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Effects of Task Difficulty on Use of Advice

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ABSTRACT

Although prior studies have found that people generally underweight advice from others, such discounting of advice is not universal. Two studies examined the impact of task difficulty on the use of advice. In both studies, the strategy participants used to weigh advice varied with task difficulty even when it should not have. In particular, the results show that people tend to overweight advice on difficult tasks and underweight advice on easy tasks. This pattern held regardless of whether advice was automatically provided or whether people had to seek it out. The paper discusses implications for the circumstances under which people will be open to influence by advisors.

KEY WORDS advice; judgmental weighting; difficulty; comparative judgment; egocentrism

INTRODUCTION

People routinely rely on advice from others. Do people use advice wisely? Evidence suggests they could do better. Previous research has generally found that people underweight advice (Yaniv & Kleinberger, 2000; Yaniv, 2004a). When people's own guesses are equally informative as is the advice they receive (and so should each be weighed 50%), research shows that advice commonly weighs around 20% and 30% in the final judgment (Harvey & Fischer, 1997).

These laboratory findings appear to be at odds with other evidence suggesting that, at least in some situations, people listen to advice too much. For instance, when it comes to selecting investments, the evidence shows that people pay too much attention and too many fees to money managers who recommend investments (Bogle, 1999). In truth, it is difficult to predict movements in the stock market (Malkiel, 2003). Investors who pay for the advice of money managers by investing in actively managed mutual funds have consistently underperformed investors who simply purchase broad stock indexes that track the overall market (Bazerman, 2001). Corporations, for their part, spend substantial amounts of money hiring management consultants to provide advice on their complex business problems, despite a shortage of evidence that consultants' advice has value (Micklethwait & Wooldridge, 1996).

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It is noteworthy that the laboratory tasks in which people neglect advice tend to be substantially easier than business strategy or stock market prediction. In this paper, we explore the possibility that task difficulty moderates people's willingness to use advice. We present the results of two experiments in which we vary the difficulty of the task and measure how people weigh others' advice. We replicate the finding that people put too little weight on advice from others when the task is easy. But we also show that when the task is difficult, people tend to heed advice too much.

The role of others' opinion in decision making

Many studies on advice taking use the so-called Judge-Advisor System paradigm (hereafter, JAS; Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001). In a Judge Advisor System (JAS), the Judge is responsible for making the final decision, but before committing to it, she is exposed to advice from one or more Advisors who share an interest in the decision problem. Studies in the JAS literature have employed either "choice" or "judgment" tasks (Bonaccio & Dalal, 2006). In the first case, judges must choose among several alternatives that are qualitative in nature. In the second case, judges must provide quantitative estimates. In most JAS studies using choice tasks, the advice is a recommendation from the advisor in favor of a particular option (e.g., Sniezek & Buckley, 1995). By contrast, in experiments employing judgment tasks, advice usually takes the form of another participant's estimate (e.g., Yaniv, 2003, 2004a, 2004b). In the traditional JAS, advice is imposed on decision makers: judges are not allowed to decide whether or not to receive advice, but advice is given by default. Yet, in some studies, advice is provided at the request of the decision maker (e.g., Gardner & Berry, 1995).

Egocentric discounting of advice

One of the main findings of the JAS literature is that people tend to discount advice (e.g., Bonaccio & Dalal, 2006; Yaniv & Kleinberger, 2000; Yaniv, 2004a). Although the appropriate use of advice leads to better judgments, people tend to weigh their own opinions too heavily (e.g., Gardner & Berry, 1995; Harvey & Fischer, 1997; Yaniv & Kleinberger, 2000).

The discounting of advice has been attributed to three causes: differential information (Yaniv, 2004a, 2004b; Yaniv & Kleinberger, 2000), anchoring (Tversky & Kahneman, 1974), and egocentric bias (Krueger, 2003). According to the differential information explanation, decision makers have privileged access to their internal reasons for holding their own opinions but not to the advisor's internal reasons (Yaniv, 2004b; Yaniv & Kleinberger, 2000). In the anchoring explanation, instead, the decision maker's initial estimate or choice serves as an anchor which is subsequently adjusted in response to the received advice. In the case of advice taking, such adjustment is insufficient and thus results in egocentric discounting (Harvey & Fischer, 1997; Lim & O'Connor, 1995). Finally, according to the egocentric bias explanation, decision makers prefer their own opinions and choices based on their belief that they are superior to those of others, including opinions or recommendations received from advisors (Krueger, 2003).

Why might people be less likely to discount advice on difficult problems? Evidence suggests that while people believe themselves to be better than others on simple tasks, they believe that they are worse than others at difficult tasks (Kruger, 1999; Moore & Kim, 2003; Windschitl, Kruger, & Simms, 2003). On simple tasks, where people perform better than expected and believe that they are better than others, they have little reason to pay attention to others' advice. But on difficult tasks where people perform worse than expected and believe that they are worse than others, they are more likely to believe that others might have something useful to tell them.

