Contents lists available at ScienceDirect

Organizational Behavior and Human Decision Processes

Advice taking vs. combining opinions: Framing social information as advice increases source's perceived helping intentions, trust, and influence

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A R T I C L E   I N F O

A B S T R A C T

People are constantly subject to various types of informational social influences, such as others' opinions and advice. A tacit assumption in the advice-taking literature is that decision makers treat others' opinions and advice equally. In this paper, we challenge this assumption by examining the differential effects of advice versus others' opinions on people's judgments. Across six preregistered experiments ($N = 3,411$), we found that participants placed greater weight on and paid more for others' estimates when presented as advice than when presented as opinions. This advice framing effect substantially reduced egocentric discounting and held across various types of judgments, and for both good and ecological advice. We propose that the advice framing effect stems from higher helping intentions and thereby trustworthiness ascribed to the source of advice (vs. opinions). Both mediational analyses and experimental evidence support this model. Theoretical and managerial implications are discussed.

1. Introduction

Managers and lay people often seek advice in various domains ranging from organizational decisions to everyday household matters and health-related problems (Argyris, 2000; Schein, 1999). Over the past 35 years, the literature on advice taking has offered important insights into people's strategies of advice utilization. In particular, it examined the effects of the advisor's characteristics (e.g., expertise, credibility, independence, and confidence), advice type (e.g., estimates vs. preferences) and quality, as well as advisee's characteristics (e.g., experience, knowledge, traits, emotions, and motivations), on the advisee's utilization of advice (Bonaccio & Dalal, 2006; Rader et al., 2017).

Yet, in their review, Bonaccio and Dalal (2006) pointed out that the advice literature has paid insufficient attention to defining the term *advice*. In a more recent review, Rader et al. (2017) also argued against the inconsistent definition and treatment of the concept of advice in the literature (for a similar argument, see Trouche et al., 2018). For the sake of clarity of the following discussion, we define advice as information that is perceived as intended to help an advisee to deal with their issue of deliberation. This definition is sufficiently inclusive to encompass the various types of advice outlined in the advice literature (Dalal & Bonaccio, 2010) and is consistent with other definitions of advice (MacGeorge & van Swol, 2018). This definition also helps to distinguish

advice from opinions (i.e., a judgment, view, or appraisal; McNemar, 1946; Trouche et al., 2018), anchors (Hütter & Fiedler, 2019), feedback (Kluger & Denisi, 1996), personal observations (Davis & Luthans, 1980; Yoon et al., 2021), persuasive messages (Wood, 2000), published data, and other types of information (Lim et al., 2020).

The objective of the present research is to test the proposition that people treat advice differently than opinions. Specifically, we propose that decision makers are more likely to solicit and utilize advice than opinions. This might be the case because information presented as advice signals the advice giver's benevolence (i.e., an intention to help the advisee). Since benevolence is known to be an antecedent of trust (Mayer et al., 1995), it is likely that advisees will trust a source of advice more than a source of opinion, and will consequently place more weight on and solicit advice more than opinions.

Our research contributes to the decision-making literature in several ways. First, we challenge the tacit assumption in the advice-taking literature that people treat advice and others' opinions equally (Bonaccio & Dalal, 2006; MacGeorge & van Swol, 2018; Rader et al., 2017). Specifically, we explain that advice differs from opinions in its intention: advice is given with the intention of helping a particular person with a specific problem, whereas opinion is not. We then empirically show that decision makers assign more weight to information framed as advice than to information framed as opinions, and pay

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more for advice than opinions. The advice framing effect reduces egocentric discounting—a central phenomenon in the advice-taking literature. We also show how this effect influences the accuracy of final judgments. Second, we contribute to the emerging literature on advisor's motives and intentions. This literature has primarily focused on the effects of advisor's perceived dishonesty on advice utilization (Haran & Shalvi, 2019; Mackinger et al., 2017; van Swol, 2009). We extend this literature by focusing on another type of advisor's intentions—helping intentions. We show that people are sensitive to a source's helping intentions and assign more weight to and pay more for information when they perceive the source as being more benevolent. Third, we contribute to the literature on social influence (Cialdini & Goldstein, 2004; Pornpitakpan, 2004; Wood, 2000) by demonstrating that the mere presentation of a message as "advice" may enhance its influence. Furthermore, this effect extends beyond attitude change to quantitative judgments of matters of fact.

1.1. Theoretical background and hypotheses

People's decisions are often subject to various forms of social influence that include persuasion, pressure for conformity and compliance (Cialdini & Goldstein, 2004; Kelman, 1958; Wood, 2000). Research on social influence can be traced to the seminal works of Sherif and Asch (Asch, 1951; Sherif, 1935). Early researchers distinguished between normative and informational social influence (Deutsch & Gerard, 1955), where the first is driven by decision makers' motivation to maintain social harmony, and the second is driven by their motivation to optimize their decisions.

Social psychology literature discusses various types of informational influence on decision-making. For example, the mere presence of apparently unrelated information is sufficient to influence judgments. This type of informational influence is known as "anchoring" (Furnham & Boo, 2011; Tversky & Kahneman, 1974). The literature on anchoring shows that even anchors that are *not* about the focal issue influence judgments (Critcher & Gilovich, 2008; Wilson et al., 1996), although the effect of anchors on people's judgments increases in line with anchors' perceived relevance to the focal issue (Mussweiler & Strack, 2001). Indeed, a recent study shows that decision makers assign more weight to numerical estimates when these estimates are presented in the context of another person's statement about a *focal* issue (i.e., opinions) than about a *different* issue (i.e., arbitrary anchors; Hütter & Fiedler, 2019). Thus, adding aboutness to the provided information increases its impact on judgments.

Other people's opinions constitute another ubiquitous type of social informational influence. As defined above, an opinion is a judgment, a view, or an appraisal expressed by a person. Numerous studies show that decision makers tend to overestimate the value of their own opinions and discount those of others. In this phenomenon, which is known as "egocentric discounting," people on average assign a weight of 20%-40% to others' opinions, in contrast to ego-neutral weighting in which one's opinion and others' opinions are equally weighted (50%-50%; Bailey et al., 2022; Harries et al., 2004; Rader et al., 2017; Soll & Mannes, 2011; Wang & Du, 2018; Yaniv & Kleinberger, 2000). Studies show that egocentric discounting is a suboptimal strategy, and that decision makers could improve their judgments more by assigning more weight to others' opinions (Armstrong, 2002; Mannes, 2009; Soll & Larrick, 2009; Surowiecki, 2004; Yaniv, 2004; Yaniv & Kleinberger, 2000). Although various explanations for egocentric discounting have been proposed in the literature (Harries et al., 2004; Harvey & Fischer, 1997; Liberman et al., 2012; Soll & Mannes, 2011; Wang & Du, 2018; Yaniv, 2004), a recent review by Rader and colleagues (2017) concludes that the phenomenon remains an enigma, and may be determined by various factors such as a motivation to maintain one's self-concept, absence of feedback about relative expertise, and lack of trust in strangers. With respect to the latter mechanism, it is interesting to examine whether egocentric discounting diminishes when the very same information is framed as advice rather than opinion.

Information can also be delivered to decision makers in the form of advice (MacGeorge & van Swol, 2018). MacGeorge and van Swol (2018) describe prototypical advice as having several defining elements, such as a focus on the advisee's future action, the advisor's intention to help an advisee in solving a problem, and a disparity of expertise between advisor and advisee in favor of the advisor. From a functional perspective, advice functions as social influence and serves as a form of helping. Advice giving may also build social status and create reciprocal obligations (MacGeorge & Hall, 2014).

Researchers distinguish between four types of advice (Dalal & Bonaccio, 2010). The most frequently studied type of advice is a recommendation concerning what a decision maker should do. Dalal and Bonaccio (2010) suggest three additional types of advice: a recommendation against a particular course of action, information concerning alternatives, and a recommendation regarding the decision-making process. To encompass all types of advice, we propose to define advice as information (rather than a recommendation) that is intended to help an advisee deal with an issue of deliberation. By this definition, advice differs from opinions, which typically are not intended to help a particular person with a specific problem.

The purpose of the present research is to examine whether the influence of *advice* on judgments differs from the influence of *opinions*. A review of the literature might suggest that their influence does not differ. In fact, many authors use these terms interchangeably in their writings (Bonaccio & Dalal, 2006; Gino & Moore, 2007; See et al., 2011; Yaniv, 2004; Yaniv & Kleinberger, 2000). For example, researchers refer to advice as "views of others" (e.g., Harvey & Fischer, 1997, p. 130), "others' opinions" (Gino & Moore, 2007, p. 32; Soll & Larrick, 2009, p. 785; Yaniv & Kleinberger, 2000, p. 260), and "others' forecasts" (e.g., Budescu & Rantilla, 2000, p. 375; Önkal et al., 2016, p. 280). In fact, the literature reviewed above on the influence of others' opinions on judgments is usually referred to as "advice taking literature."

A similar confusion of terminology exists at the operationalizational level. The main paradigm for studying social informational influence is considered to be the Judge-Advisor-System (JAS; Sniezek & Buckley, 1995). In this paradigm, a judge makes an initial quantitative judgment, receives an advisor's (i.e., another person's) estimate, and then revises their initial judgment. In several experiments that employed JAS, participants were instructed that they would receive "advice" from an "advisor" (Gino, 2008; Gino et al., 2012; Haran & Shalvi, 2019; Harvey & Fischer, 1997; Sniezek & Buckley, 1995; Sniezek & van Swol, 2001; van Swol & Sniezek, 2005; Wang & Du, 2018), whereas in other experiments, they were instructed that they would receive "opinions" (or "estimates") from "another participant" (Gino & Moore, 2007; Mercier et al., 2012; See et al., 2011; Soll & Larrick, 2009; Trouche et al., 2018; Wanzel et al., 2017; Yaniv, 2004; Yaniv et al., 2009; Yaniv & Kleinberger, 2000; Yaniv & Milyavsky, 2007). Indeed, recently, Trouche et al. (2018) asserted that "the vast majority of the studies do not deal with advice per se… since the opinions to be aggregated have not been generated as pieces of advice, and they are not presented as pieces of advice, merely as the opinions of other individuals." (p. 2). Thus, there seem to be a tacit assumption in the literature that there is no difference between how people utilize advice and opinions. But is this assumption correct?

We propose that the key difference between advice and opinions is that advice is delivered with an intention to help an advisee to resolve a specific problem, whereas an opinion is merely a judgment, a view, or an appraisal expressed by another person (McNemar, 1946). That is, advice giving is an act of communication that typically pursues the benefit of the advisee, whereas opinion is not. Theoretically, this distinction holds for all types of advice mentioned above (Dalal & Bonaccio, 2010). Yet, since a recommendation for a specific action constitutes the most prototypical form of advice and communicates the advisor's helping intentions more strongly than other types of advice, we focused in the present research on comparing opinions to this type of advice.

Empirical evidence shows that people attribute greater value to information that originates from individuals having more goodwill (Giffin, 1967). For example, a source who appeared more benevolent with respect to their audience was more persuasive (Pornpitakpan, 2004). In the context of learning, people were more willing to follow advice than to copy the equivalent observed actions (Celen et al., 2010). Similarly, the advice literature shows that advisees considered advice to be more valuable when the advisor was more attentive and supportive (Feng, 2009), and advisees favored the advice of benevolent advisors when making emotionally difficult decisions (White, 2005). Conversely, when advisees suspected that advisors' intentions were not aligned with the advisees' best interests, they rated the advice as less trustworthy and less useful (van Swol, 2009), discounted it more (Haran & Shalvi, 2019), and reported less willingness to cooperate with the advisor (Mackinger et al., 2017).

In line with these findings, Mayer and colleagues (1995) proposed theoretical model of trust. These authors define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party." (p. 712). They outline benevolence—a trustee's perceived intention to do good to the trustor (together with ability and integrity), as a key antecedent of trust, arguing that a trustee's benevolence is inversely related to the trustee's motivation to deceive the trustor. In the literature, trust has been examined in three ways (Dwyer & Lagace, 1986; Lewis & Weigert, 1985)—as a personality trait (propensity to trust; Barber, 1983; Mayer, Davis, & Schoorman, 1995; Rotter, 1967, 1980), as an expectation about the behavior of another person (Johnson-George & Swap, 1982), and as a behavioral manifestation (Mayer et al., 1995). Pertinent to our theoretical argument, Sniezek and van Swol (2001) described advice taking as a behavioral measure of trust.

