vignette 3, long positive (event in middle) version of Vignette 4, long positive (event at end) version of Vignette 5, long negative (event at beginning) version of Vignette 6, long negative (event in middle) version of Vignette 7, and long negative (event at end) version of Vignette 8. The next twenty-five participants completed different versions of the eight vignettes, and so on. No participant was presented with both a positive and a negative version of the same vignette, and no participant had both the short and the long version of the same vignette.

Procedure. After providing written informed consent to participate in the study, participants completed three paper-based surveys. The first survey was created by us as described in the Materials section above. Participants were orally instructed to read through each vignette carefully and then make their responses without rereading the vignettes. We hoped to attain participants' first impression of the luckiness of the scenario. Participants indicated their response by circling one of four responses after each vignette: *unlucky, somewhat unlucky, somewhat lucky, lucky*. For example, in Vignette 1, participants were provided with the prompt "Tara Cooper was: *unlucky, somewhat unlucky, somewhat lucky, lucky*. Circle one." In Vignette 2, participants received the prompt "Mark Zabadi was: *unlucky, somewhat unlucky, somewhat lucky, lucky*. Circle one." The instructions in the other vignettes were the same, *mutatis mutandis*.

After reading and responding to the eight vignettes, participants were instructed to turn over the worksheet to complete the other two surveys. First, participants provided written responses to five demographic questions: age, sex, class year (that is, freshman, sophomore, junior, senior), major in college, and whether English was their first language. After completing the demographic questions, participants completed the sixteen-item Belief in Luck and Luckiness Scale (Thompson and Prendergast 2013). Participants indicated their responses by circling answers, on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*), to questions like “I believe in good and bad luck” and “Belief in luck is completely sensible.”

Results

Participants’ luck ratings (that is, *unlucky*, *somewhat unlucky*, *somewhat lucky*, *lucky*) were tallied individually for each version of each vignette. For ease of interpretation, responses of *unlucky* and *somewhat unlucky* were combined into one “unlucky” category, whereas responses of *lucky* and *somewhat lucky* were combined into one “lucky” category. Percentages of “lucky” responses for all scenarios and vignettes are presented in table 5.

A chi-square test of independence was used to determine if there was a significant influence of framing (that is, positive or negative) on perceptions of luckiness (that is, “unlucky” or “lucky”). The results showed a very strong effect of framing on perceptions of luck, $\chi^2(2, n = 1,586) = 559.6, p < .001$. When events were framed positively (for example, Tara Cooper **hit five** out of six numbers in the lottery), participants considered the event “lucky” 83 percent of the time. The same events when framed negatively (for example, Tara Cooper **missed five** out of

TABLE 5. Percentages of participants who perceived an event to be “lucky” (includes *lucky* and *somewhat lucky* responses)

Vignette	Short positive	Short negative	Long positive beginning	Long positive middle	Long positive end	Long negative beginning	Long negative middle	Long negative end
1	84%	40%	84%	84%	84%	56%	56%	12%
2	84%	58%	92%	84%	88%	52%	32%	24%
3	68%	4%	54%	48%	80%	12%	8%	8%
4	100%	68%	88%	92%	88%	24%	16%	16%
5	92%	71%	88%	92%	92%	52%	72%	52%
6	72%	16%	96%	92%	80%	38%	9%	16%
7	96%	52%	83%	88%	92%	38%	54%	36%
8	44%	24%	96%	92%	100%	13%	4%	4%

six numbers in the lottery) were considered “lucky” only 29 percent of the time.

Interestingly, when the influence of framing of the event on luck ratings as a function of length of the vignettes was examined, both short and long versions of the positively framed events led to significantly more “lucky” ratings than negatively framed events ($p < .001$ in both cases). Negatively framed long vignettes were “unlucky” 71 percent of the time, and negatively framed short vignettes were similarly “unlucky” 72 percent of the time. Positively framed long vignettes were judged “lucky” 86 percent of the time, whereas positively framed short vignettes were judged “lucky” slightly less frequently (78 percent of the time). Overall, the length of the vignette, and thereby the amount of context included in the framing, did not seem to have a significant effect on perceptions of luck. Therefore, framing had significant influences on perceptions of luck regardless of whether the vignette was short or long.