The optimal use of advice

Advice often comes in the form of quantitative estimates. How much money should I invest? How strong will demand for my new product be? When others' opinions are expressed as quantitative estimates, assuming

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judge and advisor are equally well informed, the optimal strategy that people should use is averaging. Averaging tends to produce more accurate estimates because it cancels out errors (Soll & Larrick, 2004).[1]

Evidence witnessing the benefits of averaging comes from a wide range of fields, from psychiatry and meteorology to economics and forecasting (for references of studies conducted in such fields see Soll & Larrick, 2004; Surowiecki, 2003). Soll and Larrick (2004) describe why averaging works so well. Suppose one has to estimate the inventory level for the next month based on the expected demand for the product being stored. Estimates coming from ''advisors'' (e.g., two inventory managers) can either fall on the same side of the truth (for instance, 50 and 60 pieces when the true value for the demand is 70) or bracket the truth (for instance, 90 and 60 pieces when the true value for the demand is 70). In the former case, the first manager estimated 20 pieces less than the true value and the second only 10. On average, the two missed the truth by 15 pieces. The average estimate is indeed 55. In the latter case, instead, the first manager missed the truth by 20 and the second by 10. The mean discrepancy is again 15 pieces but the average estimate is in this case 75, much closer to the true value than the previous estimate. As Soll and Larrick (2004) conclude, ''In general, when estimates bracket, the discrepancy between the average and the truth must be less than the mean discrepancy of the individual estimates. At a minimum, averaging performs at the mean performance level of the individual estimates, and in the case of bracketing can perform much better'' (p. 10).

The impact of task difficulty on advice use

In the studies we present, participants are shown pictures of people and asked to estimate how much they weigh. We make this task more difficult by blurring the pictures in the difficult condition. One benefit of this approach is that it allows us to vary difficulty without varying task experience. To our knowledge, no previous research has tested the effect of task difficulty on weighting of advice.

The two experiments differ only in how advice is offered to participants. While in Study 1 participants are obliged to get advice and are then left with the option of how to use it, in Study 2 participants have the option of getting advice. This manipulation is useful for testing the possibility that people weigh advice more heavily when the experimenter implies that it is relevant by giving it to them. The design of the second experiment allows us to ask whether people want to receive the advice at all. Study 2 also allows us to test whether advice is used significantly more heavily when it is sought by participants than when it is made available to them by default.

STUDY 1

Method

Participants

We recruited participants through advertisements in which people were offered money to take part in an experiment. On average, each experimental session lasted 1 hour and 15 minutes. Sessions were conducted in the computer laboratory of a university in the Northeastern United States. Sixty-one individuals agreed to participate (58% male and 42% female). The average age of participants was 24 years old ($SD = 7.77$). Most participants were students (86% of them) from local universities.

[1]Previous work in cognitive psychology has shown that under certain conditions individuals use averaging when they deal with information coming from different sources. For instance, when the sources of information are multiple experts providing their opinions, people tend to use an average weighting model in combining them (Budescu, Rantilla, Yu, & Karelitz, 2003). Yet, often they follow other strategies such as choosing just one source of information (see, for instance, Einhorn, Hogarth, & Klempner, 1977), even when averaging would be more effective.

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Procedure

The study was described to participants as an experiment on individual decision-making. Upon arrival to the computer laboratory, participants were registered and randomly assigned to a terminal. The room was arranged so that participants could not see each other. Participants received a copy of the instructions explaining the experiment and how to play using the computer. Instructions were read aloud by the experimenter. This was followed by an opportunity to ask questions. Thus, before the session began, participants knew what each phase implied and how the payoff was computed.

The experiment consisted of an estimation task with 40 rounds. In each round, participants saw a picture of a person and were asked to guess the weight of the person in the picture. Some of the pictures were clear, and some of the pictures were blurred. After reading the instructions, participants were asked to specify whether they preferred to provide their estimates in kilograms or pounds. Estimates could range between 0 and 200 kg or between 0 and 440.92 pounds. In addition to their best guess of the correct weight of the person, participants were asked to give lower and upper estimates that they believed contained the correct answer with a 90% level of confidence. Following prior work, we use these confidence ranges to assess people's subjective confidence in their judgments (Alpert & Raiffa, 1969/1982; Soll & Klayman, 2004).

Participants had the opportunity to play four practice rounds in which they were shown a set of pictures and told the true weights of the people in the pictures. In this way, they could get a better sense of the task they would be facing during the experiment.

