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Advice taking and decision-making: An integrative literature review, and implications for the organizational sciences ☆

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Abstract

This paper reviews the advice-giving and advice-taking literature. First, the central findings from this literature are catalogued. Topics include: advice utilization, confidence, decision accuracy, and differences between advisors and decision-makers. Next, the implications of several variations of the experimental design are discussed. These variations include: the presence/absence of a pre-advice decision, the number of advisors, the amount of interaction between the decision-maker and the advisor(s) and also among advisors themselves, whether the decision-maker can choose if and when to access advice, and the type of decision-task. Several ways of measuring advice utilization are subsequently contrasted, and the conventional operationalization of "advice" itself is questioned. Finally, ways in which the advice literature can inform selected topics in the organizational sciences are discussed.

Keywords: Judge–advisor system; JAS; Advisor; Advice; Advice giving; Advice taking; Utilization; Discounting; Token shift; Decision-making

Introduction

Many (if not most) important decisions are not made by one person acting alone. A new college graduate, for example, is likely to consult his or her parents and peers about which job offer to accept; similarly, a personnel manager may well ask for colleagues' advice prior to revamping the organization's compensation system. Yet, the field of judgment and decision-making has not systematically investigated the social context of decisions (e.g., Payne, Bettman, & Johnson, 1993).

One area that takes into account the fact that individuals do not make decisions in isolation is the "small groups" literature (Kerr & Tindale, 2004). However, this area typically assumes that group members' roles are "undifferentiated" (Sniezek & Buckley, 1995, p. 159)—i.e., that all members have the same responsibilities vis-à-vis the decision task. Yet, leaders often emerge (and, in general, status hierarchies materialize) from originally undifferentiated groups. In fact, one of the dimensions of individual performance often evaluated in the "leaderless group discussion" (Bass, 1954) is leadership behavior (Campbell, Simpson, Stewart, & Manning, 2003; Petty & Pryor, 1974; Waldman, Atwater, & Davidson, 2004). In most real-world social organizations, moreover, role structures are formalized and contributions to decisions are commonly unequal (Katz & Kahn, 1966). Numerous important decisions therefore

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appear to take place within a structure that is not well captured either by an individual acting alone or by all group members acting equally (Brehmer & Hagafors, 1986; Sniezek & Buckley, 1995). Specifically, decisions are often made by individuals after consulting with, and being influenced by, others. It is to model such decision-making structures that research began to be conducted on advice-giving and advice-taking during decisions.

Impetus for the review and organization of the current paper

The impetus for this review is manifold. Although research on advice giving and taking is about two decades old (see Brehmer & Hagafors, 1986, for the first published paper), there has not yet been a comprehensive attempt to integrate the findings from, and identify the strengths and weaknesses of, the extant research. This paper attempts these tasks. The current review begins descriptively and then moves progressively toward greater evaluation. To this end, we first describe the terminology used in the paper and outline a prototypical study. Next, we review the central findings of the advice-giving and advice-taking literature. Following this section, we discuss several variations of the experimental design that have important implications for the questions posed and that may influence the conclusions reached in a particular study. Next, various methods for calculating advice utilization are described and critiqued. After this, the dominant definition of "advice" itself (and hence, indirectly, of advice utilization) is questioned. We moreover believe that the advice literature is now mature enough to inform, and be informed by, other areas of research—particularly in the organizational sciences. To this end, we conclude this paper by discussing a number of research topics with connections to advice taking and advice giving. However, one such topic—Hierarchical Decision-Making Teams (HDT; e.g., Hollenbeck et al., 1995; Humphrey, Hollenbeck, Meyer, & Ilgen, 2002)—is a subset of the larger "Judge–Advisor System"[1]; relevant HDT findings will therefore be reviewed throughout the paper.

An alternative approach would have been to structure this review around a comprehensive theory of advice giving and taking. Unfortunately, no such theory exists—perhaps because of the breadth of research questions addressed thus far (see Hollenbeck et al., 1995, for a more narrowly focused theory applicable to HDTs), and, as mentioned previously, the relative youth of this research area. In fact, one of the motivations for this review was to aid in theory generation by summarizing relevant research findings and by raising questions that a comprehensive theory of advice will need to address.

Terminology and description of prototypical study

Before reviewing research findings, it is necessary to describe the terminology used in this paper. Following most of the advice-taking research (e.g., Harvey & Fischer, 1997; Yaniv, 2004b), the term "judge" refers to the decision-maker—the person who receives the advice and must decide what to do with it. The judge is the person responsible for making the final decision. The "advisor" is, as the name implies, the source of advice or suggestions.[2] In addition, most studies have conceived of "advice" in terms of a recommendation, from the advisor, favoring a particular option. For instance, if the judge has to choose between three options, he or she would typically receive advice like: "Choose Option X." A few studies of advice have, in addition, allowed expressions of confidence or (un)certainty related to the recommendation—e.g., "Choose Option X; I am 85% sure that it's the best option." (As we discuss later in the paper, there is reason to question the appropriateness of definitions of advice that focus solely on recommendations.)

In a "prototypical" Judge–Advisor System (hereafter, "JAS") study, participants enter the laboratory and are randomly assigned to the role of "judge" or "advisor." They are informed that the judge, not the advisor, must make the final decision(s); as such, it is up to the judge to determine whether he or she should take the advice into consideration at all, and, if so, how much weight the advice should carry. Manipulations of independent variables (expertise differences between judges and advisors, type of financial incentives for JASs across conditions, etc.) are then effected—typically in a between-subjects fashion. Next, both JAS members read information about the decision task. The judge makes an initial decision. He or she may also be asked to express a level of confidence regarding the accuracy or effectiveness of the initial decision. Simulta-

[1] In fact, the HDT paradigm was specifically formulated to explain instances in which the decision-maker and multiple advisors always: share common outcomes, communicate with one another and with the decision-maker in real time, and work together over a number of trials on a quantitative judgment task on which they receive accurate performance-related feedback. Though the HDT literature regularly references the Judge–Advisor System, the converse is not true. Through this review, we hope to make Judge–Advisor System researchers more aware of the HDT literature (including its roots stretching back to Brehmer & Hagafors, 1986).

[2] To avoid confusion, the terminology of authors (e.g., Budescu & Rantilla, 2000) who use the term "judge," "advisor," or "expert" interchangeably to refer to the person providing advice will not be employed in this paper. Furthermore, though some studies (e.g., Heath & Gonzalez, 1995) were not explicitly conducted with the JAS in mind, they are nonetheless highly informative and will therefore be included in this review. When this is the case, the JAS language is used to describe their manipulations and findings.

neously, the advisor is asked to make a recommendation to the judge—accompanied, perhaps, by an expression of confidence. Next, the advisor's recommendation is conveyed to the judge (the advisor, in contrast, is typically unaware of the judge's initial decision). The judge weighs his or her own initial decision and the advisor's recommendation and arrives at a final decision and, perhaps, a confidence estimate. The judge's final decision can often be evaluated in terms of accuracy or effectiveness. In many instances, the judge is required to make not one but a series of decisions; therefore, after the judge makes a final decision, he or she moves on to the next decision task.

It should be noted that this "prototype" does not represent any JAS study perfectly; in fact, it represents some rather poorly. Note also that the JAS operates within the context of the specific decision task(s) employed by researchers. Both these issues are discussed later. We begin our review, however, with an explication of some of the important findings from the literature.

Central findings of the advice literature

To provide a framework for the central findings of the advice literature (and the subsequent section on experimental design), we propose an input-process-output model for the JAS. In so doing, we borrow from the literature on (undifferentiated) small groups (e.g., Hackman, 1987).