A second chi-square test of independence was used to determine if there was a significant influence of the location of the critical event (that is, placed at the beginning, middle, or end) on perceptions of luckiness (that is, “unlucky” or “lucky”) in the long vignettes. The location of the event did not have a significant effect on perceptions of luckiness in the positive long vignettes, $X^2(2, n = 1,192) = 1.127, p = .569$. “Lucky” ratings were fairly consistent whether the events were presented at the beginning (86 percent), in the middle (85 percent), or at the end (88 percent). However, the location of the events did have a significant effect on perceptions of luckiness in the negative long vignettes, $X^2(2, n = 1,192) = 10.024, p = .007$. “Unlucky” ratings seemed to increase as the events were presented closer to the end (beginning = 65 percent, middle = 70 percent, end = 79 percent).

Pritchard and Smith (2004, 24) try to make hay of the skill/external chance division to address earlier work in the psychology of luck. They write, “An outcome that is brought about via an agent’s skill is not, we argue, properly understood as a ‘lucky’ outcome.” Similarly, Mauboussin (2012, 24) contrasts luck and skill, and attempts to “place activities properly on the continuum between skill and luck.” Since skilled success is typically assumed to be the opposite of luck, we decided to see whether our data supported such a distinction.

Additional chi-square tests of independence were used to determine if there was a significant influence of the type of scenario on perceptions of luckiness. The eight scenarios were first split into categories of skill (Vignettes 2, 4, and 8) and chance (Vignettes 1, 3, 5, 6, and 7). The results showed that framing significantly influenced both types of scenarios: $X^2_{skill}(2, n = 591) = 208.56, p < .001$ and $X^2_{chance}(2, n = 995) = 232.02, p < .001$. Positively framed scenarios of skill were considered “lucky” 87 percent of the time, and positively framed scenarios of chance were considered “lucky” 83 percent of the time. Negatively framed scenarios of skill were considered “unlucky” 72 percent of the time, and negatively framed

scenarios of chance were considered “unlucky” 65 percent of the time. The framing effect swamped any perceptions of difference between skill and chance with respect to luck.

Teigen (2005) claims that luck implies closeness to disaster, and that people judge themselves luckier in cases of a near miss, where they just skirted a terrible outcome, than in cases where they were comfortably separated from trouble. If Teigen is correct, then we should expect that participants would consider near-miss cases to be more a matter of luck than cases where the outcome was half positive and half negative (or the glass is half empty/half full). An example of a near miss is in the Derek Washington vignette, where Derek nearly died in a freak accident with a runaway tractor-trailer tire. An example of a half-empty/half-full scenario is the Mark Zabadi case, where Mark missed half of his basketball free throws but hit half.

To test Teigen’s implication, we split the eight scenarios into categories of a near miss (Vignettes 1, 4, 5, and 7) and glass half empty or half full (Vignettes 2, 3, 6, and 8). The results showed that framing significantly influenced both types of scenarios: $X^2_{nearmiss}(2, n = 800) = 171.5$, $p < .001$ and $X^2_{glasshalf}(2, n = 786) = 283.4$, $p < .001$. Positively framed scenarios of near misses were considered “lucky” 89 percent of the time, and positively framed scenarios of glass half empty/half full were considered “lucky” 80 percent of the time. Negatively framed scenarios of near misses were considered “unlucky” only 55 percent of the time, compared to negatively framed scenarios of half empty/half full, which were considered “unlucky” 80 percent of the time. The weaker effect of framing on negatively framed near-miss scenarios is an interesting finding that we will explore in future research. Overall, however, framing had a significant effect on both types of scenarios. Participants’ assignments of luck were not notably different in the near-miss cases from what they were in the half-empty/half-full scenarios, contrary to Teigen’s prediction.

Discussion

Overall, it did not matter whether the salient event in the vignette was ostensibly connected to skill (as in the Mark Zabadi, Vicki Mangano, and José Ramirez examples) or the result of external chance or accident (as in the Tara Cooper, snowstorm, Derek Washington, Michelle Simmons, and James Goldberg examples). Nor did it matter whether the vignette depicted a “near miss” (Tara Cooper, Vicki Mangano, Derek Washington, James Goldberg) or a “the glass is half empty/half full” scenario (Mark Zabadi, snowstorm, Michelle Simmons, José Ramirez). Those factors were not relevant to the luck attributions of the study participants. The statistical determinants of their responses were whether the vignettes were framed negatively or positively and the location of negative information in the vignette.