During the experiment, there was a difference between odd rounds (e.g., round 1, round 3 and so on) and even rounds (e.g., round 2, 4 and so on). In each odd round, participants saw a picture of a person and were asked to guess the weight of the person in the photograph. There were 20 odd rounds in the experiment. In 10 of them, the shown picture was clear, and in the remaining 10 it was blurred. For instance, if participants saw a clear photograph in round 1, then in round 3 they were presented with a blurred picture. Participants had to provide not only their best guess for the person's weight but also the bottom and top values of their 90% confidence interval. In each even round, they were shown the same picture they saw in the previous round but this time they were given "advice" on the correct answer. The advice came from another (randomly selected) participant's best guess when shown the same picture in a previous (odd) round, and participants knew this. Since participants were shown the same photograph in two rounds (an odd round and an even one), over the 40 rounds participants saw a total of 20 different pictures.

At the end of the experiment, participants were asked to complete a questionnaire that asked their genders and ages.

Payment

Participants received \$10 as show up fee and, in addition to that, they had the opportunity to win up to \$20 during the experiment. The payoff was based on the accuracy of their estimates; participants received \$0.50 for every round (out of 40) in which their best guess was within 10% of the true weight. The average total payoff in Study 1 was \$22.73 ($SD = 3.56$). Participants were paid in cash at the end of the experiment.

Dependent measures

To capture the impact of advice on participants' behavior (i.e., whether participants follow the advice they get), we used the "weight of advice" (hereafter, WOA): WOA $= |\text{final estimate} - \text{initial estimate}| / |\text{advice} - \text{initial estimate}|$. This measure is simply a shift proportion. It has been previously used in several studies (see, for instance, Hell, Gigerenzer, Gauggel, Mall, & Muller, 1988 in the context of memory, and Harvey & Fischer, 1997, or Yaniv, 2004b in the context of advice taking).

The weighting of advice reflects how much a participant weighs the advice she receives (i.e., how much a participant uses the advice) and it is thus inversely related to how much a participant discounts the advice

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(Yaniv, 2004b). If the final estimate (from the even numbered round) is equal to the initial estimate (from the preceding odd numbered round), then WOA = 0. This happens every time a participant completely discounts the advice (100% discounting) and gives the same estimate in an even-numbered round as he gave in the preceding odd-numbered round. Instead, if there is a complete shift of the initial estimate towards the advice, then the final estimate will be equal to the received advice and WOA will be equal to 1. In such a case there is 0% discounting of the advice. Finally, there is partial discounting when WOA is equal to intermediate values: The respondent weighs both one's own initial estimate and the received advice positively (Yaniv, 2004b). For instance, a WOA of 0.5 means that the individual who received the advice averaged it with her initial estimate. Again, this is the optimal strategy, given that our judge and advisor are, on average, equally well informed.

The WOA measure is subject to a few limitations. First, it yields undefined values when the advice is equal to the judge's initial estimate since the denominator is zero. Second, when the final estimate is equal to the initial one WOA is zero and is thus interpreted as no advice taking. Yet, if in this case the denominator were equal to a very small number, the advice might have been taken by the judge as a confirmation that the initial estimate was close to the correct answer and should therefore be maintained. Alternatively, after receiving the advice the judge might not change her opinion, but only her confidence. One may indeed presume that the smaller the gap between the advice and the initial estimate, the smaller the interval confidence specified by the judge. Third, the WOA does not distinguish the situations in which the final estimate moves *towards* the advice from situations in which it moves *away from* the advice, although the latter occurs seldom. Finally, the WOA measure has a lower bound of zero but does not have an upper bound. Every time the final estimate overshoots the advice, the WOA is greater than one. This happens rarely (e.g., Gino, 2004; Harvey & Fischer, 1997).

Participants were asked to provide their best guesses, together with low and high estimates of their 90% confidence intervals. A judge's pre-advice confidence interval is thus a range of values: participants are confident at the 90% level that the correct answer falls within that range. The width of interval estimates in a round with no advice can be reasonably assumed to reflect participants' assessment of their own knowledge (Yaniv, 2004b; Yaniv & Foster, 1995, 1997) or of their confidence in the answer they provided. The presence of interval estimates allows us to control for the effect of confidence in the task when estimating the impact of task difficulty on advice use.

Results

Manipulation check

Consistent with our expectations, the absolute error per participant on the easy task was lower ($M = 20.75$, $SD = 4.82$) than was the absolute error on the difficult task ($M = 30.03$, $SD = 6.39$), $t(1218) = -6.670$, $p < 0.0001$. These absolute errors were computed using participants' answers in rounds without advice.