The "input" category in our model comprises individual-level, JAS-level, and environment-level factors. Individual-level inputs include role differences (e.g., differences between the advisor and judge roles), individual differences (e.g., *characteristic* levels of accuracy and confidence), and individual task-related preferences (e.g., the advisor's recommendation and confidence, and the judge's pre-advice opinion and confidence, *on the decision task at hand*). JAS-level inputs include JAS structure (e.g., whether the judge is allowed to form a pre-advice opinion, and whether the judge has a choice about whether to solicit and/or access advice) and JAS size (e.g., the number of advisors from whom a judge receives advice). Environment-level inputs include task type (i.e., the type of decision-task facing the JAS—e.g., a choice among discrete alternatives or a quantitative judgment) and reward structure (e.g., the presence and amount of financial incentives, whether they are tied to decision accuracy, and their distribution among the judge and advisors).

The "process" category comprises intra-JAS interaction (i.e., interaction between the judge and an advisor, or between two advisors). The "output" category comprises advice utilization (or discounting), the judge's post-advice accuracy and confidence, and JAS-member satisfaction and willingness to continue in the JAS.

We begin our review of the "central findings" in the advice literature with advice utilization (an output), perhaps the single most studied aspect of the JAS. Other central findings include those concerning advisor confidence (an input) and judge confidence (an input in the case of judge pre-advice confidence, and an output in the case of judge post-advice confidence), the accuracy of the judge's post-advice decision (an output), and the difference between advisors and "personal decision makers" (an input).

Advice utilization or discounting

Advice utilization refers to the extent to which the judge follows advice; advice discounting, conversely, refers to the extent to which the judge does not follow advice. As described in this section, advice utilization (or discounting) is posited to influence the judge's post-advice decision; however, much research has studied this construct as a criterion in its own right.

Decision-makers seek out and attend to advice in order to share accountability for the outcome of the decision and to improve the probability that their decisions will be accurate or optimal (Harvey & Fischer, 1997; Yaniv, 2004a, 2004b). For instance, interacting with others prior to making a decision forces decision-makers to think of the decision problem in new ways (Schotter, 2003) and provides decision-makers with new information or alternatives not previously considered (Heath & Gonzalez, 1995). In addition, receiving advice from a credible source reduces the effects of framing (Druckman, 2001). Many scholars maintain that there are indeed accuracy benefits to be gained by integrating advice that comes from multiple—preferably independent/uncorrelated (Soll, 1999; see also Johnson, Budescu, & Wallsten, 2001)—sources, and that perhaps as few as three to six sources would be sufficient (Budescu & Rantilla, 2000; Yaniv, 2004a; Yaniv & Kleinberger, 2000). The aforementioned reasons pertain to decision quality. However, there are also social reasons for taking advice. Sniezek and Buckley (1995) indicated the possibility of social pressure not to reject freely offered advice: such advice, if rejected, may not be proffered again in the future.

Yet, one of the most robust findings in the JAS literature is that of "egocentric advice discounting" (e.g., Yaniv, 2004b; Yaniv & Kleinberger, 2000). That is, most JAS researchers have noted that judges in their experiments did not follow their advisors' recommendations nearly as much as they should have (to truly have benefited from them). Although advice generally helps improve judges' accuracy, judges tend to overweigh their own opinion relative to that of their advisor (e.g., Gardner & Berry, 1995; Harvey & Fischer, 1997; Yaniv & Kleinberger, 2000). In fact, Harvey and Fischer (1997, see also Soll and Larrick, 1999) observed that judges

tended to shift a "token" amount—about 20% to 30%—toward their advisor's initial estimate.

Yaniv (2004a, 2004b; Yaniv and Kleinberger, 2000) has contended that advice discounting occurs because judges have access to their internal justifications for arriving at a particular decision as well as to the strength of the supporting evidence for that decision. In contrast, they do not have access to the advisors' reasoning, and, hence, have access to less evidence justifying the advisors' decisions. Advice discounting could also occur because of the anchoring and adjustment strategy (e.g., Tversky & Kahneman, 1974) such that the judge's initial decision serves as the anchor that is subsequently (insufficiently) adjusted in response to the advisor's recommendation (Harvey & Fischer, 1997; Lim & O'Connor, 1995).

In contrast to these explanations, Krueger (2003) argues that discounting may occur because of an egocentric bias. That is, judges may prefer their own opinions because they believe them to be superior to those of others—including the advisor. Krueger notes that decision-makers display this egocentric bias even when they are making judgments about novel situations or when they receive advice prior to seeing the decision task. In the former case, judges cannot rely on their own supporting evidence for a position (Cadinu & Rothbart, 1996); in the latter case, there is no initial decision to serve as an "anchor" (Clement & Krueger, 2000). In addition, Harvey and Harries (2004) argue that egocentrism (or conservatism, in their words) is different from anchoring. They argue that anchoring is a temporary and short-term process whereby an anchor is used in evaluation of the new stimulus. On the other hand, egocentrism/conservatism specifically refers to the long-term influence of one's own opinion. This opinion exerts influence "without being disrupted by the appearance of intervening values that would displace anchors from working memory" (Harvey & Harries, 2004, p. 399). Harvey and Harries' results strongly favor the egocentrism/conservatism account of discounting rather than the anchoring and adjustment one. Specifically, their results demonstrated longer-term effects of a presumed anchor than those usually associated with the anchoring and adjustment paradigm. In addition, their results showed that decision-makers gave greater weight to someone else's forecasts incorrectly labeled as their own than to correctly labeled others' forecasts. Given that the incorrectly labeled forecast was novel to decision-makers, it could not have served as an anchor; yet, it could serve as the basis of an egocentric/conservative forecast.

Although egocentric advice discounting is a robust phenomenon in the literature (but see Gino, 2005; Schotter, 2003, for possible exceptions), some aspects of the JAS context—all inputs in the input-process-output model—seem to ameliorate (though typically not eliminate) it. It appears that advice is perceived as more helpful and less intrusive if proffered by an expert source (Goldsmith & Fitch, 1997) and that expert advice is more influential than novice advice is (Jungermann & Fischer, 2005). In essence, when advisors have greater task-relevant expertise or knowledge, they possess "expert power" (French & Raven, 1959; also see Birnbaum & Stegner's, 1979, discussion of source credibility). Consequently, less egocentric discounting is displayed by judges who are less experienced or knowledgeable relative to their advisors (e.g., Harvey & Fischer, 1997; Sniezek, Schrah, & Dalal, 2004; also see Dalal, 2001, for related findings) and/or relative to other judges (Harvey & Fischer, 1997; Yaniv, 2004b; Yaniv & Kleinberger, 2000; Yaniv & Milyavsky, in press). These findings are in line with Yaniv's (2004b) reasoning that discounting occurs because of greater evidence retrieval for one's own opinion relative to the advisor's (similar arguments were made by Koehler, 1994, in discussing the differences between generating one's own hypotheses and evaluating the hypotheses of others). Indeed, Yaniv concluded that less knowledgeable judges could presumably retrieve less supporting information for their own opinion and therefore discount advice less than more knowledgeable judges. Given that Yaniv did not measure information retrieval, future research should include such measures to test this conjecture.

As might be expected from the findings on expertise, advice taking has also been linked theoretically (Jungermann, 1999) and empirically (Yaniv & Kleinberger, 2000; Yaniv & Milyavsky, in press) to the quality of the advice (an input in the input-process-output model). Not surprisingly, judges discount poor (inaccurate) advice more than they discount good/accurate advice (although they may also discount good advice: Gardner & Berry, 1995; Lim & O'Connor, 1995; Yaniv & Kleinberger, 2000). In addition, judges' weighting policies are sensitive to changes in the quality of advice: whereas a good reputation is gained with difficulty, it is easily lost when the quality of advice decreases. Therefore, judges quickly learn to discount poor advice (Yaniv & Kleinberger, 2000). The differential quality of a group of advisors' past recommendations, moreover, may influence judges' use of present recommendations and, ultimately, decision accuracy (Redd, 2002). Finally, judges use information and explanations about their advisors' forecasting strategies as a way to infer advice quality; yet, judges' inferences of quality may not always be correct (Yates, Price, Lee, & Ramirez, 1996). Note, in addition, that whereas expertise has typically been construed as task-relevant expertise, judges also appear to be more responsive to advice from those with greater age, education, life experience, and wisdom than themselves (Feng & MacGeorge, 2006).