Indeed, prior research on advice taking indicates that a higher level of trust in the advisor corresponds with greater acceptance of advice. Specifically, several studies have found a correlation between an advisor's perceived trustworthiness and the weight judges placed on advice (Gino & Schweitzer, 2008; Sniezek & van Swol, 2001; van Swol & Sniezek, 2005; Wang & Du, 2018). Furthermore, White (2005) demonstrated that when an advisor's trustworthiness was increased, participants expected their advice to be more readily accepted by another individual.

Based on the literature reviewed above, we propose that decision makers will perceive a source of advice as more benevolent than a source of opinions. In turn, this perception will translate into greater trust in the source of advice (vs. opinion), which will lead to greater reliance on the provided advice (vs. opinion). This line of reasoning led us to the following hypotheses:

Hypothesis 1: People will place more weight on information framed as advice (vs. opinion).

Hypothesis 2a: The effect of the advice framing on the weight people place on the given information will be mediated by the stronger intention to help an advisee they ascribe to the source of advice (vs. opinion).

Hypothesis 2b: The mediator hypothesized in H2a will evoke a higher level of trust in the source of advice (vs. opinion), which in turn will lead to a greater weight being placed on the information given (a serial mediation model).

1.2. Overview of the studies

We examined the above hypotheses in six preregistered experimental studies across perceptual and knowledge-based judgments (see Appendix A for links to preregistrations). In all studies we used JAS while manipulating the framing of information provided to judges (advice vs. opinion). In Study 1, we examined the basic effect of advice framing (advice vs. opinion) on the utilization of others' estimates (H1). In Study 2 we examined the hypothesized mediators (H2a, H2b) in a serial mediation model. In Studies 3–5, we experimentally manipulated these

mediators to examine their causal effects within the model. In Study 6, we examined the advice framing effect on a different dependent variable—advice/opinions purchasing. The data and code for this manuscript, as well as the preregistrations are publicly accessible at: https://osf.io/thd2r/?view_only=f2bd377c2ea84fb29cf9b1eb8eec45b2.

2. Study 1

Study 1 aimed at testing H1, specifically whether people will place more weight on information framed as advice (vs. opinion). To this end, we used a Judge-Advisor-System (JAS) with age estimation questions. Participants first answered a series of age estimation questions and then were presented with others' estimates that were labeled either as another participant's advice or answer. We expected participants to adjust their final answers more in the direction of estimates that were framed as *advice* (vs. opinions). This experiment was preregistered (see Appendix A).

2.1. Method

2.1.1. Participants

We recruited 398 Prolific workers (244 female; $M_{age} = 27.34$, $SD_{age} = 9.16$) who participated in the experiment in exchange for payment. The collected sample provided 80% power to detect an effect size of $d = 0.25$ in a one-tailed independent t-test, given $p = .05$ (G*Power calculator; Faul et al., 2007).

2.1.2. Procedure and design

After consenting to participate, participants were informed that they would perform an Age Estimation Task (AET) with another (alleged) participant (Rader et al., 2015). Then, a notice saying, "Please wait while we connect you with another participant," and the word "searching" appeared on the screen for 20 s. This notice was intended to create the impression that participants would receive estimates from an actual participant. Next, participants completed the first phase of the AET. Specifically, they were presented with 24 photos of faces of people (12 male and 12 female) and were asked to estimate their ages. Before the second phase of the task, participants were informed that they would be shown the same faces again along with their own estimates and the estimates of another participant and would have an opportunity to revise their initial answers if they wished to do so. Participants were randomly assigned to one of two conditions. In the control condition, the instructions described the alleged participant's estimates as "answers" whereas in the advice condition they were referred to as "advice." Moreover, in each trial, the alleged participant's estimates were labeled either as "answers" or "advice" (see Table 1). The estimates attributed to the other participant were the same across conditions and participants, and were in fact the true ages of the people in the photos. To motivate participants to provide their best answers, they were informed that if their final responses were among the top 10% in accuracy, they would receive a bonus of $2.

2.2. Results and discussion

2.2.1. Weight of advice

To assess the weight placed on the other participant's estimates, we used the Weight of Advice (WOA) index proposed by Harvey and Fischer (1997). The WOA is defined as:

$$\frac{\text{final estimate} - \text{initial estimate}}{\text{advice} - \text{initial estimate}}$$

The value of the formula represents the weight a judge places on advice when making her final estimate. We followed the common procedure to truncate WOA scores at 1 (e.g., Gino et al., 2009; Gino & Moore, 2007; Soll & Larrick, 2009).

Table 1
Sample Question and General Procedure (Study 1).

Phase 1: Connecting with another Prolific user
  "You have successfully been connected with another Prolific user: Alex"
Phase 2: Instructions for Part 1
  In this part, you will be presented with a series of 24 images of people of various ages. Your task will be to guess the age of the person in the photo.
  At this stage, you will answer the questions on your own.
  Series of 24 questions:
  An example for a question[1]:

  "How old do you think the person in the image is?"____
Phase 3: Instructions for Part 2
  Condition 1 (control):
  *In this part of the task, you will get a chance to **see the answers of Alex** (the other Prolific user) on the questions that appeared in Part 1. For each question, you will be presented with your initial answer and the **answer** Alex gave.*
  Condition 2 (advice):
  *In this part of the task, you will get a chance to **receive the advice given by Alex to you** (the other Prolific user) on the questions that appeared in Part 1. For each question, you will be presented with your initial answer and the **advice** Alex gave you.*
  Both conditions:
  You will be allowed to revise your initial answers.
  Note: If your final answers are among the most accurate participants (top 10 %), you will be paid a bonus of $2.
  Series of 24 questions:
  An example for a question:

  "How old do you think the person in the image is?"
  An example for a participant answer:
  - Your initial answer: 30
  - Alex's answer (advice): 36
  - Your final answer:___
Phase 4: Demographic questions

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[1] As per the journal's ethical guidelines and the editorial office request the actual facial images used in the experiment have been blacked out.

An independent *t*-test showed that participants utilized other person's estimates to a greater extent when they were labeled as *advice* (M = 0.42, SD = 0.17) than when they were labeled as *answers* (M = 0.38, SD = 0.18), $t(396) = 2.59$, $p = .012$, 95% CI [0.01, 0.08], $d = 0.25$ (for the distribution of WOAs, see Fig. 1). These results lend initial support to H1, showing that judges place more weight on others' estimates framed (vs. not) as advice. Interestingly, the mere framing of others' estimates as advice reduces egocentric discounting by 38% (from 12% to 8% below the 50% ego-neutral point).

3. Study 2

The primary goal of Study 2 was to test the mechanism of the advice framing effect. Specifically, we hypothesized that one of the reasons that participants assign greater weight to advice is that they perceive the advisor to be more willing to help them than another participant who merely expresses their opinion (H2a), and as a result trust the advisor more (H2b). To test these hypotheses, we measured the perceived source's intention to help the judge and its trustworthiness. In addition, we wanted to extend the advice framing effect to a different type of judgments—general knowledge questions, which have been frequently used in the literature (Yaniv & Kleinberger, 2000). Also, in this study we aimed to improve the internal, construct and external validity of the paradigm (see the details below). This experiment was preregistered (Appendix A).

3.1. Method

3.1.1. Participants

We recruited 542 Prolific workers (345 female; $M_{age} = 36.24$, $SD_{age} = 11.91$) who participated in the experiment in exchange for payment. This sample size was determined by a Monte Carlo Power Analysis for indirect effects size (Schoemann et al., 2017; https://schoemanna.shinyapps.io/mc_power_med/). The power analysis was conducted based on a serial mediation model using previous data addressing the same effect, given $p = .05$ and 90% power.

3.1.2. Procedure and design

This study was the same as Study 1, except for two major differences: First, instead of the age estimation task, we used a general knowledge task, in which participants estimated the dates of 12 historical events (see Appendix B; Gino, 2008; Yaniv & Kleinberger, 2000). Second, immediately after the instructions of Part 2 (and before the general knowledge questions), we measured the two hypothesized mediators: perceived source's intention to help the judge and its trustworthiness. To this end, we adapted items from established scales of perceived benevolence, and trust (Dong et al., 2019; Mayer & Davis, 1999). Specifically, perceived source's intention to help the judge was measured by the following items: (1) "Jamie cares for your interest," (2) "Jamie is concerned with your welfare." Perceived trustworthiness was measured by the following items: (1) "Jamie can be trusted," (2) "Jamie can be counted on." Participants rated the extent to which they agreed with each statement about Jamie (the person whose opinions [advice] they were about to see) on a scale from 1 (strongly disagree) to 7 (strongly agree).
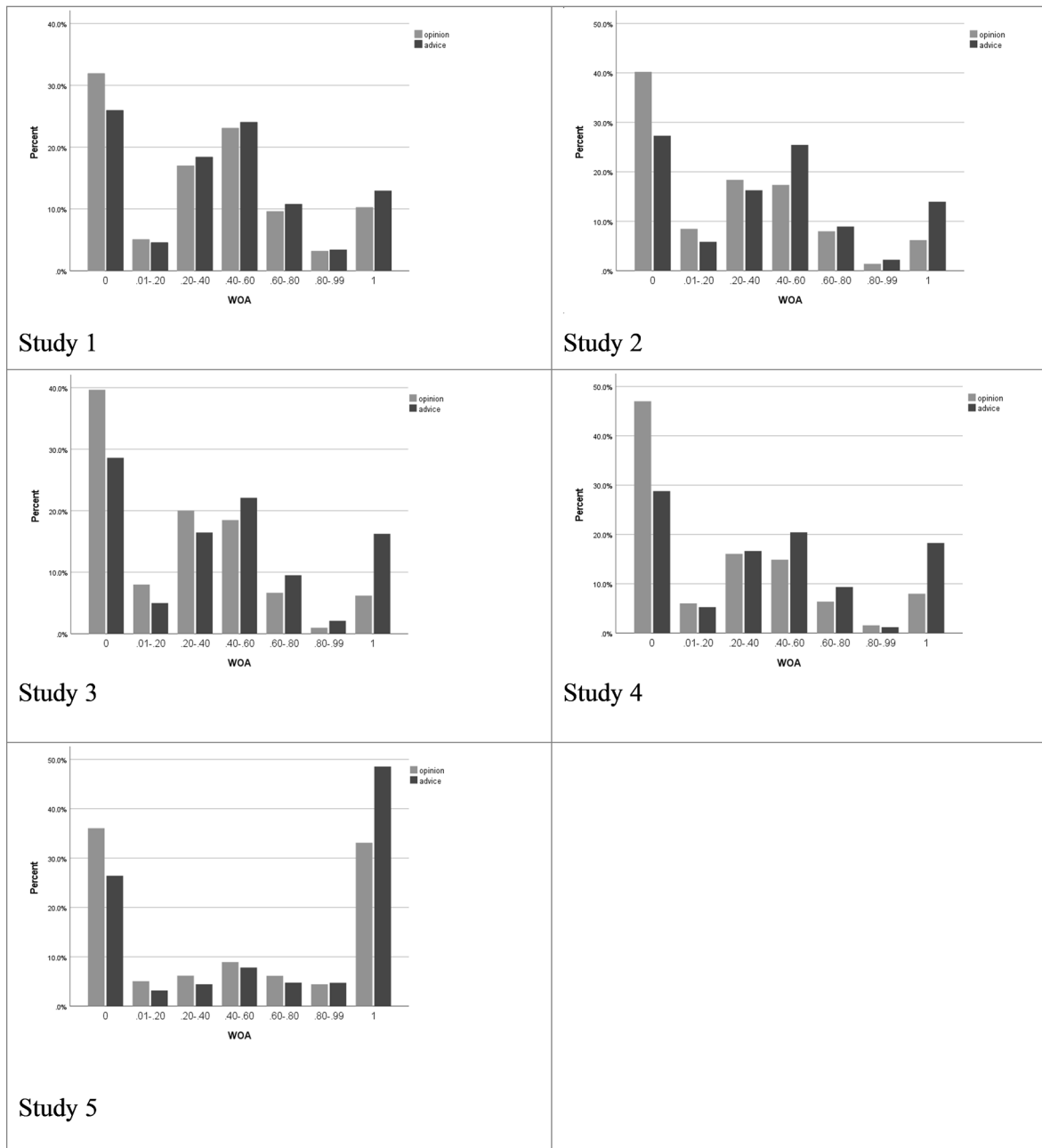
Fig. 1. Distributions of WOA by advice framing (Studies 1–5).