What is the philosophical import of these results? First, we are not assuming that evidence from empirical psychology immediately refutes or confirms any particular philosophical view. Some overly hasty enthusiasts of experimental philosophy have made this error, and one of us has criticized them in previous work (Hales 2006 and 2012). We do think, however, that the fact that luck attributions are so profoundly subject to cognitive bias—especially framing, but also recency—poses serious challenges to the three prominent theories of luck.

The intuitive responses of naïve study participants rated the same scenarios as lucky or unlucky, depending on whether the information was presented positively or negatively. How can the three major theories of luck, the probability, modal, and control views, explain that fact? One option is to maintain that according to the theories the subjects in each vignette are both objectively lucky and objectively unlucky, and that the study participants correctly perceived this fact. Therefore, the empirical results pose no threat to any theory of luck. A second option is to argue that according to one or more of the theories the subjects in each vignette are either objectively lucky or objectively unlucky (but not both), and that the study participants were simply mistaken when they gave the wrong answer.

Option 1

Consider first the probability theory of luck. According to it, something's luckiness is a function of its importance and probability of occurrence. Recall the Tara Cooper example. Under the probability theory, Tara is lucky to hit five out of six numbers in the Megabuck\$ lottery if and only if (1) hitting five numbers mattered to her in a positive way and (2) it was improbable that she would hit five of six numbers. Let us suppose that those conditions were satisfied. Thus Tara *was* lucky to hit five numbers in the lottery. Also according to the probability theory, she was *unlucky* to miss one of six numbers in the Megabuck\$ lottery if and only if (1) missing one of the numbers mattered to her in a negative way, and (2) it was improbable that she would hit all six numbers. Assuming those conditions were satisfied, it follows that she was unlucky to miss one of the six numbers.

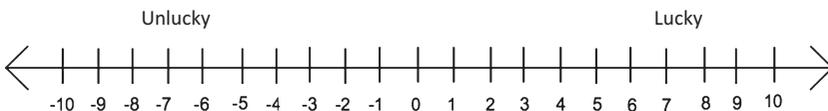
We get the same result for the modal theory. As Pritchard puts it, "The degree of luck involved varies in line with the modal closeness of the world in which the target event doesn't obtain (but where the initial conditions for that event are kept fixed). We would thus have a *continuum* picture of the luckiness of an event, from very lucky to not (or hardly) lucky at all" (Pritchard 2014). Under the modal theory, a very small change in the world, such as one ball in the Megabuck\$ lottery hopper rotating an extra 20 degrees, would have meant that Tara Cooper did not hit five of six numbers in the lottery, and so her hitting those numbers was modally

fragile. Thus her success in getting five out of six was lucky. It is also the case that a very small change in the world would have meant that she got all six numbers right in the lottery, and she was unlucky not to find herself in this very close possible world instead. Again, Tara Cooper is both lucky and unlucky for the same thing.

The control theory is no different. The fact that Tara got five of six lottery numbers correct was wholly outside her control. Coupled with the fact that getting those numbers mattered to her, under the control theory she was lucky to get five of six numbers in the lottery. However, it was also not within her control to hit all six numbers, although she would have dearly loved to. Thus the fact that she missed one number was a case of bad luck. While Tara Cooper was lucky to have hit five out of six numbers in the lottery, she was unlucky to have missed one number.

At first, one might think that the fact that all three leading theories of luck give the same result in the Tara Cooper case means that each can nicely explain why participants agreed she was lucky in the **hit five** condition but unlucky in the *missed one* condition. She was both lucky and unlucky, and the study participants correctly recognized this. And of course, similar reasoning applies to the other cases: the town was lucky that half the residents never lost their power in the storm, but unlucky that half did lose their power, and so on.

The problem with the preceding approach is, as Rescher (1995, 212) correctly notes, *being lucky* and *being unlucky* are contrary properties in the same way that *being red all over* and *being blue all over* are contraries, or *skydiving* and *swimming* are contraries. No one can skydive and swim simultaneously, and no one can be both lucky and unlucky for the same thing. One way to see this is to imagine an integer line along which someone's luck might be measured. Such a scale follows directly from Rescher's view, and is consonant with Pritchard's suggestion above that we should adopt a continuum picture of luck.