Advice discounting is also affected by the presence of performance-contingent financial incentives/rewards,

which functions as an input in the input-process-output model. Although numerous studies (e.g., Budescu & Rantilla, 2000; Dalal, 2001; Yaniv, 2004b) have made incentives available to their JASs, not all of these studies *manipulated* their presence or amount. Most of those that did involve such a manipulation found that incentives reduce advice discounting (Sniezek & Van Swol, 2001; Sniezek et al., 2004; but see Dalal, 2001). This is consistent with Camerer and Hogarth's (1999) conclusion that incentives increase effort (though not necessarily accuracy).

The JAS member responsible for allocating the financial incentive is said to hold "reward power" (French & Raven, 1959). In general, results indicate that advice discounting is less pronounced when judges, rather than advisors, have reward power (Sniezek & Van Swol, 2001; but see Van Swol & Sniezek, 2005), or when judges allocate incentives to expert advisors prior to the advising interaction (such that they are, in essence, pre-paying for expert advice; Sniezek et al., 2004). Gino (2005) also found that judges weighed purchased advice more heavily than they weighed free advice. She argued that such behavior is consistent with the tendency to escalate commitment to a "sunk cost" (a course of action in which one has previously invested time, money and/or effort; Arkes & Blumer, 1985).

In contrast, Dalal (2001) found *increased* advice discounting in the presence of financial incentives for pairs of JASs playing the prisoner's dilemma game against each other. Dalal concluded, based on exploratory analyses, that the presence of financial incentives motivated both advisors and judges to decrease adherence to their respective sources of expertise: advisors departed from the Tit-for-Tat strategy (Axelrod, 1984) they had been trained to use, whereas judges decreased advice utilization. In this case, the advisors' behavior primarily represented an attempt to break the cycle of mutual defection by recommending unilateral cooperation; however, judges did not go along with these proposals—perhaps because their own analysis of previous trials suggested that the opposing JAS would exploit, rather than reward, unilateral cooperation.

Financial incentives can also be used to manipulate the extent of "outcome interdependence" between judges and advisors. When provided, incentives have usually involved a monetary award to both the judge and the advisor contingent on the judge's final decision accuracy. However, situations could easily be set up wherein the judge's successful performance results in money for the judge but not for the advisor, or for the advisor but not for the judge. Alternatively, whereas the judge could be rewarded contingent on his or her successful performance, the advisor could be rewarded contingent on the judge's *unsuccessful* performance. In such situations, the goals of the judge and advisor are incongruent (in the terminology of agency theory, there is an "agency problem"; Eisenhardt, 1989). Judges would be expected to discount advice to a greater extent if they knew, or even erroneously suspected, that their advisors' goals differed from their own. That is, one would predict that judges' trust in their advisors will be positively related to advice taking (see also Jungermann, 1999; Jungermann & Fischer, 2005). Some empirical evidence indicates that this is indeed the case (Sniezek, Heath, Van Swol, & Nochimowski, 1998; Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005).

Other aspects of the decision-making context also appear to have an impact on advice discounting. Judges who solicit advice are more likely to follow that recommendation than are judges who receive advice without requesting it (Gibbons, Sniezek, & Dalal, 2003; see also Deelstra et al., 2003, for a discussion of potential detrimental effects of imposed help). Judges also appear to discount advice less when tasks are complex (Gino & Moore, in press; Schrah, Dalal, & Sniezek, 2006). Judges' individual differences in autonomy also seem to influence advice acceptance from expert sources (Koestner et al., 1999). Moreover, judges are more likely to follow the advice when advisors make decisions for themselves in a manner consistent with their recommendations to the judge (Schotter, 2003).

Finally, advice discounting has been linked to the persuasion and attitude change literature. For example, discounting increases as the distance between the judges' initial opinions and the advisors' recommendations increases (Yaniv, 2004b; Yaniv & Milyavsky, in press), an effect similar to that found in classic studies of attitude change (e.g., Bochner & Insko, 1966; Sherif & Hovland, 1961). Yaniv also noted that this effect was particularly pronounced for more knowledgeable judges. In addition, Harries, Yaniv, and Harvey (2004) reported that judges tend to discount advisors whose recommendations are very different from those of other advisors (i.e., judges discount outlying advice). Relatedly, advice taking is linked to the literature on belief updating. Thus, advice taking or discounting could operate according to Hogarth and Einhorn's (1992) belief adjustment model. Over-reliance on the judges' initial opinion could be a function of, among other things, how the information is encoded (i.e., relative to the pre-advice opinion or a constant), task length (here, the number of pieces of advice received), the complexity of the information, and how the information is processed (i.e., if judges can process advice in a step-by-step manner, or if they have to wait until after all advice has been received prior to processing it). A full investigation of Hogarth and Einhorn's model in the context of the JAS has not yet been conducted.

In conclusion, and at the risk of oversimplifying, advice discounting may well be a function of the judge's estimates of the potential costs and benefits of advice (Schrah et al., 2006). The potential benefits of advice

are greater decision accuracy (and its likely consequences, monetary and otherwise) and shared responsibility for the decision, whereas the potential cost is greater effort (as well as perhaps some monetary expenditure). Whether or not the judge utilizes advice depends on whether he or she believes that the potential benefits outweigh the potential costs. Cost-benefit judgments will be adjusted to match the situation; in that sense judges, like individual decision-makers, are "adaptive" (Payne et al., 1993) even though they are only partially sensitive to changes in task characteristics relevant to benefits and costs (Connolly & Gilani, 1982; Harvey & Bolger, 2001). For example, judges may make the effort to avoid using only easily accessible information and may consciously ensure that they adjust to a greater extent than they normally would from their pre-advice decisions in response to the advice if the stakes for making a correct decision are high (e.g., performance-contingent financial incentives are available) and if the advisor is known to be trustworthy (i.e., expert and well-intentioned). On the other hand, judges who are making routine, low-stakes decisions that fall squarely in their area of expertise are unlikely to take advice if they have to pay (monetarily or otherwise) for it and if the advisor was not previously known to them. Thus, as Schrah et al. (2006) argue, a cost-benefit perspective is likely to provide a useful framework (though not a sufficient one; Connolly & Gilani, 1982; Harvey & Bolger, 2001) for a theory of advice discounting.

Judge and advisor confidence

Another characteristic of the JAS that has received considerable research attention is the amount of confidence expressed by either the advisor or the judge. A judge's pre-advice confidence and the advisor's confidence function as inputs, whereas the judge's post-advice confidence functions as an output. Confidence has operationally been defined as an expectation (e.g., via a probability estimate or a rating on a Likert-type scale) of the extent to which a decision/opinion/recommendation is correct, or as a range of values within which the correct answer should fall (i.e., a subjective confidence interval; Klayman, Soll, Gonzalez-Vallejo, & Barlas, 1999).

Most research on advisor confidence has focused on confidence vis-à-vis the decision task in question as opposed to habitual levels of (i.e., individual differences in) confidence. On a decision task, expressed or inferred advisor confidence can serve as an important source of information. For instance, Price and Stone (2004) have argued that judges rely on a "confidence heuristic." That is, judges use the advisors' confidence to infer their ability, expertise, task-related knowledge, or accuracy (also see Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001). Similarly, the width of the confidence interval can be a cue to the advisor's perception of his or her own knowledge (Yaniv, 1997; Yaniv & Foster, 1997).

It has been found that recommendations given by more confident advisors are followed more often than those given by their less confident counterparts (Lawrence & Warren, 2003; Phillips, 1999; Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005; Yaniv, 1997). Further, Price and Stone (2004) found that judges even preferred overconfident advisors to appropriately confident advisors. This raises the interesting possibility that advisors can strategically use expressed confidence levels as a means to influence judges (Hollenbeck et al., 1995; Sniezek & Buckley, 1995; Yates et al., 1996). However, there are probably limits to the extent to which advisors can inflate confidence in order to wield greater influence. For instance, extreme advice (e.g., probabilistic forecasts close to 100% on a two-option choice task, where the probability of a guess would be 50%) may be interpreted not as confidence but rather as recklessness (Yates et al., 1996). In addition, confidence levels appear to be less influential than agreement between advisors (Sniezek & Buckley, 1995).