Distribution of the values for WOA

In analyzing the values of WOA, we dropped the cases in which the advice was equal to the initial estimate since they were not informative. In particular, there were 30 such cases in the easy-task condition (5% of the cases) and 23 such cases in the difficult-task condition (4% of the cases). As for the cases in which the final estimate is not inside the range between advice and initial estimate, and thus WOA is greater than 1, we followed the common procedure used in the literature (e.g., Gino, 2004; Yaniv, 2004a, 2004b) and we opted for changing values above 1 to 1. In particular, we changed values above 1 to 1 in 2% of the cases (15 out of 610) in the easy-task condition and in 4% of the cases in the difficult-task condition (26 out of 610). In total, there were 1167 valid data points for the WOA measure. These values were used in the analyses reported below. First, we computed the mean for each participant's WOA values in a certain condition and then we conducted analyses across participants.

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In the analyses, we refer to easy versus difficult task treatment. The easy task consists of the trials in which pictures presented to participants were clear, while the difficult task consists of the trials in which pictures were blurred. Note that since overall participants saw 20 different pictures, there were 10 trials for the easy task and 10 trials for the difficult task.

Advice-taking behavior

To assess the impact of the manipulation on participants' advice-taking behavior, we compared WOA on the easy tasks to WOA on the difficult tasks. The mean WOA in the easy task treatment was 0.41 ($SD = 0.03$). Instead, in the difficult task treatment the mean WOA was 0.52 ($SD = 0.03$). The values for WOA were subjected to an analysis of variance in which task difficulty (easy vs. difficult) and rounds (i.e., repeated measure) served as within-subjects factors. The main effect of task difficulty was significant, $F(1,23) = 6.193$, $p = 0.021$, $\eta^2 = 0.212$, supporting our main hypothesis.[2]

Interval estimates

One potential explanation for why participants weighed advice more heavily on difficult tasks was that they felt that their own information was less useful. We checked whether this was the case by looking at the mean width of the interval estimates participants had specified. We compared the mean width of the interval estimates in the easy task ($M = 32.05$; $SD = 5.25$) versus the difficult task condition ($M = 38.28$; $SD = 6.60$). As we did for the WOAs, the values for confidence were analyzed in an analysis of variance with task difficulty (easy vs. difficult) and round as within-subjects factors. The main effect of task difficulty was significant, $F(1,60) = 28.55$, $p < 0.0001$, $\eta^2 = 0.32$, suggesting that participants were not equally confident about the estimates belonging to the two different sets. In essence, their need for information in the difficult-task treatment was higher than their need for information in the easy-task treatment.

Do people use advice based on their knowledge when facing the task?

One might wonder whether the results we observed, that is, people listen to advice more when facing a difficult task than when facing an easy task, are driven by the fact that when facing a difficult task people are more uncertain about (less confident in) the solution to the task. People who listen to the advice are those who value such information more since they are less confident in their initial estimate. A mixed model analysis was used to isolate the effect of task difficulty (on WOA) from the effect of participants' confidence about their answers. We used the interval estimate (*IE*) as a proxy for how much a participant might have valued advice. We estimated the following model:

$$\mathrm{WOA_{ij}} = \alpha_0 + \beta_1 \mathrm{DIFFICULTY_i} + \beta_2 \mathrm{IE_{ij}} + \mathrm{subjects'\ RANDOM\ EFFECTS} + \varepsilon$$

where index i referred to participants and index j refers to pictures.

The dependent variable was thus the value for WOA for each participant and for each question. Explanatory variables were: (i) a dummy variable indicating whether the participant was facing an easy or a difficult task ($DIFFICULTY_i$), and (ii) the size of the initial range (IE_{ij}), which gives one a measure of how confident participants are in the answer to a certain question (in the round preceding the one in which advice became available). The dummy variable $DIFFICULTY_i$ took on the value 1 if the task was difficult and 0 if the advice was easy. The parameter β_1 measured the effect of taking advice on the weight participants assigned

[2]For some of our subjects, we have missing data on at least one round. In particular, there are 24 participants with complete WOA data. This explains the degrees of freedom in the *F*-test. The missing data are due to cases in which WOA is a number divided by zero, which happens every time the advice is equal to the initial estimate.

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the advice they got, while the parameter β_2 measured the effect of the participants' confidence in their estimates (estimates provided in the round preceding the one in which they received advice) on WOA.

Results are based on a total of 1167 observations, with each observation being an estimate provided by a participant. Participants did not have the choice of getting advice, but they did have the choice of using that advice on a picture by picture basis. Thus, variance across pictures in the WOA provided allowed us to isolate the effects of confidence from the effects of task difficulty.

The initial range size has positive effect on WOA: as one might expect, the wider the initial range, the higher the WOA ($\beta_2 = 0.066$, $t = 2.061$, $p = 0.040$). It appears that participants do weigh advice more heavily when they are less confident in their own knowledge. Moreover, even after controlling for this effect, the effect of task difficulty is still in the expected direction and statistically significant ($\beta_1 = 0.079$, $t = 4.746$, $p < 0.0001$). Hence, the results of the mixed model analysis show that when participants face a difficult task they weigh the advice significantly more than one would expect given how confident they are in their answers. This result supports our initial hypothesis: participants weigh advice significantly more when the task faced is difficult than when it is easy.