To enhance the validity of the framing effect, we implemented several technical modifications to the paradigm. First, to increase the internal validity, we strengthened the advice framing manipulation by using the label "advisor" when referring to the person who gave advice—a well-established procedure in JAS research (Gino et al., 2012; Sniezek & Buckley, 1995; Sniezek & van Swol, 2001; van Swol & Sniezek, 2005). Second, to bolster the construct validity of our framing manipulation, we labeled the estimates given by another participant in the opinion condition as "opinions" instead of "answers." Third, to boost the external validity of the study, we presented participants with ecological advice/opinions. To this end advice/opinions were randomly sampled from a pool of 100 actual initial estimates (Yaniv & Kleinberger, 2000) given by participants in our previous study. Finally, to ensure participants did not search for answers online, we took several precautions. These included adding dummy questions with answers available only online and incorporating a non-consequential confession

debriefing question.

3.2. Results

3.2.1. Weight of advice

First, to assess the advice framing effect, we conducted an independent *t*-test comparing the weight judges placed on advice versus opinions. Replicating Study 1, results showed that judges placed more weight on another person's estimates when they were framed as *advice* ($M = 0.62$, $SD = 0.27$) than when they were framed as *opinions* ($M = 0.48$, $SD = 0.27$), $t(540) = 5.89$, $p < .001$, 95% CI [0.09, 0.18], $d = 0.51$ (for the distribution of WOAs, see Fig. 1). These results further support H1. Interestingly, egocentric discounting was observed only in the opinion condition (2% below the 50% ego-neutral point), whereas participants in the advice condition placed more weight on advice than on their own initial estimates (12% above the 50% ego-neutral point).

3.2.2. Mediation analyses

To explore the process of the advice framing effect on WOA, we ran a preregistered serial mediation model with advice framing as an independent variable (0 – opinion, 1 – advice), perceived source's intention to help the judge (*Cronbach's* $\alpha = 0.94$) and trustworthiness ($\alpha = 0.97$) as mediators and WOA (unstandardized) as a dependent variable (model 6 in PROCESS, 20,000 bootstrapped samples; Hayes, 2018). The total effect of framing on WOA was significant, $b = 0.136$, $SE = 0.02$, $t = 5.89$, p <.001, 95% *CI* [0.09, 0.18]. The preregistered serial indirect effect was also significant, $b = 0.021$, $SE = 0.01$, $t = 2.58$, $p = .01$, 95% *CI* [0.01, 0.04]. This finding is consistent with our theoretical model according to which the effect of advice framing on WOA is mediated by perceived source's intention to help the judge and then by its perceived trustworthiness (see Fig. 2). In addition, the indirect effect of framing on WOA through helping intentions only was not significant, $b = 0.016$, $SE = 0.01$, $t = 1.36$, $p = .174$, 95% *CI* [-0.01, 0.04]. The indirect effect through trustworthiness only was in the opposite direction, $b = -0.006$, $SE = 0.004$, $t = -1.58$, $p = .115$, 95% *CI* [-0.01, -0.0001], possibly suggesting that advice lacking helping intentions may be manipulative and thereby less trustworthy than an opinion. The direct effect of framing on WOA was significant, $b = 0.104$, $SE = 0.02$, $t = 4.38$, $p < .001$, 95% *CI* [0.06, 0.15] (see Tables 2 & 3).

We also conducted the same analysis when reversing the order of the two mediators (perceived trustworthiness as M1 and perceived helping intentions as M2). The results showed that in this case the serial indirect effect was not significant, $b = 0.01$, $SE = 0.004$, $t = 1.40$, $p = .16$, 95% *CI* [-0.002, 0.02]. Taken together, the results support H2a and H2b.

3.2.3. Accuracy

Since we used ecological advice/opinions in this study, it was interesting to analyze the improvement of the accuracy of final versus initial estimates. The literature suggests that using ecological advice (opinions) improves the accuracy of final estimates (e.g., Yaniv & Kleinberger, 2000). Thus, one could expect that assigning greater weight to estimates framed as advice (vs. opinions) would result in greater improvement. Yet, this effect is likely to occur in relatively rare circumstances, when advice/opinions and the initial estimates are positioned on opposite sides of the truth (i.e., "bracketing"), and judges employ an averaging rather than choosing strategy (Soll & Larrick, 2009).

We conducted the analyses of accuracy on the mean absolute differences of judges' estimates from the correct answers. Specifically, we ran an ANOVA with repeated measures on the timing of estimates (initial vs. final) and framing (advice vs. opinion) as a between participants' factor. This analysis showed a significant main effect of timing, indicating that across framing conditions final estimates were more accurate ($M = 46.70$, $SD = 16.31$) than the initial ones ($M = 59.31$, $SD = 20.50$), $F(1, 540) = 298.14$, $p < .001$, *partial* $\eta^2 = 0.36$. The main effect of framing condition was not significant ($M_{advice} = 53.34$, $SD_{advice} = 18.06$ vs. $M_{opinion} = 52.67$, $SD_{opinion} = 18.76$), $F(1, 540) = 0.22$, $p =.637$, *partial* $\eta^2 = 0.004$. Also, the interaction effect was not significant ($M_{advice\_initial} = 59.79$, $SD_{advice\_initial} = 20.08$ vs. $M_{advice\_final} = 46.89$, $SD_{advice\_final} = 16.03$; $M_{opinion\_initial} = 58.84$, $SD_{opinion\_initial} = 20.92$, $M_{opinion\_final} = 46.50$, $SD_{opinion\_final} = 16.60$), $F(1, 540) = 0.14$, $p = .71$, *partial* $\eta^2 < 0.01$. As aforementioned, the lack of effect of advice framing on accuracy improvement may stem from the fact that a relatively small share (26%) of the advice framing effect on WOA originated from the trials where an averaging strategy was employed (see Fig. 1). Moreover, only in half of all trials advice/opinions and initial opinions bracketed the truth. For a detailed analysis of accuracy improvement according to advice/opinion position see Appendix C.

3.3. Discussion

The results of Study 2 provide evidence for the hypothesized mediating roles of perceived source's intention to help the judge (H2a) and

then its perceived trustworthiness (H2b) in the advice framing effect. Specifically, the serial mediation effect suggests that participants perceive advisors as being more benevolent than other people who merely express their opinions, which in turn increases participants' trust in the advisors and leads them to place greater weight on their advice. These results lend initial support for our theoretical model by showing the process by which advice framing affects WOA. It is important to acknowledge that benevolence and trust are related concepts that are likely mutually reinforce each other within a cognitive activation system (Mayer et al., 1995), as also shown by their correlation (see Table 2). Therefore, even though our data did not support alternative indirect paths encompassing these mediators, they should not be dismissed outright. Note that the supported indirect effect does not necessarily imply the causal relationship between the mediators and WOA (Fiedler et al., 2018; Pirlott & MacKinnon, 2016).

In addition, the results extend the advice framing effect from perceptual tasks to general knowledge tasks. Moreover, enhancing the construct validity of the advice framing manipulation, the effect held when others' estimates were labeled as "opinions" (rather than "answers"). In addition, increasing the external validity of the advice framing effect, the effect held for ecological advice as well. Finally, accuracy analyses (see Appendix C) show that framing others' estimates as advice (vs. opinions) enhances the improvement in judgments' accuracy when those estimates are relatively good. However, when others' estimates are relatively inaccurate, framing others' estimates as advice (vs. opinions) exacerbates the drop in the accuracy of final judgments (Fig. C2).

4. Study 3

The primary goal of Study 3 was to further examine the source's perceived intention to help the judge as an underlying mechanism of the advice framing effect (H2a). Specifically, we manipulated advice framing and the source's perceived intention to help the judge (no helping intentions vs. control) in a concurrent double randomization design to examine the causal effects of the source's perceived intention to help the judge on WOA, and on the effect of framing on WOA (Pirlott & MacKinnon, 2016). We predicted that informing participants that the source of advice/opinions has no intention to help them would reduce WOA as well as the effect of advice framing on WOA. This experiment was preregistered (see Appendix A).

4.1. Method

4.1.1. Participants

We recruited 568 Prolific Academic workers (364 male; $M_{age} = 41.90$, $SD_{age} = 14.32$) who participated in the experiment in exchange for payment. A pilot study ($N = 82$) showed that the advice framing effect had an effect size of $d = 0.49$. Hence, we collected a sample that provided 80% power to detect an effect size of $d = 0.42$ (according to a more conservative estimation) in a one-tailed interaction contrast, given $p = .05$ (G*Power calculator; Faul et al., 2007).

4.1.2. Procedure and design

This study was the same as Study 1, except for the following differences: First, we manipulated the source's intentions to help the judge, yielding a 2 × 2 framing (opinion vs. advice) × helping intentions (no vs. control) between-participant design. In the *no helping intentions* condition, participants were presented with the following statement "Please note that Alex has absolutely no intention of helping you whatsoever." In the control condition, this statement was not presented. Second, at the end of Part 2 of the age estimation task, to gauge the effectiveness of this manipulation we asked participants to rate the extent to which the advisor / another participant tried to help them in the task on a scale from 1 (*not at all*) to 7 (*very much*). Third, we retained the paradigm improvements from Study 2 (labeled the other person's estimates as
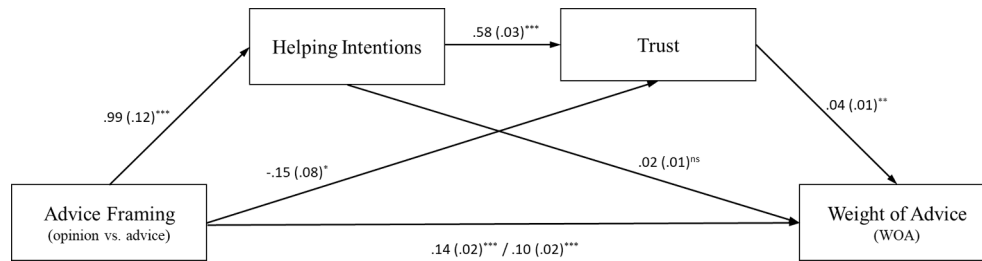
Fig. 2. Study 2: The effect of advice framing on WOA mediated by perceived source's helping intentions and trustworthiness. Coefficients unstandardized and SEs in parentheses. *p <.05, **p <.01, ***p <.001**.

Table 2
Correlations and Descriptive Statistics (Study 2).

Variables	*M* (*SD*)	Advice Framing	Helping Intentions	Trust	WOA
Advice Framing		NA	0.33*	0.18*	0.25*
Helping Intentions	3.87 (1.51)		NA	0.71*	0.26*
Trust	4.35 (1.19)			NA	0.26*
WOA	0.55 (0.28)				NA

Notes. N = 542. Helping Intentions = perceived source's intention to help the judge; Trust = perceived source's trustworthiness; WOA = weight of advice.
* *p* <.001.

Table 3
Indirect Effects of Advice Framing on WOA (Study 2).

Indirect Effect	*b*	*SE*	*t*	*p*	*95% CI*
1. Framing → Helping Intentions → WOA	0.016	0.01	1.36	0.174	−0.01, 0.04
2. Framing → Trust → WOA	−0.006	0.004	−1.58	0.115	−0.01, −0.0001
3. Framing → Helping Intentions → Trust → WOA	0.021	0.01	2.58	0.010	0.01, 0.04

Notes. N = 542. Helping Intentions = perceived source's intention to help the judge; Trust = perceived source's trustworthiness; WOA = weight of advice.

"opinions" and "advice", referred to him/her as "advisor", employed ecological advice/opinions, and tied a bonus of 10 pennies to each correct final answer). Finally, in the debriefing stage, we asked participants to explain the objective of the Age Estimation Task and to guess the experimental hypotheses.

4.2. Results

4.2.1. Manipulation check

An independent *t*-test showed that participants in the *control condition* rated the advisor / another participant as having a stronger intention to help them (*M* = 4.52, *SD* = 1.46) than in the *no helping intentions condition* (*M* = 2.35, *SD* = 1.58), $t(566) = 17.12, p <.001$, 95% CI [1.93 to 2.43], *d* = 1.44. Thus, the manipulation of helping intentions was effective.

To verify that participants understood their objective in the task as intended and had no sense that the task represented competitive or cooperative activity, we analyzed their answers to the task objective question. The results showed that the vast majority of participants (94.7 %) reported their objective in Part 2 in line with the instructions (e.g., to get the right answer, to reconsider the initial estimate, or to compare the initial estimates to the advice / other's opinions).

One could argue that the advice framing effect occurred because participants wanted to help the experimenters to confirm their hypothesis (a demand effect). However, an analysis of the second debriefing question regarding the possible experimental hypotheses showed that no participant mentioned the actual experimental hypothesis. Moreover, in the first debriefing question, only three participants (of 568) mentioned using advice as their task objective.