It is interesting to note that advisors' confidence levels are not always a valid cue to advice accuracy. In other words, the correlation between an advisor's reported confidence level and his or her accuracy is sometimes low. Thus, while some studies have found that confidence ratings were valid cues of advice quality (e.g., Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005), others have not (e.g., Gibbons et al., 2003; Phillips, 1999). The difference may be due to the fact that Sniezek and Van Swol (2001; Van Swol and Sniezek, 2005) had specifically paired expert advisors with novice judges.

Judges' own confidence has also been investigated. Again, the focus has typically been on judges' pre-advice and post-advice confidence on the decision task in question rather than on judges' habitual levels of confidence. The confidence of judges in their pre-advice decisions is related to the number of advisors from whom they solicit free advice, such that less confident judges seek greater amounts of advice (Cooper, 1991). In turn, judges' confidence in their post-advice decision appears to be influenced by a number of variables. Post-advice confidence increases with increasing advisor accuracy (Budescu, Rantilla, Yu, & Karelitz, 2003). Confidence levels are also higher when judges receive recommendations from multiple advisors, when there is a greater amount of information on which advisors can base their recommendations, and when there is greater overlap in the information seen by the advisors (Budescu & Rantilla, 2000; Budescu et al., 2003).

However, the level of agreement among advisors appears to influence confidence ratings such that when advisors disagree with each other, judges' post-advice confidence is low (Budescu et al., 2003; Savadori, Van

Swol, & Sniezek, 2001; see also Sniezek & Buckley, 1995)—especially if judges believe that the disagreeing advisors had access to the same information (Budescu & Rantilla, 2000). Moreover, the effort necessary to process and react to an advisor's recommendation is related to judges' post-advice confidence in their decisions: higher effort leads to higher post-advice confidence (Kuhn, Spurlock, & Sniezek, 1998; see also Paese & Sniezek, 1991). Finally, judges' confidence in their decision is higher post-advice than pre-advice (Heath & Gonzalez, 1995; Savadori et al., 2001), perhaps because the process of interacting with the advisor(s) leads judges to construct a rationale for their decision (Heath & Gonzalez, 1995).

Some researchers have also found that judges are overconfident in their judgments. Although it has been the focus of much research attention in the decision-making literature as a whole (e.g., Klayman et al., 1999), overconfidence (or, conversely, underconfidence) has seldom been explicitly investigated in JASs. Sniezek and Buckley (1995) found that the judges who had access to the least amount of task-specific information, and consequently had to fully rely on their advisors' recommendations, were the most overconfident in their choices (underconfidence was not displayed). However, judges who received conflicting recommendations from their advisors were not overconfident. Furthermore, Heath and Gonzalez (1995) demonstrated that interaction between decision-makers, in which advice could be exchanged, did not necessarily increase accuracy but did increase confidence—and hence overconfidence.

It is particularly important to note that the overconfidence literature indicates that the prevalence of overconfidence depends on the type of task used, with overconfidence being more likely in judgment than in choice tasks (Klayman et al., 1999; Soll & Klayman, 2004). We return to task characteristics in a later section; for the time being, we suggest only that JAS researchers interested in overconfidence (and underconfidence) pay close attention to the type of task that they are employing.

Accuracy of final decisions

The accuracy of judges' post-advice (final) decisions (along with their own confidence in these decisions—discussed in the previous section), represents the end-product, or output, of the advising process.

In general, using advice has been found to increase decision accuracy (e.g., Gardner & Berry, 1995; Sniezek et al., 2004; Yaniv, 2004a; but see Heath & Gonzalez, 1995 and Van Swol & Ludutsky, 2003, for exceptions). This finding is consistent with Brehmer and Hagafors (1986) contention that relying on (expert) advisors should increase accuracy perhaps simply because relying on advice decreases the complexity of the overall decision. This increase in accuracy should occur, according to these researchers, even if advice is slightly inaccurate. In fact, Yaniv (2004a, 2004b) argues that combining the opinions of multiple, preferably uncorrelated, advisors increases decision accuracy because it reduces random error tied to each individual recommendation (see also Stewart, 2001). That is, aggregating across forecasts ensures that the resulting forecast has lower variability, lower random error, and converges towards the "true" forecast. In a related vein, optimal use of advice is improved by making the sources of advice more distinguishable from each other. For example, Harvey, Harries, and Fischer (2000) found that judges made better use of advice when a subset of advisors gave advice revealing forecasting trends that were unusual for the task (i.e., with bias equal in magnitude but opposite in direction to what is normally observed in time series forecasts), thereby making these advisors stand out.

Research has shown that judges' post-advice decision accuracy is related to three core JAS-level variables: the average amount of decision-relevant information available to advisors, the average accuracy of advisors' recommendations, and the weight the judge gives to each advisor's recommendation (Hedlund, Ilgen, & Hollenbeck, 1998; Hollenbeck, Ilgen, LePine, Colquitt, & Hedlund, 1998; Hollenbeck et al., 1995; Humphrey et al., 2002; see also Brehmer & Hagafors, 1986). When advisors have more decision-relevant information, they are on average more accurate, which in turn affects judges' accuracy to the extent that the judges are capable of discriminating between good and bad advice (and weighing the former more highly).

Various types of feedback have also been linked to increased decision accuracy. First, providing feedback on judges' own accuracy across trials improves their decision accuracy (Fischer & Harvey, 1999). Second, given the above findings on the antecedents to decision accuracy, it follows that providing feedback on these core JAS-level variables should also help with judges' accuracy—and this has been shown to be the case (Fischer & Harvey, 1999; Hollenbeck et al., 1998; Phillips, 1999). Furthermore, judges can learn to rely on outlying advisors (in spite of a natural tendency to discount dissenting opinions) if they receive consistent feedback identifying the outlying advisor as accurate (Harries et al., 2004).

Decision accuracy is also influenced by task-related experience (Hollenbeck et al., 1998, 1995; Phillips, 1999). However, the effects of both experience and feedback on decision accuracy are at least partially mediated by the three core variables mentioned above (Hollenbeck et al., 1998). Specifically, feedback influences judges' post-advice accuracy by improving their weighting strategies. In contrast, experience influences judges' post-advice accuracy by improving the accuracy of the advisors' recommendations.

Note that it is somewhat surprising that feedback improves judges' performance on advice-taking tasks. After all, decades of research on tasks such as multiple cue probability learning (hereafter, "MCPL") tasks have demonstrated that improvements due to (outcome) feedback are at best modest and, even then, occur only after numerous trials (Harvey & Fischer, 2005; Todd & Hammond, 1965). In their review of the impact of feedback across various types of decision tasks, Harvey and Fischer (2005) speculate that feedback is helpful on tasks (such as advice-taking tasks) where it provides judges with easily interpretable information concerning how their performance can be improved. Interestingly, another feature that distinguishes between performance on advice-taking and MCPL tasks is "feedforward" (i.e., expectations based on information and instructions provided by the instructor; Harries & Harvey, 2000; Harvey & Fischer, 2005). For example, judges on an advice-taking task may reasonably conclude that the correct answer lies somewhere within the range of the advisor estimates; thus, the advice (and feedback) is used effectively. Decision-makers on MCPL tasks, on the other hand, realize that the correct answer is generally not constrained to be within the range of the cue values; thus, it is much more difficult for judges to use the cue values (and feedback) effectively.

The accuracy of post-advice decisions is also affected by the precision with which advice is expressed (e.g., numerically versus verbally versus via ambiguous statements), such that more precise advice leads to better decisions (Rantilla, 2000). Other notable findings involve the role of judge and advisor individual differences in determining judge post-advice decision accuracy (LePine, Hollenbeck, Ilgen, & Hedlund, 1997). Results indicate that accuracy is highest when both judges and advisors possess higher levels of intelligence (i.e., general mental ability), and that judges or advisors with high intelligence cannot compensate for the other party's lower intelligence. Similarly, accuracy is highest with higher levels of judge and advisor conscientiousness, whereas lower levels of conscientiousness are detrimental regardless of the other party's characteristics.