Strategy used to weigh advice

Did participants weigh advice more or less than they should have? Did their strategy in weighing advice differ based on the difficulty of the task? In each treatment, if rational, participants should have given to the advice they received the same weight they gave to their initial estimate. The optimal WOA is equal to 0.5.[3] To test whether in the context of the easy task participants underweighted the advice they received and in the context of the difficult task they overweighed it, we tested the WOA scores against 0.5 as an optimal value of advice integration. In particular, we conducted a repeated-measures ANOVA in which task difficulty and round served as within-subjects factors, while the difference between the actual WOA and the optimal WOA served as dependent variable. The results reveal a main effect for task difficulty: when dealing with easy tasks participants tend to underweight the advice they received (mean difference between actual and optimal WOA $= -0.09$, $SD = 0.05$), while when dealing with difficult tasks participants tend to overweight the advice they received ($M = 0.02$, $SD = 0.03$), $F(1,23) = 6.13$, $p = 0.02$, $\eta^2 = 0.21$.

We conducted additional analyses to explore the underweighting effect in the easy task condition and the overweighting effect in the difficult task condition. In the easy task condition, the average weight assigned to advice was 0.41. The values for WOA in the easy task condition were subjected to an analysis of variance in which weight (observed vs. optimal) and rounds (i.e., repeated measure) served as within-subjects factors. The main effect of weight was significant, $F(1,35) = 17.928$, $p < 0.0001$, $\eta^2 = 0.339$, supporting the hypothesis that advice is underweighted. As for the difficult task condition, the average weight assigned to advice was 0.52. The values for WOA in the difficult task condition were subjected to an analysis of variance in which weight (observed vs. optimal) and rounds (i.e., repeated measure) served as within-subjects factors. The main effect of weight was not significant, $F(1, 41) = 0.07$, *ns*. Thus, for difficult tasks, the weight participants assigned to advice is higher than the optimal value, but the overweighting effect is not statistically significant.

Discussion

The results of Study 1 are consistent with our hypotheses. People weigh advice significantly more when the task is difficult than when the task is easy. Moreover, people underweight advice on easy tasks. While both the

[3]Note that while there may have been some participants who believed themselves to be better than others at guessing weights, for such beliefs to be rational, there would also have to be just as many participants who believed themselves to be worse than others.

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effect of task difficulty and the underweighting effect are strong, the overweighting effect is weak. The results of Study 1 also show that people's confidence in their own opinions prior to receiving advice cannot fully explain people's advice use: on difficult tasks, people use advice significantly more heavily than one would expect given their level of confidence. We remained concerned that participants' use of advice may have been influenced by the fact that the experimental procedure forced them to obtain it. Usually people have a choice about whether to receive advice. It is possible that the fact that the experimenter provided it served as signal that the advice ought to be useful. Would people use that advice more or less if they had chosen it themselves? We explore this question in our second study.

STUDY 2

Method

Participants

As in Study 1, we recruited participants through ads in which they were offered money to participate in an experiment. Fifty-seven individuals agreed to participate (62% male and 38% female). The average age of participants was 25 years ($SD = 7.62$). Most participants were undergraduate students (90% of them) from local universities.

Procedure

Study 2 followed the same procedure used in Study 1 with only one difference: While in Study 1 participants were given advice (in even rounds), in the second study participants had *the option* of getting advice for free (in even rounds). In particular, in each even round, they were shown the same picture they had seen in the previous round, but they had also the option of receiving ''advice'' on the correct answer. In the even rounds, participants saw a button labeled ''Get Advice.'' If they pressed the ''Get Advice'' button, they would receive advice for the person's weight, and they would then have to provide their estimates. If they did not want to get advice, they just had to provide their estimates again without pressing the ''Get Advice'' button.

Payment

As in Study 1, participants received \$10 as show up fee and, in addition to that, they had the opportunity to win up to \$20 during the experiment. The payoff was based on the accuracy of their estimates; participants received \$0.50 for every round (out of 40) in which their best guess was within 10% of the true weight. The average overall payoff in Study 2 was \$23.63 ($SD = 3.92$).

Results

Manipulation check

The absolute error per participant on the easy task was lower ($M = 18.33$, $SD = 3.27$) than was the absolute error on the difficult task ($M = 29.88$, $SD = 7.25$), $t(1138) = -8.196$, $p < 0.0001$.

Distribution of the values for WOA

As we did in Study 1, in analyzing the values of WOA, we left out the cases in which the advice is equal to the initial estimate since they are not informative. In particular, there were three such cases in the easy-task condition (0.5% of the cases) and five such cases in the difficult-task condition (0.9% of the cases). As for the

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cases in which the WOA was not well defined, we changed values above 1 to 1 in 4% of the cases in the easy-task condition (25 cases out of 570) and in 4% of the cases in the difficult-task condition (22 cases out of 570).