4.2.2. Weight of advice

First, we conducted an independent *t*-test comparing the weight participants placed on advice versus opinions in the control condition. Replicating Studies 1–2, results showed that participants placed more weight on another person's estimates when they were framed as *advice* (*M* = 0.41, *SD* = 0.19) than as *opinions* (*M* = 0.26, *SD* = 0.13), $t(282) = 7.73, p < .001$, 95% CI [0.11, 0.19], *d* = 0.92 (for the distribution of WOAs see Fig. 1). These results lend additional support to H1. Notably, framing others' estimates as advice reduced egocentric discounting by 64% (from 24% to 9% below the 50% ego-neutral point).

An ANOVA with advice framing (advice vs. opinion) and advisor's helping intentions (control vs. no) as between-participant factors was conducted on participants' average WOA. Replicating the advice framing effect found in Studies 1–2 and further supporting H1, this analysis showed a significant main effect of advice framing, $F(1, 564) = 54.71, p < .001$, *partial* $\eta^2 = 0.09$, indicating that participants utilized another participant's estimates to a greater extent when they were framed as advice (*M* = 0.34, *SD* = 0.20) than when they were framed as opinions (*M* = 0.24, *SD* = 0.14). Also, in line with our reasoning, the main effect of helping intentions was significant, $F(1, 564) = 43.58, p < .001$, *partial* $\eta^2 = 0.07$, indicating that participants utilized another participant's estimates to a greater extent in the *control* (*M* = 0.34, *SD* = 0.18) than in the *no helping intentions condition* (*M* = 0.25, *SD* = 0.17). This result supports the causal effect of the perceived source's intention to help the judge (the first mediator in our model) on WOA (the DV).

The interaction effect was also significant, $F(1, 564) = 11.05, p < .001$, *partial* $\eta^2 = 0.02$, showing that the framing effect was reduced almost by two thirds in the *no helping intentions condition* ($M_{advice} = 0.28$, $SD_{advice} = 0.19$ vs. $M_{opinion} = 0.22$, $SD_{opinion} = 0.15$, *d* = 0.34) compared
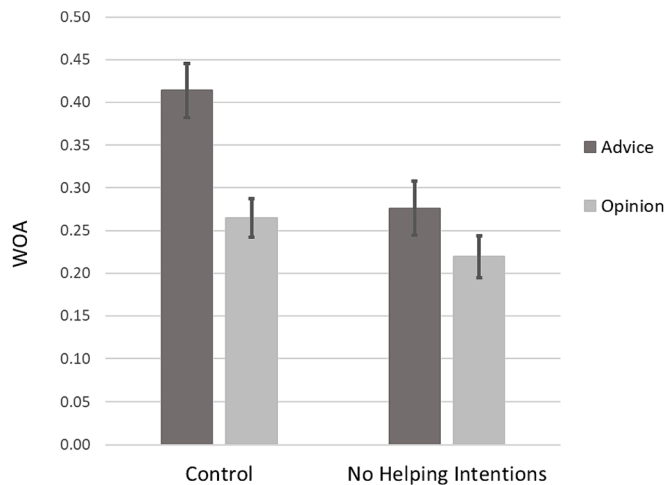
Fig. 3. Study 3: The effect of advice framing on WOA moderated by source's helping intentions. Whiskers show +/- 2SEs.

to the *control condition* ($M_{advice} = 0.41$, $SD_{advice} = 0.19$ vs. $M_{opinion} = 0.26$, $SD_{opinion} = 0.13$, $d = 0.92$) (see Fig. 3). This result shows that perceived source's intention to help the judge moderates the effect of framing on WOA. This finding supports H2a.

Analyses of simple effects showed significant effects of advice framing both in the *control*, $t(564) = 7.58$, $p < .001$, 95% CI [0.06 to 0.09] and the *no helping intentions* conditions, $t(564) = 2.88$, $p = .004$, 95% CI [0.01 to 0.05]. The simple effects of helping intentions were significant both in the *advice*, $t(564) = 6.99$, $p < .001$, 95% CI [0.05 to 0.09] and the *opinion* conditions, $t(564) = 2.33$, $p = .022$, CI [0.01 to 0.04].

Since previous literature found that the proximity of advice to initial estimates may influence WOA (e.g., Hütter & Ache, 2016; Liberman et al., 2012; Schultze et al., 2015), as a robustness check, we examined whether this factor moderated the advice framing effect. To this end, we ran a Multilevel Linear Model on WOA with framing (-0.5 - opinion vs. 0.5 - advice) and absolute advice-initial estimate distance (grand mean centered) as fixed factors, and a subject's intercept as a random factor in the *control* condition. This analysis showed the reported above significant main effect of advice framing, $b = 0.15$, $SE = 0.02$, $t(286) = 7.89$, $p < .001$. The main effect of advice distance was not significant, $b = 0.01$, $SE = 0.01$, $t(6288) = 0.07$, $p = .944$. The interaction effect was significant, $b = -0.01$, $SE = 0.01$, $t(6288) = -5.85$, $p < .001$, indicating that the advice framing decreased for more distant advice/opinions.[1] To understand this interaction, we probed the advice framing effect on one SD below and above the mean. Importantly, the advice framing effect was significant in the predicted direction both for relatively proximate advice/opinions, $b = 0.25$, $SE = 0.03$, $t(827) = 9.68$, $p < .001$, and distant advice/opinions, $b = 0.17$, $SE = 0.02$, $t(315) = 8.81$, $p < .001$.

4.2.3. Accuracy

We conducted the analyses of accuracy only for the control condition. Specifically, we ran an ANOVA with repeated measures on the timing of estimates (initial vs. final) and framing (advice vs. opinion) as a between participants' factor. This analysis showed a significant main effect of timing, indicating that across framing conditions final estimates were more accurate ($M = 5.17$, $SD = 1.14$) than the initial ones ($M = 6.11$, $SD = 1.40$), $F(1, 282) = 307.96$, $p < .001$, partial $\eta^2 = 0.52$. The main effect of framing condition was not significant ($M_{advice} = 5.55$, $SD_{advice} = 1.28$ vs. $M_{opinion} = 5.73$, $SD_{opinion} = 1.40$), $F(1, 282) = 1.46$, $p = .23$, partial $\eta^2 = 0.005$. Also, the interaction effect was not significant

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[1] This interaction also held when the accuracy of both initial answers and advice/opinions was kept constant.

($M_{advice\_initial} = 6.01$, $SD_{advice\_initial} = 1.39$ vs. $M_{advice\_final} = 5.10$, $SD_{advice\_final} = 1.15$; $M_{opinion\_initial} = 6.20$, $SD_{opinion\_initial} = 1.41$ vs. $M_{opinion\_final} = 5.25$, $SD_{opinion\_final} = 1.14$), $F(1, 282) = 0.13$, $p = .72$, partial $\eta^2 < 0.001$. In line with the previous study, a relatively small share (33%) of the advice framing effect originated from the trials where an averaging strategy was employed (see Fig. 1), and bracketing was observed only in half of all trials. For a detailed analysis of accuracy improvement see Appendix D.

4.3. Discussion

This study replicates the advice framing effect found in Studies 1–2 (H1). Furthermore, the results also show that the source's perceived intention to help the judge increases the weight that judges place on the other person's estimates. This finding corroborates the causal effect of the source's intention to help the judge on WOA. Moreover, when judges know that the source has no intention to help them, the advice framing effect substantially diminishes. Taken together, these findings support the argument that an intention to help the judge attributed to the source constitutes a causal link in the mechanism of the advice framing effect (H2a).

Also, strengthening the internal validity of the advice framing effect, analyses of the debriefing questions showed that the vast majority of participants understood their task objective properly, yet none of them guessed the experimental hypotheses. Moreover, the effect was robust across both proximate and distant advice/opinions. Finally, as in Study 2, the accuracy analyses (Appendix D) show that advice framing enhances the improvement in judgments' accuracy, when others' estimates are good, and exacerbates the drop in accuracy, when others' estimates are poor (Fig. D1, Appendix D).

5. Study 4

The primary goal of Study 4 was to further examine the source's perceived trustworthiness as an underlying mechanism of the advice framing effect (H2b). Specifically, we manipulated advice framing and the source's perceived trustworthiness in a concurrent double randomization design to examine the causal effects of the source's perceived trustworthiness on WOA, and on the effect of framing on WOA (Pirlott & MacKinnon, 2016). We predicted that the effect of advice framing on WOA will be lower when trust in the source is reduced. This experiment was preregistered (see Appendix A).

5.1. Method

5.1.1. Participants

We recruited 825 Prolific Academic workers (493 female; $M_{age} = 41.14$, $SD_{age} = 11.89$) who participated in the experiment in exchange for payment. The collected sample provided 80% power to detect an effect size of $d = 0.36$ (based on previous data) in a 2 × 2 two-tailed interaction, given $p = .05$ (power simulations calculator for interactions in 2 × 2 between-subjects factorial designs; White, 2018).

5.1.2. Procedure and design

This study was the same as Study 3, except for the following differences. First, instead of the source's intention to help the judge, we manipulated the source's trustworthiness, yielding a 2 × 2 framing (opinion vs. advice) × the source's trustworthiness (low vs. control) between-participant design. In the low trustworthiness condition, participants were presented with the following statement "Here is what a previous participant said about Alex: *JB: "I think Alex cannot be fully trusted!"* This statement was presented immediately after the instructions of Part 2. In the control condition, this statement was not presented. Second, to check the effectiveness of the trustworthiness manipulation, participants rated their trust in the source on a scale from 1 (not at all) to 7 (very much).

5.2. Results

5.2.1. Manipulation check

An independent *t*-test showed that participants in the control condition trusted the source more ($M = 4.23$, $SD = 1.19$) than in the low trustworthiness condition ($M = 3.84$, $SD = 1.20$), $t(823) = 4.72$, $p < .001$, 95% *CI* [0.23 to 0.56], $d = 0.33$. Thus, the manipulation of the source's trustworthiness was effective.

5.2.2. Weight of advice

First, to assess the advice framing effect, we conducted an independent *t*-test comparing the weight participants placed on advice versus opinions in the control condition. Replicating Studies 1–3, results showed that participants placed more weight on another person's estimates when they were framed as *advice* ($M = 0.42$, $SD = 0.18$) than as *opinions* ($M = 0.29$, $SD = 0.15$), $t(411) = 8.22$, $p < .001$, 95% *CI* [0.10, 0.17], $d = 0.81$ (for the distribution of WOAs, see Fig. 1). These results further support H1. Notably, framing others' estimates as advice reduced egocentric discounting by 62% (from 21% to 8% below the 50% ego-neutral point).

An ANOVA with advice framing (advice vs. opinion) and the source's trustworthiness (low vs. control) as between-participant factors was conducted on participants' average WOA. Replicating previous studies and further supporting H1, this analysis showed a significant main effect of advice framing, $F(1, 821) = 84.79$, $p < .001$, *partial* $\eta^2 = 0.09$, indicating that participants utilized another participant's estimates to a larger extent when they were presented as advice ($M = 0.37$, $SD = 0.19$) than when they were presented as opinions ($M = 0.26$, $SD = 0.15$). The main effect of the source's trustworthiness was also significant, $F(1, 821) = 30.74$, $p < .001$, *partial* $\eta^2 = 0.04$, indicating that participants utilized another participant's estimates to a greater extent in the control condition ($M = 0.35$, $SD = 0.18$) than in the low trustworthiness condition ($M = 0.29$, $SD = 0.18$). This effect supports the causal effect of the perceived source's trustworthiness (the second mediator in our model) on WOA (the DV).

The interaction was also significant, $F(1, 821) = 4.06$, $p = .044$, *partial* $\eta^2 = 0.01$, indicating that the framing effect was reduced almost by a third in the low trustworthiness condition ($M_{advice} = 0.33$, $SD_{advice} = 0.20$ vs. $M_{opinion} = 0.24$, $SD_{opinion} = 0.16$, $d = 0.49$) compared to the control condition ($M_{advice} = 0.42$, $SD_{advice} = 0.18$ vs. $M_{opinion} = 0.29$, $SD_{opinion} = 0.15$, $d = 0.81$) (Fig. 4). This result shows that the source's perceived trustworthiness moderates the effect of advice framing on WOA. This finding supports H2b.

Analyses of simple effects showed significant effects of advice framing both in the *control*, $t(821) = 7.94$, $p < .001$, 95% *CI* [0.05 to

0.08] and the *low trustworthiness* conditions, $t(821) = 5.08$, $p < .001$, 95% *CI* [0.03 to 0.06]. The simple effects of the source's trustworthiness were significant both in the *advice*, $t(821) = 5.34$, $p < .001$, 95% *CI* [0.03 to 0.06] and the *opinion* conditions, $t(821) = 2.50$, $p = .013$, 95% *CI* [0.01 to 0.04].