Differences between advisors and "personal decision-makers"

Whereas most JAS research has taken the perspective of the judge, fewer studies have chosen to take the perspective of the advisor (Jonas & Frey, 2003). That is, most research has studied advice taking rather than advice giving. One important question that has been posed in the latter area, however, is whether people's recommendations to others differ from the choices they would make for themselves. It appears that they do: advisors tend to recommend options that most judges would prefer, whereas decision-makers choosing for themselves ("personal decision-makers") make choices consistent with their own preferences (Kray, 2000). Specifically, advisors favor the choice/alternative that has the best value on the most important attribute; personal decision-makers, on the other hand, weigh the attributes more evenly (Kray & Gonzalez, 1999). After having made an initial decision, however, personal decision-makers appear to engage in biased information search (i.e., confirmation bias), whereas advisors appear to engage in a more balanced information search (Jonas & Frey, 2003).

These differences do not seem to be due to motivational deficiencies in advisors. On the contrary, relative to personal decision-makers, advisors exhibit greater concern about the accuracy of their recommendations (Jonas & Frey, 2003; Kray, 2000) and exert more task-related effort (Kray, 2000). There is also some evidence that decision-makers want their expert advisors to employ decision-making strategies different from the ones the decision-makers would use if they were to make the decision independently (Kahn & Baron, 1995).

The aforementioned research on the differences between advisors and personal decision-makers suggests that studying situations in which people make decisions after viewing the decisions of others who had previously made the decisions for themselves is not equivalent to studying situations in which people make decisions after viewing the recommendations of advisors (the typical JAS case). Still, the ways in which observers differ from actors (see, e.g., Harvey, Koehler, & Ayton, 1997; Koehler, 1994; Koehler & Harvey, 1997) are likely to provide insight into the ways in which advisors differ from personal decision-makers.

Summary and conclusions

An interesting parallel can be drawn between the central findings of the advice literature and Lasswell's (1948) famous quotation—"who says what to whom with what effect" (p. 37)—reminding researchers studying attitude change and persuasion of the importance of the source, message, recipient and outcome, respectively. Individual differences relating to the advisor(s) and judge (e.g., their reputations and their habitual levels of accuracy and confidence) would fall under the "who" and "to whom" rubrics, respectively. "What" pertains to the accuracy and confidence of the advisor's recommendation vis-à-vis the decision task in question. It also refers, however, to the *type* of advice provided (discussed in a later section). Finally, "with what effect" refers to the extent to which the judge utilizes versus discounts the proffered advice, the extent to which the judge's final (post-advice) decision is accurate, and the extent to which the judge is confident in his or her final decision.

Several studies have investigated advice discounting and have attempted to diminish it, presumably with an eye to increasing the accuracy of the judge's final (post-advice) decision. In particular, research has shown that the expertise differential between judges and advisors, advice quality, performance-contingent financial rewards, trust in advisors, and advisors' confidence in their recommendations all influence advice utilization. Future research should assess which of these variables are more important in predicting advice utilization/discounting, and which are less important (e.g., Azen & Budescu, 2003).

Existing research has also examined factors responsible for influencing judges' post-advice accuracy and confidence. In the case where multiple advisors are available, we see some evidence for why accuracy and confidence do not move in tandem. Decision accuracy is increased when each recommendation, while (relatively) accurate, is uncorrelated with the other recommendations (e.g., because each advisor examined unique/non-shared information). In contrast, decision confidence is increased when each recommendation is strongly correlated with the other recommendations, even if the recommendations are not accurate. Future research should continue to explore this disconnect.

It is worthwhile mentioning that some of the aforementioned findings—for example, the tendency of judges to discount advice, and the benefits to judges' decision accuracy from combining multiple sources of advice—were anticipated by findings in the literatures on forecasting and decision aids (see Clemen, 1989; Collopy, Adya, & Armstrong, 2001; Harvey, 2001; Stewart, 2001). Forecasting studies and studies involving the use of decision aids are not isomorphic with studies of advice utilization. Motives such as sharing responsibility for the decision and avoiding the appearance of rejecting help (Harvey & Fischer, 1997) become salient only in the case of human advisors.[3] However, some JAS studies—e.g., those involving simulated advisors (and, consequently, no interaction or outcome interdependence between judges and advisors)—do begin to resemble the forecasting and decision aid studies. More generally, one could question the extent to which experimental design has an impact on research findings. This issue is addressed further in the subsequent section of the paper.

Finally, extant findings also suggest a profitable avenue for future research. JAS research would benefit from recognition of the dependencies between variables and an examination of the judge–advisor "system" as a whole. This would involve a model in which not only the *direct* effects of the independent variables on judge final accuracy and confidence, but also the *mediated* effects (via judge initial accuracy and confidence, advisor accuracy and confidence, and advice utilization), are examined simultaneously—probably via path analysis. Research conducted under the rubric of hierarchical decision-making teams (e.g., Hollenbeck et al., 1998) has adopted such an approach. Among JAS studies, Sniezek et al. (2004) attempted something along these lines (though they did not discuss confidence). Sniezek et al. found that: (1) the direct effects of their independent variables (advisor expertise, and financial incentive allocation timing) on judge final accuracy were generally negligible, and (2) relationships between independent variables and judge final accuracy were mediated to a much greater extent by advisor accuracy and judge initial accuracy than by advice utilization.

Experimental design

There have been many variations on the basic experimental design described previously. To understand their potential effects, we return to the input-process-output model described previously. Here, in the "input" category, we consider: (1) whether the judge is allowed to form a pre-advice opinion, (2) whether the judge has a choice about whether to solicit and/or access advice, (3) the number of advisors from whom the judge receives advice, and (4) the type of decision task facing the JAS. In the "process" category, we consider the extent of interaction between the judge and his or her advisors and also between the advisors themselves.

As others (e.g., Van Swol & Sniezek, 2005) before us have also noted, variations in experimental design are important because they have the potential to influence the last category: "output" (including, but not limited to, advice utilization and the judge's post-advice accuracy and confidence). In fact, these variations may have implications for *which* outputs are studied. Although systematic investigations of the effects of experimental design variations are unfortunately few and far between, some preliminary conclusions can be reached and some additional questions can be raised.

Absence of a pre-advice judge decision

The timing of advice acquisition should be an important consideration for researchers interested in studying advice taking and giving. The designs of several studies have precluded judges from forming pre-advice opinions (e.g., Budescu & Rantilla, 2000; Harvey et al., 2000; Sniezek & Van Swol, 2001). Most often, these experiments have asked judges to familiarize themselves with the decision task at the same time that they received their advisors' recommendations. Here, judges do not have a chance to access their internal information regarding

[3] Moreover, as discussed later, recommendations (provided by decision aids or advisors) are prescriptive whereas information (used in forecasts) is descriptive or, at the very least, is seen by the decision-maker as being descriptive.

the task before they receive the advice; in other words, the advice "cues" judges toward the option(s) recommended (Sniezek & Buckley, 1995). Cueing has been shown to increase decision-makers' overconfidence (Ronis & Yates, 1987; Sniezek & Buckley, 1995), perhaps because decision-makers process uncued alternatives more superficially (Sniezek, Paese, & Swithers, 1990; see also Koehler's, 1994, research showing that confidence is lower when one's own hypotheses are generated than when others' hypotheses are evaluated).

Asking judges to make pre-advice decisions also allows for the possibility that judges might convey these pre-advice decisions to advisors before advisors provide their recommendations. To our knowledge, only one study that incorporated pre-advice decisions actually allowed for this possibility (Gibbons et al., 2003). In that study, advisors were free to offer unsolicited advice and often did so when their opinion conflicted with the judge's initial opinion. It would be interesting to determine whether, and if so how, advising interactions are altered when advisors have access to judges' pre-advice opinions. For instance, one can ask whether advisors change their recommendations or confidence after accessing their judges' initial decisions.