Someone mildly lucky might have a score of 3 on the scale; someone quite lucky might have a score of 12. The negative integers measure unluckiness. A rating of -4 is fairly unlucky, but -15 is much more unlucky. Zero means that someone is neither lucky nor unlucky; his luck balances out. Sam might be lucky in love but unlucky with investments, which is to say that he scored $+5$ luck with respect to love and, say, -5 with respect to

investments. What is nonsensical is to claim that someone might rate both +5 and -5 on the luck scale with respect to love. One cannot be simultaneously lucky and unlucky with respect to the same thing. Tara Cooper cannot be both positively lucky and negatively unlucky in the lottery case.

The empirical results are that study participants perceived a scenario as lucky when the information was presented in a positive light and unlucky when it was presented in a negative light. At first it seems that all three theories of luck can explain these results in terms of the subjects in the vignettes being both lucky and unlucky. We have just argued, however, that it is not possible for someone to be both lucky and unlucky for the same thing. If the three theories of luck do not fall directly to *reductio ad absurdum*, at the least they must retool and find some other way of dealing with these results.

A defender of a traditional theory of luck might respond to the preceding criticism as follows. When discussing luck, there is an ambiguity between the lucky/unlucky distinction and the luck/non-luck distinction. While the various accounts of luck are committed to the possibility that the same event can be both good luck and bad luck, that's not a problem for any specific theory of luck at all, since those theories are not an account of good or bad luck, just of whether an event is lucky *simpliciter* (that is, if the subjects agree that the event is good luck/bad luck, then they agree it's lucky, and that's all that's relevant). For our objection to stick we would thus need to disambiguate this distinction along the "P/not-P" lines and then show that the probability, modal, and control accounts are committed to both P and not-P (that is, to the same event being both a case of luck and not a case of luck). Since we have not done so, our criticism goes wide of the mark.³

While it is true that there is a valuable distinction between good luck/bad luck and luck/non-luck, that distinction is not germane to our critique. Here's why. Consider an analogy to axiology. There is a difference between the moral/immoral distinction and the moral/non-moral distinction. It is a very plausible assumption that token identical acts cannot be simultaneously moral and immoral; any theory of ethics committed to the same act being both moral and immoral faces a very serious problem.⁴ A critic of such a theory need not show that the theory further entails that the very same act is both moral and non-moral. While we have not demonstrated that, say, the modal theory is committed to a person being both lucky and non-lucky for the same thing (which would certainly be bad news for the theory), we *have* shown that it is committed to a person being both lucky and unlucky for the same thing (which is also bad news for the theory).

Another strategy a defender of the traditional theories might pursue is to maintain that the event of **hitting five numbers** is not the same event as

³ Thanks to Duncan Pritchard for this criticism.

⁴ As Plato notes at *Euthyphro* 8a–b.

missing one number. To be sure, such a strategy requires specific commitments in the theory of events. Is Sabastian's stroll at midnight the same event as Sabastian's leisurely stroll at midnight? Is Brutus's stabbing of Caesar the same event as Brutus's killing of Caesar? These matters go back to the well-known Davidson-Kim debate over events.⁵ Insisting the positive and negative conditions are really descriptions of separate events in order to preserve the probability, modal, or control theories looks even stranger with some of the other scenarios. For example, the tornado that destroyed half the buildings in town is identical to the tornado that spared half the buildings in town, but that tornado participated in two simultaneous yet independent events: destroying half the buildings and sparing half. Still, one might think that the empirical data above simply put a certain amount of metaphysical pressure on any particular theory of luck, not that they are in direct conflict.

Unfortunately, the "different events" response misses its target entirely. As was noted above, the study participants were not asked whether an *event* was lucky/somewhat lucky/somewhat unlucky/unlucky. They were asked whether *a person or an object* was lucky/somewhat lucky/somewhat unlucky/unlucky. Was Tara Cooper, Mark Zabadi, the town, Vicki Mangano, Derek Washington, and so on, lucky or not? Appealing to a certain metaphysics of events will do nothing to accommodate these results. Thus Option 1 is unsuccessful—it cannot be that the vignette subjects were both objectively lucky and objectively unlucky, and to the extent that the theories of luck allow for that possibility, so much the worse for those theories.