5.2.3. Accuracy

The analyses of accuracy were conducted only for the control condition. Specifically, we ran an ANOVA with repeated measures on the timing of estimates (initial vs. final) and framing (advice vs. opinion) as a between participants' factor. This analysis showed a significant main effect of timing, indicating that across framing conditions final estimates were more accurate ($M = 5.19$, $SD = 1.12$) than the initial ones ($M = 6.19$, $SD = 1.42$), $F(1, 411) = 511.02$, $p < .001$, *partial* $\eta^2 = 0.55$. The main effect of framing condition was not significant ($M_{advice} = 5.79$, $SD_{advice} = 1.31$ vs. $M_{opinion} = 5.60$, $SD_{opinion} = 1.23$), $F(1, 411) = 2.48$, $p = .116$, *partial* $\eta^2 = 0.006$. Also, the interaction effect was not significant ($M_{advice\_initial} = 6.32$, $SD_{advice\_initial} = 1.48$ vs. $M_{advice\_final} = 5.25$, $SD_{advice\_final} = 1.13$; $M_{opinion\_initial} = 6.07$, $SD_{opinion\_initial} = 1.34$ vs. $M_{opinion\_final} = 5.12$, $SD_{opinion\_final} = 1.11$), $F(1, 411) = 1.78$, $p = .184$, *partial* $\eta^2 = 0.004$. In line with the previous studies, a relatively small share (42%) of the advice framing effect originated from the trials where an averaging strategy was employed (see Fig. 1), and bracketing was observed only in 40% of all trials. For a detailed analysis of accuracy improvement see Appendix E.

5.3. Discussion

This study replicates the advice framing effect found in Studies 1–3 (H1). Furthermore, the results show that the source's perceived trustworthiness increases the weight that judges place on the source's estimates. This finding corroborates the causal effect of the source's trustworthiness on WOA. Moreover, when judges distrust the source, the framing effect substantially diminishes. Taken together, these findings support the argument that trustworthiness attributed to the source constitutes a link in the mechanism of the advice framing effect (H2b). Also, Study 4 provides further support for the enhancing effect of advice framing on accuracy improvement for good estimates of others and accuracy reduction for the poor estimates (see Appendix E).

6. Study 5

Study 5 pursued several objectives. First, we aimed to test the two links of the proposed mechanism of the advice framing effect (H2a and H2b), namely, perceived source's intention to help the judge and its trustworthiness, in one experimental design. Second, we wanted to drill down into the effect of the perceived source's intention to help the judge. This construct involves two components: (1) the nature of the intention (i.e., to help) and (2) its orientation (i.e., toward the advisee; MacGeorge & van Swol, 2018). In the present study we focused on the role of the second component. Specifically, we examined whether the advice framing effect would decrease when advice/opinions are not directed at the judge.

Third, we wanted to shed light on why the source of advice is perceived as more trustworthy than the source of opinions. According to Mayer and colleagues (1995), a trustee's benevolence (i.e., good intentions towards the trustor) is inversely related to the trustee's motivation to deceive the trustor. In the present study, we examined this process as a mechanism of the advice framing effect. Namely, judges may rely on advice more than on opinions because they perceive their source as more benevolent and therefore are less concerned with its potential deceptiveness. If this is indeed the case, then presenting the source of advice as potentially deceptive should mitigate the influence of the source's intention to help the judge.

Lastly, our objective was to enhance the ecological validity of the manipulations concerning the perceived intention of the source to help
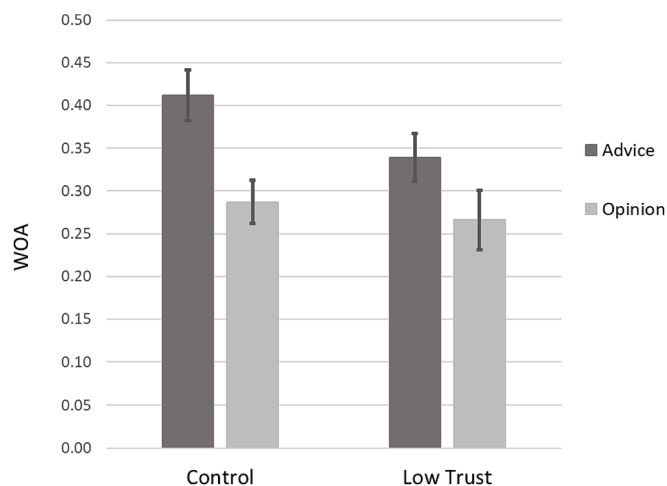
Fig. 4. Study 4: The effect of advice framing on WOA moderated by trust in the source. Whiskers show +/- 2SEs.

the judge and its trustworthiness. While Studies 3 and 4 relied on explicit statements presented to participants, such methods are less likely to take place in real-world communications, and may raise a concern of experimental demand. In contrast, the present study employed indirect situational manipulations, offering higher ecological validity and mitigating concerns about experimental demand.

Specifically, we manipulated the source's intention to help the judge by presenting it as either directed toward the judge or to someone else. To manipulate the source's trustworthiness, we attached a facial image to the source of advice/opinions and varied the shape of their eyes by depicting them as either round or narrow. According to previous studies, people with narrow eyes are perceived as less trustworthy (i.e., more potentially deceptive) than people with round eyes (Schul et al., 2004; Zebrowitz, 1997).

Based on our theoretical model, we predicted a specific pattern of a 3-way interaction: that the framing effect will be reduced when the advice/opinions are not intended to help the judge, and/or the source of advice/opinions is perceived as relatively untrustworthy (H2a and H2b). Moreover, we predicted a 2-way framing × intentions interaction, indicating a decrease in the advice framing effect when the advice/opinions are not intended to help the judge, when the source of advice/opinions is trustworthy. Similarly, we predicted a 2-way framing × source's trustworthiness interaction indicating a decrease in the advice framing effect when the source of advice/opinions is less trustworthy, when advice (opinions) are directed to the judge. These predictions were preregistered (see Appendix A).

6.1. Method

6.1.1. Participants

We recruited 800 Prolific Academic workers (469 male; $M_{age} = 40.63$, $SD_{age} = 12.96$) who participated in the experiment in exchange for payment. The collected sample provided 80% power to detect an effect size of $d = 0.35$ in a one-tailed three-way interaction contrast in a mixed design, given $p = .05$ (G*Power calculator; Faul et al., 2007).

6.1.2. Procedure and design

This study was the same as Study 4, except for the following changes. First, we added a manipulation of the source's intention to help the judge. Specifically, in the instructions of Part 2, we informed participants that they would be shown either "Taylor's advice (opinion)" or "Taylor's advice (opinion), communicated to another responder in a previous study". The latter statement was presented to make the source's intentions less relevant to the judge (as it was provided to someone else in another study), while retaining their general helping nature.

We ran a pretest ($N = 147$) to check this manipulation. Part 1 of this study was identical to Study 4. In the instructions of Part 2, after the manipulation of advice framing and the above-mentioned manipulation of the source's intention to help the judge, we measured the perceived intention of the source to help the judge by two items: (1) Taylor cares for my interest, and (2) Taylor is concerned with my welfare (1 - strongly disagree, 7 - strongly agree), yielding the following design: framing (advice vs. opinion) × the source's intention to help the judge (yes vs. no). To check the effectiveness of the manipulation of the source's intention to help the judge we ran an ANOVA with the advice framing and the source's intention to help the judge as between participants' factors on the average of the two items described above (*Cronbach's α* = 0.90). Importantly, the main effect of the source's intention to help the judge was significant, $F(1, 143) = 5.05$, $p = .026$, indicating that participants perceived the source as more intending to help them when the advice/opinions were directed to them ($M = 3.79, SD = 1.47$) than when they were not ($M = 3.27, SD = 1.40$). Expectedly, the main effect of framing was also significant, $F(1, 143) = 6.43$, $p = .012$, indicating that participants perceived the source of *advice* as more intending to help them ($M = 3.82, SD = 1.31$) than the source of *opinions* ($M = 3.24, SD = 1.53$). The interaction effect was not significant, $F(1, 143) = 0.63$, $p = $

.43. Taken together, these results confirmed the effectiveness of the manipulation of the source's intention to help the judge across the levels of framing.

In addition, we changed the manipulation of the source's trustworthiness. Namely, we utilized four pretested facial images, two male and two female, that were modified to feature either round eyes (indicating trustworthiness) or narrow eyes (indicating untrustworthiness). Half of the participants first received advice/opinions from a trustworthy source for the first set of 12 questions, and then from the untrustworthy source for the second set of 12 questions. For the other half of the participants this order was reversed. The order of the source's facial images and sets of questions was counterbalanced across participants. To preclude gender effects, male participants were presented with images of male sources, whereas female—with images of female sources. The advice/opinions were attributed to two distinct sources, with the first one being referred to as "Taylor" and the second one as "Jordan".

Thus, we used a 2 × 2 × 2 framing (advice vs. opinion) × source's intention to help the judge (yes vs. no) × source's trustworthiness (low vs. high) mixed design. The first two factors were manipulated between participants and the third—within participants. To check the effectiveness of the trustworthiness manipulation, following the JAS task, participants rated the trustworthiness of the source of advice/opinions on a scale from 1 (not at all) to 7 (very much).

6.2. Results

6.2.1. Manipulation check

A paired *t*-test showed that participants in the high source trustworthiness condition trusted the source of advice/opinion more ($M = 4.57, SD = 1.13$) than in the low trustworthiness condition ($M = 4.11, SD = 1.16$), $t(799) = 12.53$, $p < .001$, 95% CI [0.39 to 0.53], $d = 0.44$. Thus, the manipulation of the source's trustworthiness was effective.

6.2.2. Weight of advice

To assess the advice framing effect, we conducted an independent *t*-test comparing the weight participants placed on advice versus opinions when advice/opinions were delivered to the judge and the source's trustworthiness was high. Replicating Studies 1–4, results showed that participants placed more weight on the source's estimates when they were framed as *advice* ($M = 0.42, SD = 0.21$) than as *opinions* ($M = 0.27, SD = 0.18$), $t(395) = 7.63$, $p < .001$, 95% CI [0.11, 0.19], $d = 0.77$ (for the distribution of WOAs, see Fig. 1). These results further support H1. Notably, framing others' estimates as advice reduced egocentric discounting by 65% (from 23% to 8% below the 50% ego-neutral point).

An ANOVA with repeated measures on the source's trustworthiness (low vs. high), and advice framing (advice vs. opinion) and the source's intention to help the judge (yes vs. no) as between-participant factors was conducted on participants' average WOA. Replicating previous studies and further supporting H1, this analysis showed a significant main effect of advice framing, $F(1, 796) = 64.59$, $p < .001$, *partial η^2* = 0.08, indicating that participants utilized another participant's estimates to a larger extent when they were framed as advice ($M = 0.36, SD = 0.21$) than as opinions ($M = 0.26, SD = 0.17$). The main effect of the source's intention to help the judge was also significant, $F(1, 796) = 18.86$, $p < .001$, *partial η^2* = 0.02, indicating that participants utilized another participant's estimates to a greater extent when they were directed to the judge ($M = 0.34, SD = 0.21$) than when they were not ($M = 0.29, SD = 0.19$). This result conceptually replicates the effect of the source's intention to help the judge on WOA found in Study 3 and provides further support for H2a. The main effect of the source's perceived trustworthiness was not significant, $F(1, 796) = 1.32$, $p = .25$, *partial η^2* = 0.002.