We believe that the question of whether a pre-advice judge decision should be incorporated in the experimental design is an important one. Certainly, some research questions (e.g., investigating how judges aggregate multiple pieces of advice in situations where the judges themselves do not have the capacity to make intelligent decisions; see Budescu & Rantilla, 2000; Budescu et al., 2003) would make the incorporation of judge initial opinions counterproductive. In other circumstances, however, it would be beneficial for researchers to measure judges' initial opinions. As we discuss later, and as others (e.g., Van Swol & Sniezek, 2005) have also noted, judges' pre-advice decisions can serve as the baseline for evaluating advice utilization (or discounting). In addition, it is important to know whether the very act of asking judges to provide initial opinions makes them more resistant to advice. If advice utilization is influenced by the mere presence of a judge's pre-advice decision (as Sniezek & Buckley, 1995, suggest), we should be cautious in comparing results from studies that contain pre-advice decisions with those that do not.

Guaranteed versus solicited versus unsolicited advice

In the traditional JAS, advice is guaranteed and is imposed on judges. In other words, advisors can decide neither whether to provide advice nor when to provide it. Similarly, judges can decide neither whether to view (i.e., access) advice nor when to view it. Some experiments have, however, employed designs in which judges controlled when, if at all, they wanted to solicit advice. It appears that judges tend to seek out more advice from accurate advisors (Yaniv & Kleinberger, 2000; Experiment 4), and judges' uncertainty regarding their initial decision predicts advice seeking (Cooper, 1991; Gibbons et al., 2003). Also, if given the freedom to solicit advice at any stage during a complex decision problem, most judges opt to conduct a fairly substantial information search on their own (acquire "internal information," in Sniezek & Buckley's, 1995, terms) before obtaining advice ("external information") (Schrah et al., 2006). Finally, in one study, judges could decide from which advisor to seek information (Van Swol & Ludutsky, 2003). Results indicated that judges sought more task-related cues from the advisor who possessed some unique information compared to the advisor who only possessed information redundant with the judge's. Furthermore, unique information was seen as more important and influential than shared information.[4]

Yet, the evidence regarding judges' propensity to seek advice is mixed. Some studies have found that judges do not always solicit free advice (Gibbons et al., 2003) even if they know that the advice is accurate (Gardner & Berry, 1995, Experiment 3). Conversely, other studies found that free advice from expert advisors was nearly always solicited (Gino, 2005; Schrah et al., 2006), and that it was solicited more often than costly advice (Gino, 2005).

The above research suggests that it is insufficient simply to attempt to predict the extent to which judges weigh their own opinion versus one or more advisor recommendations that are automatically imposed as part of the laboratory experiment. Rather, a comprehensive theory of advice utilization should be able to predict the environmental conditions under which, the times at which, and the persons from whom judges will seek out advice, in addition to how heavily judges will weigh that advice (once received).

Such a theory should also be able to predict how judges react to unsolicited advice. Here, advice is not automatically provided to judges; rather, advisors can choose if (and when) to provide recommendations. The research, though sparse, indicates rather unambiguously that unsolicited advice is poorly received. It is discounted to a greater extent than explicitly solicited advice (Gibbons et al., 2003). Moreover, whereas explicitly solicited advice is perceived as cooperative and helpful, unsolicited advice is considered to be intrusive (i.e., an attempt to "butt in"), a form of criticism (Goldsmith, 2000; Goldsmith & Fitch, 1997), and

[4] As the authors state, these results appear to contradict the (undifferentiated) "small groups" literature, which finds that group members tend to mention, and repeat, common rather than unique information (Wittenbaum & Stasser, 1996). Future research should therefore directly compare undifferentiated groups and JASs to investigate whether the divergent results are due to differing procedures, or, more interestingly, to the structure of the decision-making entity (the "undifferentiated" group versus the JAS).

inappropriate (Deelstra et al., 2003). Unsolicited help (e.g., advice and/or physical/material help), especially if offered in a directive (i.e., controlling or imposing) manner, may convey to judges that they are unable to cope with the problem autonomously and may consequently threaten their self-esteem (cf., Deelstra et al., 2003; Harber, Schneider, Everard, & Fisher, 2005; Reinhardt, Boerner, & Horowitz, 2006). Judges evaluate people providing such help unsympathetically, especially when judges are not facing a problem for which help is necessary (Deelstra et al., 2003). Advisors may sense this hostility on the part of their judges, and may be wary of providing unsolicited advice: less advice is provided unsolicited than is explicitly solicited (Gibbons et al., 2003).

Number of advisors

What seems to be a natural extension of the extant advice-taking research, but yet is presently lacking, is an investigation of how advice taking is affected by variations in the number of advisors. Past research has used one real or computerized advisor (e.g., Harvey & Fischer, 1997), two advisors (e.g., Yaniv, 1997, Studies 1 and 2), three advisors (e.g., Budescu et al., 2003), four advisors (e.g., Harvey et al., 2000), six advisors (e.g., Budescu & Rantilla, 2000; Study 1) and a maximum of ten advisors (e.g., Rantilla, 2000). In spite of the variation in number of advisors *across* JAS experiments, to our knowledge only two studies varied the number of advisors within the same experiment in an effort to determine how this would affect advice taking (Budescu & Rantilla, 2000; Yaniv & Milyavsky, in press). Budescu and Rantilla found that increasing the number of advisors made judges more confident in their final decisions, but that, regardless of the number of advisors, the aggregation model that fit judges' estimates best was simply the arithmetic mean. In addition, when judges were first asked to provide a pre-advice opinion, Yaniv and Milyavsky found that, regardless of the number of advisors, judges tended to egocentrically prefer their initial opinion in nearly 40% of decisions. When judges elected to give some weight to advisors' opinions, they tended to egocentrically discount the one or two opinions furthest from their initial opinion, and average the remaining ones.

It is interesting to note that varying the number of advisors can potentially have different effects, depending on the nature of the decision-making task. We discuss the characteristics of tasks in the next section. For now, however, we note only that Budescu and Rantilla (2000) and Yaniv and Milyavsky (in press) used tasks in which averaging across advisor recommendations was possible. Other tasks, such as the multiple choice task used by Sniezek and Buckley (1995), do not permit taking the mean across recommendations because the alternatives are qualitatively different. Consequently, judges are required to find alternative ways (such as, say, the modal recommendation) of resolving discrepancies.

It seems plausible that judges who are required to integrate advice from multiple sources are under greater cognitive pressure than judges who only have to attend to one source of advice. Further, increasing task complexity will influence the decision-maker's strategies (Payne et al., 1993). Thus, future JAS research should investigate how JAS dynamics and decision outcomes are affected by changes in the number of advisors. Finally, it would be interesting to examine the shape of the functional relationship between the number of advisors and the dependent variables most often investigated in JAS studies (e.g., advice utilization, and judge final/post-advice accuracy and confidence). For example, is judge final accuracy linearly related to the number of advisors, or are there diminishing returns to adding advisors beyond a certain number?

Type of task

In his 1984 book on (undifferentiated) "small groups" research, McGrath (pp. 53–66) lamented the lack of attention paid to the type of tasks used in research studies. He pointed out that research must either assume that all tasks are alike (an absurdity), or else must account for differences in performance as a function of task differences. He further noted that the extant research had chosen tasks arbitrarily and/or for reasons of convenience. McGrath's critique is equally relevant to JAS research.

As previously mentioned, the operation of a JAS must be seen within the context of the specific decision-task used. Some examples of decision tasks are multiple-choice questions (e.g., Sniezek & Buckley, 1995) or estimations of probabilities of occurrence of events (e.g., Budescu & Rantilla, 2000). The effects of the type of decision-task may take (at least) four forms. First, the task may directly influence the judge's pre-advice opinion, his or her post-advice decision, and/or the advisor's recommendation. Second, two different types of two-way interactions may take place: (1) the task may moderate the direct effect of the judge's pre-advice opinion on his or her post-advice decision, and (2) the task may moderate the direct effect of the advice on the judge's post-advice decision. Third, a three-way interaction may occur such that the moderating effect of advice on the relationship between the judge's pre-advice opinion and his or her post-advice decision may itself be moderated by the task. Finally, as alluded to previously, the task may be such that judges are precluded from forming a pre-advice opinion (e.g., Budescu & Rantilla, 2000). We therefore think it important to attempt a classification of JAS tasks.