Advice-seeking behavior

In the easy task condition, in 19 cases (3% of the cases) a participant opted for not receiving advice. In the difficult task condition, this happened in 20 cases (4% of the cases). The difference in the rate at which participants sought advice in the two conditions is not significant, $\chi^2(1, N = 1140) = 0.027$, *ns*. In the cases in which participants opted for not getting advice, a measure for WOA could not be computed. Dropping all cases without valid data resulted in 1093 observations.

To examine whether advice seeking differed significantly between easy and difficult tasks, we used a mixed model analysis and estimated the following model:

$$\text{GET ADVICE}_{\text{ij}} = a_0 + \beta_1 \text{ TASK} + \beta_2 \, IE_{ij} + \text{subjects}' \text{ RANDOM EFFECTS} + \varepsilon$$

where index i refers to participants and index j refers to pictures. Results are based on a total of 1140 observations, with each observation being initial range size provided by a participant. The type of task participants faced (easy versus difficult) does not have a significant effect on the decision of getting advice ($\beta_1 = 0.1169$, $t = 0.17$, *ns*). Also the effect of the initial range size is not significant ($\beta_2 = 0.029$, $t = 1.70$, *ns*). Hence, it does not appear that it is more likely for participants to get advice if they are less confident in their own knowledge.

Advice-taking behavior

To assess the impact of the manipulation on participants' advice-taking behavior, we compared the value for the WOA on the easy tasks to the value for the WOA on the difficult tasks. The mean WOA in the easy task treatment was 0.39 ($SD = 0.05$). Instead, in the difficult task treatment the mean WOA was 0.54 ($SD = 0.03$). The values for WOA were analyzed in a repeated-measures ANOVA in which participants' values for WOA served as dependent variable, and task difficulty (easy vs. difficult) and round (i.e., repeated measure) served as within-subjects factors. The main effect of task difficulty was again significant, $F(1,38) = 38.686$, $p < 0.0001$, $\eta^2 = 0.504$, thus supporting our primary hypothesis.

Interval Estimates

We tested whether participants did not feel equally confident about their estimates for pictures of differing difficulties, that is, blurred and clear. We compared the mean width of the interval estimates in the easy task ($M = 33.22$; $SD = 5.75$) versus the difficult task condition ($M = 41.27$; $SD = 5.83$). The values for confidence were analyzed in a repeated-measures ANOVA in which task difficulty (easy vs. difficult) and round served as within-subjects factors. The main effect of task difficulty was significant, $F(1,56) = 60.18$, $p < 0.0001$, $\eta^2 = 0.52$, suggesting that participants were not equally confident about the estimates belonging to the two different sets. In essence, their need for information in the difficult-task treatment was higher than their need for information in the easy-task treatment.

Do people use advice based on their knowledge when facing the task?

As we did in Study 1, we used a mixed model analysis to isolate the effect of task difficulty on taking advice from the effects of participants' confidence. We estimated the same model we used for Study 1:

$$\text{WOA}_{\text{ij}} = \alpha_0 + \beta_1 \text{DIFFICULTY}_{\text{i}} + \beta_2 \text{IE}_{\text{ij}} + \text{subjects}' \text{ RANDOM EFFECTS} + \varepsilon$$

where index i refers to participants and index j refers to pictures.

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Results are based on a total of 1093 observations, with each observation being an estimate provided by a participant. The initial range size has positive effect on WOA: as one might expect, the wider the initial range, the higher the WOA. It appears that participants do weigh advice more heavily when they are less confident in their own knowledge ($\beta_2 = 0.001$, $t = 2.199$, $p = 0.028$). Moreover, even after controlling for this effect, the effect of task difficulty is still in the expected direction and statistically significant ($\beta_1 = 0.137$, $t = 6.674$, $p < 0.0001$). Hence, the results of the mixed model analysis show that when participants face a difficult task they weigh the advice significantly more than one would expect given how confident they are in their answers.

Strategy used to weigh advice

To test whether the weighting strategy differed based on task difficulty, we conducted a repeated-measures ANOVA in which task difficulty and round served as within-subjects factors, while the difference between the actual WOA and the optimal WOA served as the dependent variable. The results reveal a main effect for task difficulty: When dealing with easy tasks participants tend to underweight the advice they received (mean difference between actual and optimal WOA $= -0.11$, $SD = 0.04$), while when dealing with difficult tasks participants tend to overweight the advice they received ($M = 0.04$, $SD = 0.05$), $F(1,38) = 38.686$, $p < 0.0001$, $\eta^2 = 0.51$.