The 2-way framing × source's intentions interaction was significant, $F(1, 796) = 6.26$, $p = .013$, *partial η^2* = 0.01, indicating that the advice framing effect was larger when the advice/opinions were directed toward the judge ($M_{advice} = 0.41, SD_{advice} = 0.19; M_{opinion} = 0.28, SD_{opinion}$
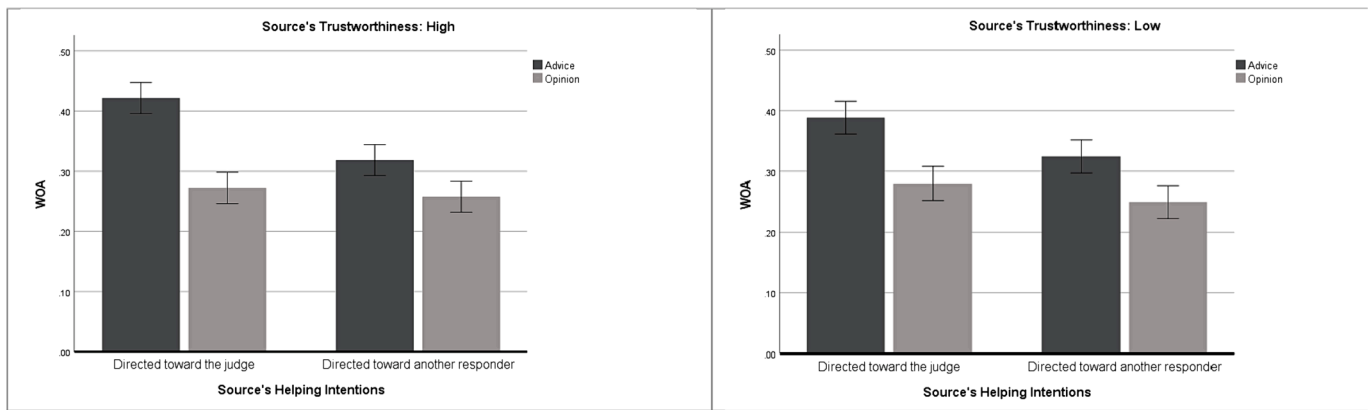
Fig. 5. Study 5: The effect of advice framing on WOA moderated by source's helping intentions and trustworthiness. Whiskers show +/- 2SEs.

$= 0.16$, $t(395) = 7.32$, $p < .001$, 95% *CI* [0.09, 0.16], $d = 0.74$) than when they were not ($M_{advice} = 0.32$, $SD_{advice} = 0.19$; $M_{opinion} = 0.25$, $SD_{opinion} = 0.15$, $t(401) = 7.32$, $p < .001$, 95% *CI* [0.03, 0.10], $d = 0.40$). The latter simple effect of advice framing in conjunction with the interaction effect suggest that both the *nature* of the intention and its *orientation* towards the judge contribute to the advice framing effect. The other 2-way interactions were not significant $p > .23$.

The preregistered 3-way interaction framing × source's intentions × source's trustworthiness was also significant, $F(1, 796) = 5.31$, $p = .022$, *partial* $\eta^2 = 0.01$. This result shows the predicted pattern: that the framing effect is reduced when the advice/opinions are not directed to the judge, and/or the source of advice/opinions is relatively low in trustworthiness (see Fig. 5).

To further scrutinize the nature of the 3-way interaction, we started by examining the first link of our mediation model—the source's intention to help the judge. Accordingly, we analyzed the 2-way framing × source's intentions interaction at each level of source's perceived trustworthiness. The results showed that when the source of advice/opinions was relatively trustworthy, the 2-way framing × source's intentions interaction was significant, $F(1, 796) = 11.20$, $p < .001$, *partial* $\eta^2 = 0.014$, indicating that the effect of advice framing was stronger when the advice/opinions were directed to the judge ($M_{advice} = 0.42$, $SD_{advice} = 0.21$; $M_{opinion} = 0.27$, $SD_{opinion} = 0.18$, $t(395) = 7.63$, $p < .001$, 95% *CI* [0.11, 0.19], $d = 0.77$) than when they were not ($M_{advice} = 0.32$, $SD_{advice} = 0.19$; $M_{opinion} = 0.26$, $SD_{opinion} = 0.16$, $t(401) = 3.44$, $p < .001$, 95% *CI* [0.03, 0.10], $d = 0.34$). This conceptually replicates similar findings of Study 3, hereby lending further support for H2a.

In contrast, when the source of advice/opinions was relatively untrustworthy, the 2-way framing × source's helping intentions interaction was not significant, $F(1, 796) = 1.49$, $p = .222$, *partial* $\eta^2 = 0.002$, that is, the effect of advice framing was not stronger when the advice/opinions were directed to the judge ($M_{advice} = 0.39$, $SD_{advice} = 0.22$; $M_{opinion} = 0.28$, $SD_{opinion} = 0.17$, $t(395) = 5.46$, $p < .001$, 95% *CI* [0.07, 0.15], $d = 0.55$) than when they were not ($M_{advice} = 0.32$, $SD_{advice} = 0.21$; $M_{opinion} = 0.25$, $SD_{opinion} = 0.18$, $t(401) = 3.80$, $p < .001$, 95% *CI* [0.04, 0.11], $d = 0.38$). This result underscores the importance of trust in the source as the second link in our model. Indeed, "cutting" the link of trust mitigates the role of the source's intention to help the judge in the model.

To examine the next link in our model—the source's trustworthiness, we analyzed the 2-way framing × source's trustworthiness interaction at each level of the source's intention to help the judge. The results showed that when advice/opinions were directed to the judge, the framing × source's trustworthiness interaction was significant, $F(1, 395) = 5.34$, $p = .021$, *partial* $\eta^2 = 0.013$, indicating a stronger effect of advice framing when the source of advice/opinions was relatively trustworthy ($M_{advice} = 0.42$, $SD_{advice} = 0.21$; $M_{opinion} = 0.27$, $SD_{opinion} = 0.18$) than when it was relatively untrustworthy ($M_{advice} = 0.39$, $SD_{advice} = 0.22$; $M_{opinion} =$

0.28, $SD_{opinion} = 0.17$). This replicates similar findings of Study 4, hereby lending further support for H2b.

In contrast, when the source of advice/opinions were not directed to the judge, the framing × source's trustworthiness interaction was not significant, $F(1, 796) = 0.73$, $p = .40$, *partial* $\eta^2 = 0.002$, suggesting that the effect of advice framing was not stronger when the source was relatively trustworthy ($M_{advice} = 0.39$, $SD_{advice} = 0.22$; $M_{opinion} = 0.28$, $SD_{opinion} = 0.17$) than when the source was relatively untrustworthy ($M_{advice} = 0.32$, $SD_{advice} = 0.21$; $M_{opinion} = 0.25$, $SD_{opinion} = 0.18$). This result underscores the importance of the source's intention to help the judge as the first link in our model. Indeed, "cutting" this link mitigates the role of the source's perceived trustworthiness in the model.

6.2.3. Accuracy

The analysis of accuracy was conducted only for conditions where the advice/opinions were directed toward judge and the source's trustworthiness was high. Specifically, we ran an ANOVA with repeated measures on the timing of estimates (initial vs. final) with framing (advice vs. opinion) as a between participants' factor. This analysis showed a significant main effect of timing, indicating that across framing conditions final estimates were more accurate ($M = 5.08$, $SD = 1.35$) than the initial ones ($M = 6.06$, $SD = 1.68$), $F(1, 395) = 276.66$, $p < .001$, *partial* $\eta^2 = 0.41$. The main effect of framing condition was not significant ($M_{advice} = 5.57$, $SD_{advice} = 1.47$ vs. $M_{opinion} = 5.56$, $SD_{opinion} = 1.56$), $F(1, 395) = 0.003$, $p = .959$, *partial* $\eta^2 < 0.001$. Interestingly, the interaction effect was significant, indicating that an improvement in accuracy was greater in the advice condition ($M_{initial} = 6.12$, $SD_{initial} = 1.65$ vs. $M_{final} = 5.02$, $SD_{final} = 1.29$) than in the opinion condition ($M_{initial} = 5.99$, $SD_{initial} = 1.71$ vs. $M_{final} = 5.13$, $SD_{final} = 1.41$), $F(1, 395) = 4.11$, $p = .043$, *partial* $\eta^2 = 0.01$. For a detailed analysis of accuracy improvement according to advice/opinion position see Appendix F.

6.3. Discussion

This study replicates the advice framing effect found in Studies 1–4 (H1). Furthermore, conceptually replicating the findings of Study 3, the results showed a decrease in the advice framing effect when advice/opinions were not intended to help the judge. Moreover, the present study shows that both components of the source's perceived intention to help the judge (i.e., the nature of the intention and its orientation) play an important role in the mechanism of the advice framing effect.

In addition, conceptually replicating the findings of Study 4, the results indicated a decrease in the advice framing effect when the source was relatively untrustworthy. While in Study 4, the origin of the source's low trustworthiness was not specified and hence could be interpreted by the judges both as low expertise and dishonesty, in the present study, low trustworthiness was manipulated through implied dishonesty.

These findings also enhance the validity of our conclusions regarding

the roles of the source's intention to help the judge and its trustworthiness in our theoretical model and clarify how each of them functions separately. Indeed, in line with our model, a decrease in either the source's intention to help the judge or in its trustworthiness is sufficient to reduce the advice framing effect. Furthermore, the influence of one of these two factors on the advice framing effect is contingent on the level of the other factor.

The current study provides further support for the enhancing effect of advice framing on accuracy improvement for relatively good estimates of others and accuracy reduction for relatively poor estimates of others (see Appendix F). Moreover, we find that across all positions of advice/opinions, advice framing enhances the improvement of accuracy of final (vs. initial) estimates.

7. Study 6

A central finding in Studies 1–5 is that people place greater weight on advice than on opinions. However, prior to deciding how much weight to place on advice/opinions, people typically decide whether to solicit this information in the first place. Thus, the major goal of the present study was to test whether people prefer to solicit advice over opinions (H1). To assess the actual value that people attribute to social information contingent on its presentation as advice versus opinion, we attached a cost to its solicitation. Attaching such costs also aimed to avoid solicitation of advice/opinions by default (Gino & Moore, 2007).

To this end, in Study 6, we followed the procedure of Yaniv and Kleinberger (2000). Namely, after participants provided their initial estimates to the questions in Part 1, we gave them an opportunity to purchase advice (vs. opinions) for each question in Part 2 at a fixed cost. We then used the total amount of money spent on advice versus opinions as a new dependent variable for examining the advice framing effect.

Examining solicitation of advice versus opinions could also shed light on the plausibility of several alternative mechanisms of the advice framing effect. For example, one could argue that people use advice more than opinions because ignoring offered advice incurs interpersonal costs (Blunden et al., 2019; Harvey & Fischer, 1997). This mechanism, however, can hardly explain why judges would solicit advice and even pay for it more than opinions. Hence, if the advice framing effect holds for purchasing advice/opinions, this finding would rule out the aforementioned alternative explanation. This experiment was preregistered (see Appendix A).

7.1. Method

7.1.1. Participants

We recruited 278 Prolific workers (155 male; $M_{age} = 40.69$, $SD_{age} = 14.28$) who participated in the experiment in exchange for payment. The collected sample provided 80% power to detect an effect size of $d = 0.30$ in a one-tailed independent t-test, given $p = .05$ (G*Power calculator; Faul et al., 2007).

7.1.2. Procedure and design

This study was the same as Study 5, except for the following differences: First, we manipulated only the advice framing 2 (advice vs. opinion) between participants. Second, in the instructions of Part 2, participants were told that for each final answer that would fall within a range of +/- 10 years around the correct answer, they would receive a bonus of 20 pennies. Third, participants were offered to purchase advice (opinions) from an advisor (another participant) for the questions they had answered in Part 1. Each advice (opinion) cost 12 pennies and would be deducted from their bonus payment. Participants were presented with a list of the 12 general knowledge questions from Part 1 and indicated the questions (if any) for which they would like to purchase advice (opinion). Finally, after completing this task, the general knowledge questions were not presented a second time. Instead, participants proceeded to the demographics questions, were debriefed, and

thanked.

7.2. Results and discussion

7.2.1. Purchasing advice

To calculate the amount of money participants paid for advice (opinions), we multiplied the number of questions for which they requested to purchase advice (opinion) by 12 pennies. An independent t-test showed that participants paid twice as much for advice ($M = 48.61$, $SD = 50.27$) than for opinions ($M = 24.34$, $SD = 39.43$), $t(276) = 4.49$, $p < .001$, 95% CI [13.62, 34.92], $d = 0.54$. This result replicates and further supports H1, showing that judges tend to pay more for advice than for opinions. This finding extends the advice framing effect to an additional measure that is relevant to managerial and business decisions. Moreover, it undermines the plausibility of a potential mechanism of the advice framing effect based on interpersonal costs of ignoring advice.

8. General discussion

In this paper, we examined the differential effect of advice versus opinions on people's judgments. Across five experiments (Studies 1–5), we found that people placed more weight (12% on average) on estimates framed as advice than on estimates framed as opinions, which reduced egocentric discounting by 70% on average. This effect held across various types of judgments and for both good and ecological advice. The findings show that the advice framing effect stems from perceived source's intention to help an advisee (Studies 2, 3 & 5) and its trustworthiness (Studies 2, 4 & 5) attributed to the source of advice versus opinion.