One difference between tasks pertains to the measurement scale for the response expected from JAS members. That is, certain tasks require JAS members to choose among multiple qualitatively different alternatives; other tasks require them to make estimates that could vary in magnitude along a quantitative scale. This difference parallels the often-made distinction between "choice" and "judgment" (e.g., Billings & Scherer, 1988; Gigone & Hastie, 1997; Hinsz, 1999).

Choice tasks in JAS research have often taken the form of multiple-choice questions (e.g., Gibbons et al., 2003; Sniezek & Van Swol, 2001). For instance, participants were asked to select which of four answers they believed to be correct in questions such as:

"This file contains characters that are in machine readable form.

A. DOS file
B. hidden file
*C. binary file
D. root directory file"

(Sniezek & Van Swol, 2001, p. 293; asterisk indicates correct answer). In JAS judgment tasks, on the other hand, judges are not given a set of qualitatively different answers from which they must choose. Rather, judges must make quantitative forecasts or provide quantitative estimates based on their knowledge of the subject matter and/or advisors' recommendations. For instance, JAS studies have used tasks in which judges were asked to estimate sales of a product (Fischer & Harvey, 1999; Harvey et al., 2000), prices of various products (Schrah et al., 2006; Sniezek et al., 2004), the probability that an event will occur (Budescu & Rantilla, 2000; Budescu et al., 2003), the number of cattle that would die following the outbreak of a disease (Harvey & Fischer, 1997), and the dates of certain historical events (Yaniv, 2004b; Yaniv & Kleinberger, 2000).

It is interesting that many studies did not provide a rationale for selecting one type of task over another (e.g., judgment over choice, or vice versa). This is consistent with Billings and Scherer's (1988) statement, in relation to choice versus judgment tasks, that "many empirical studies seem to assume that the response mode required is an incidental aspect of the task and does not affect the conclusions" (p. 1). Yet, much judgment and decision-making research has indicated that response mode does influence decision processes (Gigone & Hastie, 1993, 1997; Hinsz, 1999; Payne et al., 1993). For instance, Billings and Scherer (1988) found that choice tasks give rise to more non-compensatory decision strategies than do judgment tasks.

Another distinction between types of tasks comes from Laughlin (1980), who argued (in the context of undifferentiated small groups) that tasks differ in terms of whether a "correct" answer exists and, if so, in terms of the ease with which this answer's correctness can be demonstrated to others. On tasks for which correct answers exist and are very easy to demonstrate (e.g., "eureka" tasks), the agreement between the advisor's recommendation and the judge's final decision should be strongly predicted by whether or not the advisor has recommended the "correct" alternative. On the other hand, advisor correctness should not predict agreement as strongly on tasks for which correct answers exist either do not exist or are very difficult to demonstrate.

In conclusion, we reiterate our contention that more attention ought to be paid to task properties. Given that the aforementioned task types appear meaningfully different, one can reasonably question whether they all elicit the same strategies. Finally, as we discuss later, the choice of task has a direct bearing on the way advice utilization is computed.

Amount of interaction between JAS members

An important consideration in terms of "process" is the amount of interaction between judges and advisors. The amount of interaction, across JAS studies, varies along a continuum ranging from full interaction to absolutely no interaction between members. Only a few JAS experiments have allowed judges and advisors to interact verbally, either in person (Savadori et al., 2001; Van Swol & Ludutsky, 2003; Van Swol & Sniezek, 2005) or via a videoconferencing system (Gibbons et al., 2003). A more restrictive interaction is found in Dalal (2001) and Sniezek and Van Swol (2001, Experiment 2). In both cases, judges and advisors were seated close to each other in the same experimental room, and communicated only in writing. Even more restrictive are interactions in which judges and advisors are interacting in real-time, but cannot see each other (Sniezek & Buckley, 1995; Sniezek et al., 2004; Sniezek & Van Swol, 2001, Experiment 1). Communication in these studies was in writing, and was transported from one JAS member to another by an experimenter. Even if members of the JAS were located in different rooms (e.g., Sniezek et al., 2004), the procedures were such that judges knew that they were interacting with real participants.

In some studies, advisors and judges did not interact at all. Here, advice was collected prior to the judges' decisions. Judges were (truthfully) told that the advice came from real advisors, either subject matter experts (e.g., Schrah et al., 2006), or peers (e.g., Yaniv, 2004b; Yaniv & Kleinberger, 2000, Experiments 1–3). Finally, many JAS studies have used advice generated by the experimenter. Judges were told that the advice came from true advisors, most often subject matter experts (e.g., Brehmer & Hagafors, 1986; Budescu & Rantilla, 2000; Budescu et al., 2003; Harvey & Fischer, 1997); however, in reality, there were no advisors. Other exper-

iments also involved advice that was generated, but it does not appear from the descriptions that judges were explicitly told that the advice came from "real" people (see, e.g., Fischer & Harvey, 1999; Harvey et al., 2000).

Research on hierarchical decision-making teams, moreover, has shown that the type of allowed interaction influences decision-making accuracy. Hedlund et al. (1998) found that JASs interacting face-to-face differed from those interacting via a computer. In particular, face-to-face interactions helped advisors give more accurate recommendations and helped JASs gather more of the task-relevant available information, whereas computer-mediation helped judges effectively weigh their advisors' recommendations in terms of their quality. The latter finding may be explained by the fact that computer mediation reduces judges' reliance on cues extraneous to the accuracy of recommendations. However, face-to-face interactions led to overall better performance when the researchers statistically controlled for the amount of weight judges gave to advisors' recommendations. In addition, Colquitt, Hollenbeck, Ilgen, LePine, and Sheppard (2002) found that JAS-level openness to experience (i.e., individual openness to experience aggregated to the JAS level) moderated the effects of communication type (strictly verbal versus computer-mediated plus verbal) on accuracy, such that computer-assisted communication was most beneficial for teams that were highly open to experience.

The advisors in a JAS have typically not been allowed to interact with *each other*. But what if this were not the case? Consider, for example, the two variations on the traditional JAS described by Lualhati (1992). In the first variant, *N* advisors interacted face-to-face and provided the judge with only one group recommendation. In the second variant, which bears some similarities to the Delphi technique in the nominal groups literature (Linstone, 1978; Rowe & Wright, 1996), advisors had access to each other's recommendations but did not interact face-to-face: they used other advisors' recommendations to update their own initial recommendations, and then each of them provided the judge with an updated recommendation. The Vroom and Yetton (1973) model of leadership also allows for various forms of advisor–advisor interaction. Many additional interaction patterns could also be constructed. For example, the judge could be advised by advisors in competing coalitions with possibly conflicting goals and interaction within but not across coalitions.

The above research clearly suggests that the amount and type of interaction present in JAS experiments cannot be overlooked as simply a secondary or incidental aspect of the experimental design. Researchers face a difficult decision when designing JAS experiments, and many resolve it by taking the middle road: they trade-off some control to allow for a moderate amount of interaction. Unfortunately, limiting every JAS experiment to a particular level of interaction precludes us from investigating how social interaction affects the giving and taking of advice or whether it is appropriate to generalize results found at one interaction level to other levels. Thus, an interesting avenue for future research involves varying the interaction between JAS members within the same study. However, rather than assuming that (seemingly) qualitatively different "types" of interaction will necessarily lead to different outcomes, it is preferable to adopt a theoretical approach that isolates the quantitative dimensions along which the various types of interaction may differ. One can then assess the effects of the dimensions rather than the types.