Option 2

According to one or more of the theories of luck, the subjects in each vignette are either objectively lucky or objectively unlucky (but not both) and the study participants were simply mistaken when they gave the wrong answer. Given the preceding arguments that every theory of luck seems to give the result that each vignette subject is both lucky and unlucky, we are not clear whether a proponent of, for example, the modal theory would declare that Tara Cooper is objectively lucky or that she is objectively unlucky. Under the present option, she cannot be both. Let's suppose for the sake of argument that she is, in fact, unlucky to have missed one number. In the positive framing case, the study participants are simply misled by the phrasing and wrong to identify her as lucky. (Note that the present option does not address the recency effect at all. No metaphysical account of luck explains why a vignette subject should be judged unluckier as the negative information is moved closer to the end of the vignette.)

⁵ The classic Davidson and Kim pieces are reprinted with commentary in Hales 1999, 319–69. Casati and Varzi 2010 is a good review of recent literature on events.

The question then becomes one of why we should prefer the *modus ponens* of assuming a theory of luck is right and then dismissing the luck judgments of the study participants over the *modus tollens* of taking those judgments seriously and rejecting any theory of luck that comes into conflict. Philosophical theories of luck aim to solve certain problems in epistemology or ethics or political philosophy, but when they are presented as general metaphysical accounts of what luck is, they must take seriously robust intuitions about luck outside philosophical contexts. The appeal of any theory of luck rests partly upon the degree to which it comports with our pre-analytic intuitions or naïve judgments about luck. To be sure, reflective equilibrium demands that we balance the power and appeal of a theory with data that come into conflict with that theory. Sometimes we do reasonably reject data as outlier, biased, or poorly acquired in favor of preserving an otherwise well-supported theory.

In the present case, though, there is no reason to think that the study participants were laboring under some kind of cognitive illusion, or making a perceptual or inferential error when they judged that Tara Cooper was lucky, but not suffering the same illusions or making the same errors when they judged that she was unlucky. At the very least, a defender of one of the traditional theories of luck needs to provide an error theory that explains not only why naïve participants are wrong in their luck attributions but also why they are systematically, predictably wrong, depending on how the information is presented. We are doubtful that a cogent argument can be made to the conclusion that people make mistakes due to framing and recency effects when the information is negative, but properly grasp the truth when the information is positive. For one thing, sometimes the belief that a subject in a vignette is unlucky will be the correct view, in which case traditional luck theorists will have to hold that judgments that the subject is lucky are due to erroneous bias. The study participants got it right when they thought James Goldberg was lucky, right when they said Michelle Simmons was unlucky, and wrong when they concluded that Derek Washington was lucky? We cannot see how such reasoning might proceed except on a purely ad hoc basis.

Conclusion

A reasonable interpretation of our results is that luck is a cognitive illusion and assignments of luck are merely a way to subjectively interpret our experiences; our encounters with the world do not include the detection of a genuine property of luck. Once we see this, it is easy to understand otherwise puzzling claims of luck. Teigen (2005, 129–30) offers this example: “Anat Ben-Tov, survivor of two Tel Aviv bus bomb attacks, expressed this [point] succinctly in an interview, given from her hospital bed: ‘I have no luck [i.e. am unlucky] or I have all the luck in the world—I’m not sure which.’” Neither Teigen nor Pritchard (2005, 142), who

comments on this case, see its true import. Anat Ben-Tov is unsure how to interpret her involvement with the terrorist bombings without a specific frame to structure that interpretation. As with the vignettes in our study, if her experiences are framed positively as persistent survival in dangerous circumstances, then she has all the luck in the world, but if they are presented negatively as repeated victimization by violent terrorism then she has no luck whatsoever. There is no fact about whether she is objectively lucky or objectively unlucky to be discovered through the application of the probability, modal, or control theory of luck. In our view, philosophers concerned about the role luck plays in philosophical problems are misled about the nature of those problems. An amputee who feels phantom limb pain is misguided about the true source of the pain and requires cognitive therapy to overcome it. While our feelings and intuitions about luck remain even if we recognize them as no more veridical than an itch in a missing leg, we too should see those intuitions as meriting therapy instead of further theoretical analysis.

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Acknowledgments

We are grateful to our research assistants José Calvo and Krista Kobbe and also to Mary Katherine Waibel Duncan for helpful comments on a previous version. This work has been funded by Spanish Government (Ministerio de Economía y Competividad) Research Projects FFI2008-01205, Puntos de Vista. Una Investigación Filosófica, and FFI2011-24549, Puntos de vista y estructuras temporales.

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