Perceived intention of the source to help the advisee has two aspects: the intrinsic nature of the intention, which is to provide help, and its direction, that it is aimed at the advisee. Our findings indicate that both aspects contribute to the advice framing effect (Study 5). Intriguingly, the advice framing effect held even when the source's helping intentions were not directed at the advisee. This implies that a source's perceived benevolence towards a third party may spill over to the perceived benevolence toward the advisee. This is so because benevolence towards others could be interpreted as a general reluctance to deceive or cause harm, potentially increasing the source's perceived trustworthiness (Mayer et al., 1995).

In addition, our findings show that people are more likely to solicit advice than opinions and pay twice as much for advice than for opinions (Study 6). This finding extends the advice framing effect beyond advice/opinions utilization to advice seeking and undermines the plausibility of interpersonal cost of ignoring advice as a potential mechanism of the advice framing effect.

8.1. Theoretical contributions

The current research contributes to the decision-making literature on advice taking in several ways. Firstly, our results challenge a prevalent, yet implicit, assumption in the literature that views advice and opinions as equivalent sources of social information. We offer a conceptual distinction between these two constructs and provide a rationale for why the influence of these two types of social information on judgments may differ. Our empirical findings support this distinction. Moreover, we observed that the well-documented egocentric discounting effect (Bailey et al., 2022; Rader et al., 2017) is more pronounced in the context of others' opinions than advice. In addition, our research contributes to a growing body of literature on advice-taking by elucidating how individuals tend to favor information from sources perceived as more supportive (Feng, 2009) and benevolent (Haran & Shalvi, 2019; Mackinger et al., 2017; van Swol, 2009; White, 2005). Our investigation expands upon these findings by demonstrating that the mere framing of information as *advice* can increase decision makers' perceptions of the

source's benevolence and trustworthiness, leading them to place greater weight on this advice in their subsequent judgments.

Interestingly, our conclusions resonate with findings in the social learning literature showing that in social learning tasks, people appear to be more likely to follow their predecessors' advice rather to copy their actions (Celen et al., 2010). More generally, our findings add to the literature on social influence that shows that perceived benevolence and trustworthiness of a source of information increase the message recipient's tendency to change their attitudes in accordance with that information (Cialdini & Goldstein, 2004; Pornpitakpan, 2004; Wood, 2000). Our results show that merely framing information as "advice" can heighten the perceived benevolence and trustworthiness of the source, resulting in participants adjusting their judgments even in the context of factual matters.

Finally, the effect of advice framing on accuracy sheds light on how decision-makers should leverage the wisdom of others. Specifically, across three studies (Studies 2–4), we found that others' estimates which were relatively good, improved judges' accuracy more when framed as advice (vs. opinions). On the other hand, others' estimates which were relatively poor, deteriorated judges' accuracy more when framed as advice (vs. opinions). In one study, we found that across all quality levels of others' estimates, judges' accuracy improved more when framed as advice (vs. opinions; Study 5). It should be noted that while the use of advice framing increases the *utilization* of others' estimates, it does not necessarily result in a corresponding *accuracy* improvement. This is due to the fact that, theoretically, others' estimates are expected to improve judges' initial estimates only if both estimates bracket the truth, which is typically the case in only 50% of trials (Larrick & Soll, 2006). Additionally, accuracy is expected to improve only if judges apply an averaging strategy, whereas our findings indicate that the advice framing effect is primarily observed in cases where judges employ a choosing strategy. This highlights the intriguing observation that a seemingly minor manipulation such as advice framing can have a positive impact on recipients' judgments.

8.2. Practical implications

The findings of the present research have several practical implications. First, practitioners in various professional domains (e.g., medicine, finance) often provide information that can be useful for the public. The framing of these messages may have far-reaching consequences for the audience and for the practitioners themselves (Maack, 2018). For example, genetic counselors explain to the patients the consequences of committing and omitting certain genetic tests during pregnancy to help patients make the best choices. Since the consequences of each choice are probabilistic and, in some cases, may lead to serious outcomes, practitioners may face a dilemma. On the one hand, they are interested in nudging patients toward the better course of action. On the other hand, they may be concerned with being accountable for potential negative outcomes of this action. Practitioners often solve this dilemma by avoiding framing this information as advice. While this solution can reduce their accountability, our results suggest that it may also reduce the influence of this information and thus increase the probability of patients' suboptimal choice. Therefore, based on our findings, we advise practitioners not to underestimate the potential risk of avoiding advice giving.

Second, as people rely more heavily on online reviews in making consumption decisions, the way these reviews are communicated bears significant business consequences for merchants. Our findings suggest that when the same information is presented as advice rather than as a reviewer's opinion, it is likely to have a greater impact on consumer decisions. Framing one's review as advice may reduce people's tendency to egocentrically discount others' opinions and thereby improve consumers' decisions.

Third, our results highlight the importance of trusting other people in order to exploit the benefits of advice. For example, in organizational

contexts, managers are often interested in encouraging knowledge sharing and advice flows among the employees, as this can improve employees' performance (Argote & Fahrenkopf, 2016; Argote & Ingram, 2000). Our findings suggest that creating a climate of trust in the workplace is essential for this process. When this is not the case, employees may distrust their colleagues' intentions, and the advantage of framing information as advice is likely to diminish.

Finally, our findings may help leaders to communicate their messages more effectively. For example, in times of employee empowerment, leaders are inclined to increase employee freedom to act more independently (Blanchard et al., 1996). Hence, leaders may frame their feedback as opinions rather than advice. Our results, however, suggest that such framing intensifies employees' discounting of the feedback, undermining its application. On the other hand, our findings suggest that feedback framed as advice would find broader reception.

8.3. Limitations and future directions

Our findings regarding the difference between advice and opinion are based on numerical judgments that judges made within the Judge-Advisor-System (JAS) paradigm. We chose this method since the interchangeable use of "advice" and other terms such as others' "estimates," "opinions," and "answers" exists primarily in the research that employs this paradigm. In this paradigm, advice is information generated by others on the matters of fact. This allows us to gauge the exact weight that people assign to advice (vs. others' opinions) in their judgments. Yet, the JAS paradigm does not capture other types of decisions, such as judgments regarding personal preferences (e.g., what new music to consume; Yaniv et al., 2011). Clearly, further research on these issues is needed. We can speculate that judges will still value others' helping intentions, and hence weight advice more than opinions, since decision makers also strive to optimize their decisions on the matters of taste.

Moreover, in the present research we focused on utilization of *unsolicited advice* versus opinions. We would anticipate an even larger effect for *solicited advice*, as people attribute more prosocial motives to the providers of solicited than unsolicited advice and perceive the former type as being more useful (Landis et al., 2022). Furthermore, in the present research we examined how people utilize advice that Dalal and Bonaccio (2010) call "a recommendation in favor of a particular course of action" (e.g., "Penicilin was developed in 1930"). Future research should examine the advice framing effect on other types of advice such as a recommendation against a particular course of action, information concerning alternatives, and advice regarding the decision-making process (Dalal & Bonaccio, 2010).

In the current research, we examined perceived source's intention to help the judge and its trustworthiness as a mechanism of the advice framing effect. We found these factors to partially mediate the advice framing effect. However, other mechanisms may also be at play. During our research, we explored several of these. For instance, we investigated whether information framed as advice is perceived as more accurate, and its source viewed as more expert, compared to when framed as an opinion. We also explored three additional mechanisms—concern for the relationship with the source, reactive autonomy, and the motivation to outperform the source of advice/opinion. However, we found no evidence supporting these mechanisms. Future research may explore additional causal paths. For instance, the word "advice" may prime a certain cognitive script that entails adhering the provided information. Another possibility is that decision makers view the source of advice as more accountable than the source of an opinion, leading them to favor information from the more accountable source.

9. Conclusion

Previous literature distinguished between two types of social influence—normative and informational (Deutsch & Gerard, 1955). In the current paper, we dig deeper into the latter type of social influence and

distinguish between two types of social informational influence: advice and opinions. We propose that in contrast to opinions, advice is intended to help a particular person with a specific problem. We argue that people value others' intention to help them and hence trust the source of advice more than the source of opinions. Trust, in turn, translates to utilizing and paying more for advice than opinions. Our findings support these arguments. Moreover, the results show that egocentric discounting—a central and robust finding in the advice taking literature—is substantially diminished when others' numerical estimates are framed as advice as compared to opinions. Overall, our findings suggest that framing of social information constitutes an important factor that influences the likelihood of soliciting and utilizing this information.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used GPT-4 in order to improve language and readability. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

Data availability

Data will be made available on request.

Acknowledgments

Appendix A. Links to preregistered Studies

Study 1: https://osf.io/p2kub/?view_only=4779ea2d09f24e769ed5c36514cb949c.
Study 2: https://osf.io/gu48z?view_only=50f594c363d54a049e971613b4e7b92f.
Study 3: https://osf.io/p6swe/?view_only=aa517c80e27c49adab0bd38dc5b68c43.
Study 4: https://osf.io/x2g3h/?view_only=0d8fd29bd6bd413890d8f3f94abab23a.
Study 5: https://osf.io/srbwy/?view_only=1c571e0e649f48d196cecc2ab9e3348d.
Study 6: https://osf.io/4k3mh/?view_only=96ddc0e3c41c422c86662904840ee566.

Appendix B

Question	Truth
1. In what year did the Star-Spangled Banner become the USA's national anthem?	1931
2. In what year did Neville Chamberlain become the British Prime Minister?	1937
3. In what year did Maine become a state?	1820
4. In what year did Sir Edmund Hillary and Tenzing Norgay successfully climb the summit of Everest?	1953
5. In what year did Ghana gain its independence from Britain?	1957
6. In what year did Karl Marx publish The Communist Manifesto?	1848
7. In what year did Simon Bolivar liberate Latin America from Spanish rule?	1827
8. In what year was penicillin developed?	1928
9. In what year did William Penn found Pennsylvania?	1682
10. In what year did James Watt invent the steam engine?	1765
11. In what year did excavations end, and the Suez Canal opened for its first cruise?	1869
12. In what year was Marie Curie awarded the Nobel Prize for physics?	1903

Appendix C. A detailed analysis of accuracy improvement (Study 2)

Theoretically, we distinguished between three types of advice according to its position with respect to the correct answer (the truth) and the initial estimate (see Fig. C1): (1) advice/opinions that fall in the opposite direction of the truth; (2) advice/opinions that fall between participants' initial estimates and the truth; and (3) advice/opinions that fall beyond the truth. For the first type of advice, the framing effect should exacerbate the drop in the accuracy of final (vs. initial) estimates, as placing more weight on advice (vs. opinions) distances one's final estimates from the truth even further. For the second type of advice, the framing effect should enhance the improvement in the accuracy, as placing more weight on advice (vs. opinions) brings one's final estimates closer to the truth. For the third type of advice, the effect of advice framing is less straightforward since it depends both on the distance between the advice and the truth and on the weight one places on the advice (vs. opinion). Yet, all else being equal, the farther advice/opinions fall beyond the truth, the less improvement is expected as a result of the advice framing effect.

To examine the effect of advice framing on accuracy improvement (i.e., $MAD_{initial} - MAD_{final}$), we ran Multilevel Linear Models on accuracy improvement with framing condition as a fixed factor (-0.5 – opinion vs. 0.5 – advice) and subjects' intercept as a random factor. As expected, for the first type of advice, the *drop* in accuracy was greater in the advice condition than in the opinion condition, $b = -6.15$, $SE = 1.92$, $t(496) = -3.20$, $p = .001$, 95% CI [-2.98, -9.32] (see Fig. C2); for the second type of advice, the *improvement* in accuracy was significantly greater in the advice condition than in the opinion condition, $b = 7.30$, $SE = 2.16$, $t(504) = 3.39$, $p < .001$, 95% CI [3.75, 10.85]; and for the third type of advice, the *drop* in accuracy was not significant in the advice condition than in the opinion condition, $b = -2.69$, $SE = 2.59$, $t(437) = -1.07$, $p = .287$, 95% CI [-6.84, 1.47].