As we did in Study 1, we conducted additional analyses to explore the underweighting effect in the easy task condition and the overweighting effect in the difficult task condition. In the easy task condition, the average weight assigned to advice was 0.39. The values for WOA in the easy task condition were subjected to an analysis of variance in which weight (observed vs. optimal) and rounds (i.e., repeated measure) served as within-subjects factors. The main effect of weight was significant, $F(1,46) = 16.657$, $p < 0.0001$, $\eta^2 = 0.266$, supporting the hypothesis that advice is underweighted. As for the difficult task condition, the average weight assigned to advice was 0.54. The values for WOA in the difficult task condition were subjected to an analysis of variance in which weight (observed vs. optimal) and rounds (i.e., repeated measure) served as within-subjects factors. The main effect of weight was significant at the 10% level, $F(1,46) = 3.171$, $p = 0.082$, $\eta^2 = 0.064$, supporting the hypothesis that advice is overweighed.

The impact of optional versus compulsory advice

To test whether advice was used more heavily when it was sought than in the case in which it was provided by default, the values for WOA in both study 1 and study 2 were subjected to an analysis of variance in which task difficulty (easy vs. difficult) and rounds (i.e., repeated measure) served as within-subjects factors and advice (compulsory vs. optional) served as between-subjects factor. The main effect of task difficulty was significant, $F(1,61) = 31.674$, $p < 0.0001$, $\eta^2 = 0.342$, supporting the hypothesis that advice is used more heavily when the task is difficult. As for advice, we found no significant effect. Thus, there appears to be no extra weight given to advice just because the participant opted for getting it.

Discussion

The results of Study 2 are consistent with our hypotheses and thus provide further support to the findings from Study 1. People weigh advice significantly more when the task is difficult than when the task is easy, and this effect is not just a consequence of their confidence. More specifically, people overweight advice on difficult questions and underweight advice on easy questions. We had been concerned that participants may have inferred too much from the experimenter providing them advice. Yet they listened, if anything, even more to advice they chose to receive. Our theory would have also predicted that people working on difficult tasks should be more interested in obtaining advice than would people working on easy tasks. But we did not find a

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significant difference in the rate at which our participants sought advice. The explanation for this null finding probably has to do with a ceiling effect: Given that participants chose to obtain advice in 97% of easy rounds, there was little room for them to seek more advice in difficult rounds.

GENERAL DISCUSSION AND CONCLUSIONS

Most of the choices people make on a daily basis are the result of weighing their own opinions with advice from other sources. In this paper we tested the hypothesis that people would weigh others' advice significantly more heavily on difficult tasks than easy tasks. Previous work has shown that the strategy of averaging the opinions from two sources is usually superior to the strategy of choosing one opinion (Soll & Larrick, 2004), and this does not depend on task difficulty. Our hypothesis predicted that the strategy people use to weigh advice varies with task difficulty even when it should not. These predictions were confirmed in two experiments involving choices with and without advice from others in an estimation task. The results of the two studies also show that the effect of task difficulty on people's use of advice is not only due to how confident people are in their judgments: On difficult tasks people use advice significantly more than one would expect based on the confidence they expressed in their opinions prior to receiving the advice.

These results are ironic because task difficulty did not affect the value of listening to advice. In both our experiments, advice came from other participants who were, on average, no better informed. Given that it was difficult if not impossible for participants to determine whether their own or their advisor's estimate was the more accurate one, the best general strategy was simply to average one's own opinion with that of the other. This would, at the very least, tend to reduce the noise in estimates. Yet our participants behaved as if, in the difficult condition, their own opinions were worth less than those of a randomly selected other. In the easy condition, participants were more confident in the value of their own judgment and were more willing to dismiss the advice of another person who was, on average, equally confident and well-informed.

Moderating variables for egocentric discounting

Task difficulty is not the only moderator of advice usage. For instance, advice from experts is discounted less (Goldsmith & Fitch, 1997; Harvey & Fischer, 1997; Sniezek, Schrah, & Dalal, 2004). People are also more responsive to advice from older, better educated, wiser, or more experienced advisors (Feng & MacGeorge, 2006). Advisors' confidence also moderates advice use: Advice coming from more confident advisors is weighed more heavily than advice received from less confident ones (Lawrence & Warren, 2003; Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005).

All these variables refer to features of the advisors. Research on features of the advice is more limited. Research has considered two variables: the quality of advice and its cost. The higher the quality of advice, the less advice is discounted (Yaniv & Kleinberger, 2000), although good advice is still often discounted (see for instance Gardner & Berry, 1995). Gino (2005) showed advice is weighed more heavily when it is costly, holding its quality constant. This paper focuses on a third aspect that might affect the extent to which advice is used, namely features of the task.