To further examine the effect of advice framing on the accuracy improvement for the third type of advice, we conducted a Multilevel Mixed Model on accuracy improvement with framing condition and distance between the advice and the truth (centered on zero) as fixed factors and subjects' intercept as a random factor. As expected, we found a significant interaction between the advice framing and distance effects, $b = -0.15$, $SE = 0.04$, t

$(2083) = -4.03$, $p < .001$, 95% CI [-0.22, -0.08], indicating that the advice framing effect decreased as the distance of advice/opinions from the truth increased. Scrutinizing this interaction showed that for advice/opinions that were 1 SD *below* the mean distance, the framing effect was positive, $b = 6.59$, $SE = 3.25$, $t(1093) = 2.03$, $p = .043$, 95% CI [0.21, 12.96]; whereas for advice/opinions that were 1 SD *above* the mean distance, the framing effect was negative, $b = -11.55$, $SE = 3.25$, $t(1056) = -3.55$, $p < .001$, 95% CI [-17.93, -5.17].
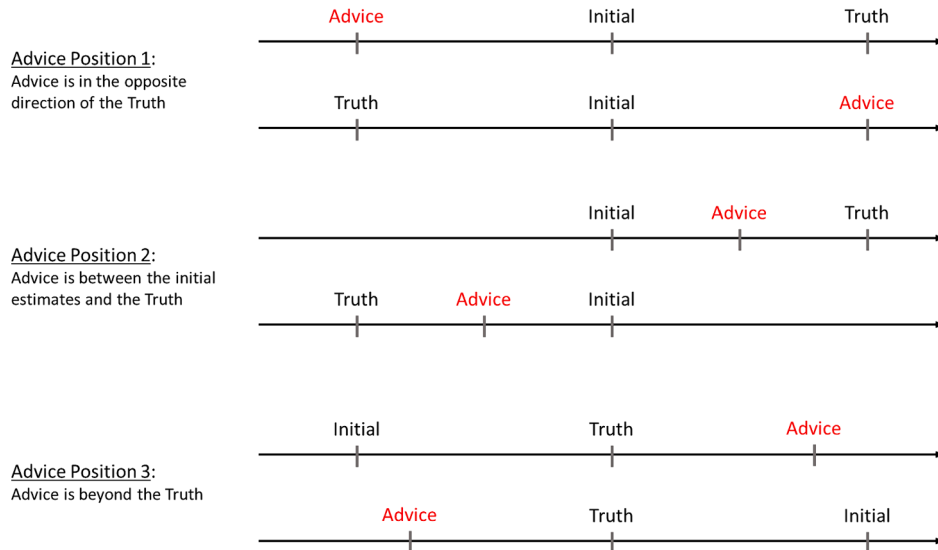

Fig. C1. Study 2: Types of advice positions relative to the initial estimate and the truth.
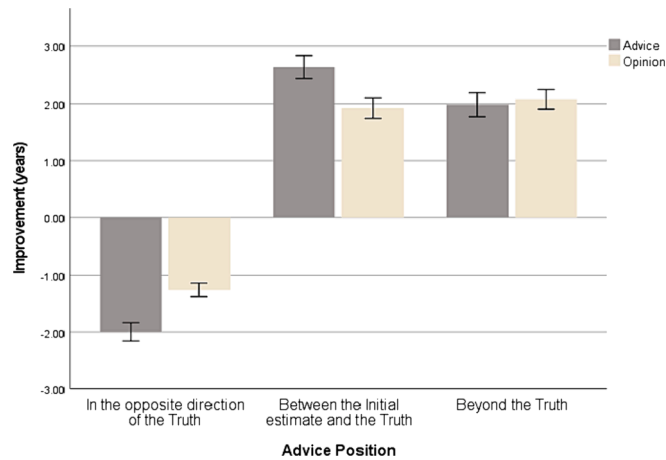

Fig. C2. Study 2: The effect of advice framing on accuracy improvement moderated by advice position. Whiskers show +/- 2SEs.
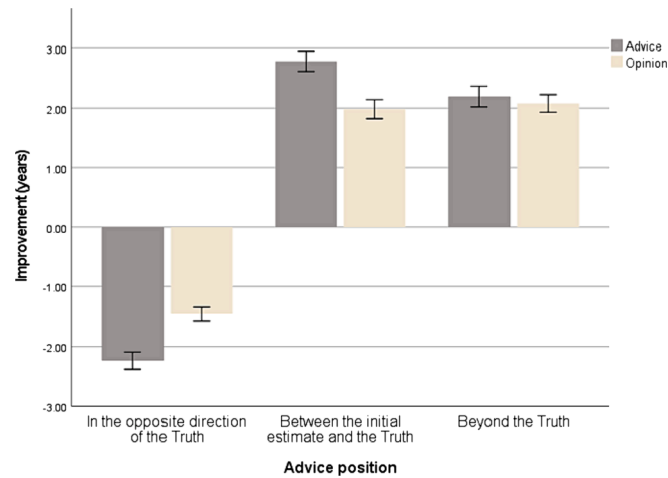
Appendix D. A detailed analysis of accuracy improvement (Study 3)

To examine the effect of advice framing on accuracy improvement (in the control condition) we ran Multilevel Mixed Models on accuracy improvement with framing condition as a fixed factor (-0.5 – opinion vs. 0.5 – advice) and subjects' intercept as a random factor. As expected, for the first type of advice, the *drop* in accuracy was greater in the advice condition than in the opinion condition, $b = -0.75$, $SE = 0.13$, $t(265) = -5.67$, $p < .001$, 95% CI [0.49, 1.01] (Fig. D1); for the second type of advice, the *improvement* in accuracy was greater in the advice condition than in the opinion condition, $b = 0.70$, $SE = 0.17$, $t(287) = 4.14$, $p < .001$, 95% CI [0.36, 1.03]; and for the third type of advice, there was no significant difference in the improvement in accuracy between the advice and the opinion conditions, $b = -0.12$, $SE = 0.18$, $t(280) = -0.67$, $p = .51$, 95% CI [-0.47, 0.23].

To probe deeper into the effect of advice framing on the accuracy improvement for the third type of advice, we conducted a Multilevel Linear Model on accuracy improvement with advice framing (-0.5 – opinions, 0.5 – advice) and the distance between the advice and the truth (centered on zero) as fixed factors and subjects' intercept as a random factor. As expected, we found a significant interaction between the framing and distance effects, $b = -0.13$, $SE = 0.03$, $t(2596) = -4.17$, $p < .001$, 95% CI [-0.19, -0.07], indicating that the advice framing effect decreased as the distance of advice/opinions from the truth increased. Scrutinizing this interaction showed that for advice/opinions that were 1 SD *below* the mean distance the advice framing effect was positive (i.e., advice improves final estimates more than opinions), $b = 0.43$, $SE = 0.22$, $t(631) = 1.93$, $p = .054$, 95% CI [-0.007, 0.86]; whereas for advice/opinions that were 1 SD *above* the mean distance the framing effect was negative, $b = -0.68$, $SE = 0.22$, $t(624) = -3.09$, $p = .002$, 95% CI [-1.11, -0.25].

To summarize, when advice/opinions fall in the opposite direction of the truth (i.e., advice/opinions are less accurate than the judges' initial estimates), the presentation of advice reduces final accuracy more than opinions. When advice/opinions fall between participants' initial estimates

and the truth (i.e., advice/opinions are more accurate than the judges' initial estimates), advice improves final accuracy more than opinions. Finally, when advice/opinions fall *slightly* beyond the truth, advice improves final estimates more than opinions, whereas when advice/opinions fall beyond the truth to a great extent, opinions improve final estimates more than advice. To summarize, results of the accuracy analyses overall replicate those of Study 2.
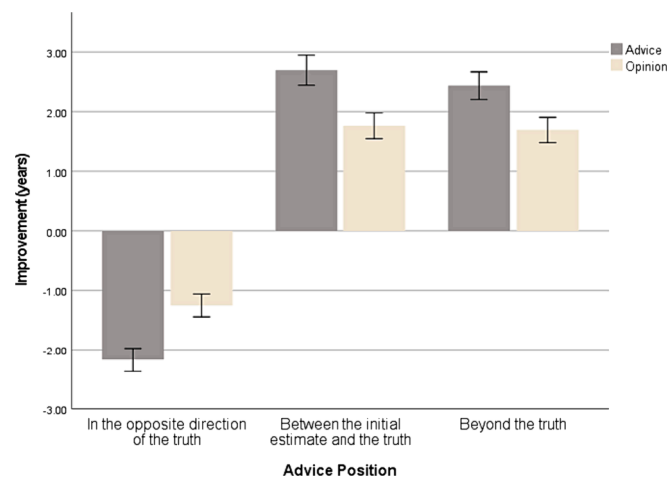

Fig. D1. Study 3 (control condition): The effect of advice framing on accuracy improvement moderated by advice position. Whiskers show +/- 2SEs.

Appendix E. A detailed analysis of accuracy improvement (Study 4)

To examine the effect of advice framing on accuracy improvement (in the control condition) we ran Multilevel Mixed Models on accuracy improvement with framing condition as a fixed factor (-0.5 – opinion vs. 0.5 – advice) and subjects' intercept as a random factor. As expected, for the first type of advice, the *drop* in accuracy was greater in the advice condition than in the opinion condition, $b = -0.75$, $SE = 0.12$, $t(398) = -6.35$, $p < .001$, 95% CI [-0.98, -0.52] (see Fig. E1); for the second type of advice, the *improvement* in accuracy was greater in the advice condition than in the opinion condition, $b = 0.80$, $SE = 0.15$, $t(447) = 5.43$, $p < .001$, 95% CI [0.51, 1.09]; and for the third type of advice, there was no significant difference in improvement in accuracy between the advice and the opinion conditions, $b = 0.11$, $SE = 0.15$, $t(392) = 0.72$, $p = .47$, 95% CI [-0.18, 0.40].

To further examine the effect of advice framing on the accuracy improvement for the third type of advice, we conducted a Multilevel Mixed Model on accuracy improvement with framing condition and distance between the advice and the truth (centered on zero) as fixed factors and subjects' intercept as a random factor. As expected, we found a significant interaction between the advice framing and distance effects, $b = -0.06$, $SE = 0.03$, t (3825) = -2.30, $p = .02$, 95% CI [-0.11, -0.01], indicating that the advice framing effect decreased as the distance of advice/opinions from the truth increased. Scrutinizing this interaction showed that for advice/opinions that were 1 SD *below* the mean distance, the framing effect was positive, $b = 0.34$, $SE = 0.19$, $t(885) = 1.87$, $p = .062$, 95% CI [-0.02, 0.71]; whereas for advice/opinions that were 1 SD *above* the mean distance, the framing effect was not significant, $b = -0.16$, $SE = 0.18$, $t(860) = -.89$, $p = .377$, 95% CI [-0.52, 0.20]. Thus, overall, these results are consistent with the results of Studies 2–3.

Fig. E1. Study 4 (control condition): The effect of advice framing on accuracy improvement moderated by advice position. Whiskers show +/- 2SEs.

Appendix F. A detailed analysis of accuracy improvement (Study 5)

To examine the effect of advice framing on accuracy improvement (in the control condition), we ran Multilevel Linear Models on accuracy

improvement with framing condition as a fixed factor (-0.5 – opinion vs. 0.5 – advice) and subjects' intercept as a random factor. As expected, for the first type of advice, the *drop* in accuracy was greater in the advice condition than in the opinion condition, $b = -0.88$, $SE = 0.17$, $t(369) = -5.26$, $p < .001$, 95% CI [-1.21, -0.55] (see Fig. F1); for the second type of advice, the *improvement* in accuracy was greater in the advice condition than in the opinion condition, $b = 0.93$, $SE = 0.20$, $t(325) = 4.68$, $p < .001$, 95% CI [0.54, 1.32]; and for the third type of advice, the *improvement* in accuracy was also greater in the advice condition than in the opinion condition, $b = 0.76$, $SE = 0.18$, $t(355) = 4.11$, $p < .001$, 95% CI [0.39, 1.18]. Thus, grosso modo, this pattern of results is consistent with the results of Studies 2–4.
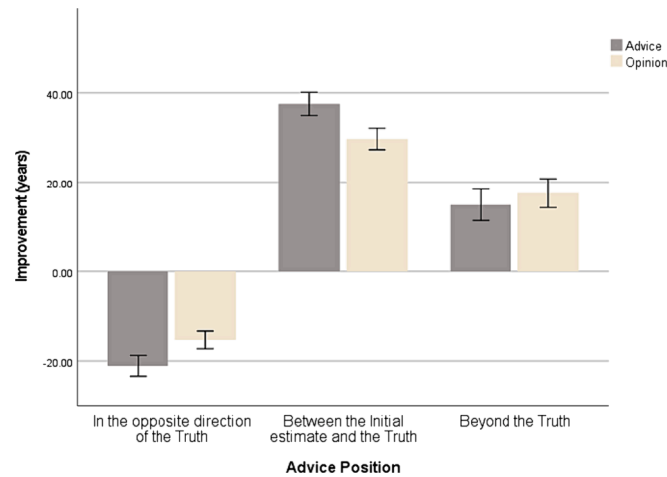

Fig. F1. Study 5 (control condition): The effect of advice framing on accuracy improvement moderated by advice position. Whiskers show +/- 2SEs.

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