Individual versus group decision making

While the JAS literature distinguishes between choice and judgment tasks, research on group decision making employs a different distinction: judgmental versus intellective tasks (see, for instance, Kerr, 2001). While intellective tasks have an objectively correct answer within a shared conceptual system (e.g., solving an arithmetic operation), judgmental tasks do not (e.g., deciding on an ethical issue). Research in this area has suggested that the likelihood of the minority position to prevail depends on the nature of the task, that is, on

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whether the task is judgmental or intellective (Kerr, 2001). In particular, the more judgmental the task, the less minorities are likely to prevail since a higher level of social support is required for a demonstrably correct alternative to succeed. This paper focuses an intellective task but in the context of individual decision making and thus does not allow to make inferences on the power of minorities. These issues could be explored in future research.

Limitations and future research opportunities

One important topic for future research surrounds the limitations and boundary conditions of the effects we document. Are there circumstances under which people will realize that even if they have strong opinions, it is useful to listen to and learn from others with similarly strong—even if divergent—opinions? Can, for example, people on opposite sides of the political or religious spectrum, learn from each other and find common ground by sharing their opinions? We suspect that, rather than calling their own beliefs into question, inconsistent advice from others leads people with strong opinions to question the motives or the intelligence of these advisors (Ross & Ward, 1996).

This line of reasoning suggests that people will be open to advice only when their own information is poor and their own opinions are weak. And our results suggest that people are insufficiently sensitive to the quality of the opinions they seek out. When our participants knew they had poor information, they were only too willing to listen to the opinions of others with equally poor information. When people are desperate, they will take whatever they can get, even if what they get is equally uninformative. Sick people who have not found cures in the treatments offered by modern medicine often turn to faith healers and alternative therapies that provide some answers, even if there is little evidence in support of their truth or healing value. Businesses pay vast sums of money to management consultants for their advice on complex business problems, even when there is little evidence that the consultants are any better at figuring out what actually leads businesses to succeed (Micklethwait & Wooldridge, 1996). And investors, daunted by the difficulties of predicting the market, pay substantial fees for the guidance investment managers, despite evidence suggesting that the fees are not worth it because the investment advisors cannot predict the market either (Bogle, 1999).

A precise measure of how much people use advice in real-word settings is often difficult to identify. Yet, there is some evidence that people use advice received from dubious experts. For example, Americans spend more on alternative health practitioners than on primary care (Eisenberg et al., 1993) even if the efficacy of unconventional therapies for health problems has not been conclusively demonstrated. Also, an increasing number of patients are using the World Wide Web as a source of medical and health information. A recent study reported that 53.5% of the surveyed patients used the Internet for health information, on a broad range of medical topics (Diaz et al., 2002). Yet the quality of medical information available on the Internet is often dubious—a recent survey found important inconsistencies between standard medical guidelines and advice available on the Internet (Impicciatore et al., 1997).

Future research should investigate potential mediators of the effect we demonstrate. For instance, it would be fruitful to explore more closely the psychological process underlying the effect of difficulty on advice taking. We found that difficulty increases advice taking by reducing confidence, as measured by the width of our participants' confidence intervals. However, difficulty still increased advice taking, even after controlling for expressed confidence. Future research should explore the causes for this effect. Another direction for future research is the use of different tasks to investigate our effect. For instance, research might consider judgment tasks people are confronted with on a daily basis, such as investment decisions or purchasing choices.

Our findings join a string of recent findings that highlight the important role of task difficulty in moderating effects that had previously been attributed to egocentrism. These results have shown that effects previously assumed to be attributable to egocentrism only hold for easy tasks or common events. Here, we have shown that the tendency to egocentrically discount advice from others (Yaniv, 1997, 2004a) only holds

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for easy tasks. Other evidence has shown that the tendency for people to believe that they are better than others only holds for easy tasks; on difficult tasks, people believe that they are below average (Kruger, 1999; Moore & Kim, 2003; Windschitl et al., 2003). And the tendency to egocentrically believe that one is more likely than others to experience positive events only holds for common events; for rare positive events, people believe that they are less likely than others to experience them (Chambers, Windschitl, & Suls, 2003; Kruger & Burrus, 2004).

The reason for the important moderating role of task difficulty has, ironically, been attributed to egocentrism. But this explanation does not hinge on egocentrism as self-enhancement (Moore, 2004, 2005). Instead, this is myopic self-focus, whether it casts the self in a favorable or disparaging light. People believe they are happier than others simply because they themselves are happy (Klar & Giladi, 1999). People believe they are less likely than others to live past 100, simply because they are unlikely to do so (Kruger & Burrus, 2004). And people believe that, when they have good information, their opinions are more useful than are those of others, simply because they have good information, even when it is common knowledge that others have good information too. Sometimes, this effect may be perfectly sensible, such as when people cannot be sure of the quality of others' information. But the effect of task difficulty clearly persists even when it cannot be explained so rationally.

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