The effect of JAS members' relationships prior to the decision-task should also be explored, especially given that the closeness of the interpersonal relationship between judges and advisors may determine whether the advice is received well (Feng & MacGeorge, 2006; Goldsmith & Fitch, 1997). To date, most JAS experiments have employed judges and advisors who were strangers. One exception has been the use of classmates (Sniezek & Van Swol, 2001, Experiment 2; Van Swol & Ludutsky, 2003). Hollenbeck et al. (1995), writing from the perspective of hierarchical decision-making teams, found that advisors in teams composed of familiar members initially proposed more valid recommendations but were later surpassed by their counterparts in teams composed of unfamiliar members under conditions of instability in team-member composition (manipulated by the experimenters). Results such as these underscore the importance of studying the prior familiarity of JAS members.

Summary and conclusions

As discussed above, many aspects of the experimental design have the potential to influence decision processes and outcomes. In particular, the presence or absence of a judge pre-advice decision, whether the advice is imposed on judges, the number of advisors, the type of task employed, and the amount of interaction between JAS members all important variables in their own right. However, these variables (and their effects) have generally not been studied in a systematic manner. For the moment, therefore, researchers should be aware of the potential problem (and try to avoid it). Once a critical mass of studies pertaining to each of these variables comes into existence, meta-analytic investigations will be in order. Regression-based meta-analytic approaches (e.g., Hedges & Olkin, 1985) could be used to pit these potential moderator variables against each other. For example, is the relationship between task complexity and advice utilization moderated to a greater extent by the number of advis-

ors or by the amount of interaction between judge and advisors?

One obstacle to such meta-analytic studies, however, is that the outcomes of interest (advice utilization, and judge post-advice accuracy and confidence) have themselves been measured very differently across different studies. As can be seen in the next section, the amount of advice utilization, computed via different methods (e.g., formula versus regression), cannot necessarily be equated without access to researchers' raw data.

Measure of advice utilization

A number of measures of advice utilization have been developed by JAS researchers. Measures of advice utilization can be grouped according to whether the decision to be made is a choice or a judgment.

Advice utilization on choice tasks

As mentioned previously, choices are decisions involving qualitatively different alternatives. Thus, decision-makers may have to choose between investing in stocks or bonds or real estate, or between attending or missing work on a snowy day. On choice tasks, advice acceptance is most often operationalized as "matching," that is, a consistency between the judge's final (post-advice) decision and the advisor's recommendation (e.g., Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001). Two observations can be raised with respect to advice acceptance measures based on matching.

First, matching measures are insensitive to changes between judge's pre-advice and post-advice choices when the latter do not match the advice. For instance, when three answer choices are available, a judge could select choice "A" prior to receiving a recommendation to select choice "B," only to select choice "C" as a final answer. Presumably, this outcome is different from that of a judge who retains his or her initial position ("A," in the example); yet, measures of matching would treat them both as instances of advice discounting.

Second, matching can be examined in terms of "hold" versus "shift" decisions (Gibbons et al., 2003). "Holds" and "shifts" both pertain to cases in which the judge's final choice matches the advisor's recommendation; they differ, however, in terms of whether the judge's initial choice also matches the advisor's recommendation. "Holds" refer to situations where the judge's initial choice, the advice, and the judge's final choice are all the same alternative. In other words, the judge initially chooses an alternative, receives advice that recommends the same alternative, and does not switch to a different alternative. "Shifts," in contrast, refer to situations where the judge's initial choice conflicts with the advice, and the judge ultimately decides to switch to the alternative recommended by the advisor.

Merely assessing whether the judge's final opinion matches the advice, therefore, does not distinguish between holds and shifts. Furthermore, although it may initially appear as though "advice taking" really only occurs in the case of shifts, the possibility of it occurring during holds should not be dismissed in such a cavalier manner. The advice may have succeeded in convincing judges that their initial choices, quite possibly made under a great deal of uncertainty, were likely to be correct.

JAS researchers interested in choice tasks are therefore encouraged to include initial (pre-advice) choices for judges, as long as the research questions permit this. Moreover, it may be the case that advice utilization is best measured by assessing not only changes in choice but also changes in the associated confidence or uncertainty.

Advice utilization on judgment tasks

As mentioned previously, judgments are decisions involving estimates or forecasts of a quantitative nature. Thus, decision-makers may have to judge how much money to invest in stock, or how much earlier than usual they would need to leave for work on a snowy day in order to still make it in on time.

Because judgment tasks produce data that are at least at an ordinal level (compared to the nominal or categorical level of choice data), more options are available in terms of measuring advice taking. Generally, two broad approaches have been taken. The first approach measures advice utilization via one of several related formulae. The second approach takes a regression-based approach. We discuss each of these approaches in turn.

Formula-based approaches

Advice taking in judgment tasks has been measured via several different formulae. Each formula has advantages and disadvantages, and certain formulae cannot be applied in cases where judges were not required to provide a pre-advice estimate. However, each formula essentially weighs the extent to which the judge's final decision is a function of his or her own initial estimate versus the advisor's recommendation. In addition, as explained below in greater detail, the results obtained from the formulae are most meaningful when the judge's final estimate falls between his or her initial estimate and the advice.

Harvey and Fischer (1997; see also Sniezek et al., 2004) defined advice taking as the ratio of two differences: that between the judge's post-advice and pre-advice estimates, and that between the advisor's recommendation and the judge's pre-advice estimate. Expressed mathematically:

$$\text{Advice taking} = \frac{\text{judge final estimate} - \text{judge initial estimate}}{\text{advisor recommendation} - \text{judge initial estimate}}.$$

Yaniv (2004; see also Gino, 2005) subsequently generated a similar measure of advice weighting (weight of advice; WOA). Mathematically, this formula is expressed as:

$$\text{WOA} = \frac{|\text{judge final estimate} - \text{judge initial estimate}|}{|\text{advisor recommendation} - \text{judge initial estimate}|}.$$

Apart from the use of absolute values, WOA is equivalent to Harvey and Fischer's (1997) measure.

Another advice-taking measure encountered in the JAS literature is that used by Yaniv and Kleinberger (2000). Here, advice taking is measured as the ratio of two absolute differences: that between the advisor's recommendation and the judge's final estimate, and that between the recommendation and the judge's initial estimate. Mathematically, the weight of own estimate (WOE) is expressed as:

$$\text{WOE} = \frac{|\text{advisor recommendation} - \text{judge final estimate}|}{|\text{advisor recommendation} - \text{judge initial estimate}|}.$$

Several observations can be made with regard to these formulae. First, all three yield undefined values when the advice is equivalent to the judge's initial estimate (because the denominator is zero in such cases). As mentioned in the section on advice utilization on choice tasks, it is not necessarily true that such situations represent instances of no advice taking. Though the formulae do not indicate that advice taking is zero in such situations, they are nonetheless unable to quantify it.

Second, all three formulae do yield a value of zero under certain circumstances. Harvey and Fischer's (1997) formula and the WOA yield a value of zero (interpreted as no advice taking or a zero weight on advice) when the judge's final estimate is identical to his or her initial estimate. Yet, if, in such a situation, the denominator (i.e., the difference between the advisor's recommendation and the judge's initial estimate) were some very small (albeit non-zero) value, the advice might have served to confirm to the judge that the initial opinion was approximately correct and should therefore be maintained. It may also have been the case that though the judge did not respond to the advice by changing his or her judgment, he or she did respond by altering his or her confidence (presumably by becoming more confident in response to a small gap between the recommendation and his or her own initial estimate, and by becoming less confident in response to a larger gap). The assumption of no advice taking under such circumstances may, thus, be unwarranted.

The WOE, on the other hand, yields a value of zero (interpreted as a zero weight on own estimate) when the judge's final estimate is equivalent to the advice. Similar concerns may be raised about this assumption. In the instance of a small (albeit non-zero) difference between the judge's initial estimate and the advice, the judge may have felt comfortable adopting the advice precisely because the difference was small. Also, here too the judge's confidence may change from initial to final estimate.

Third, given a particular judge initial estimate and advisor recommendation, the WOE does not distinguish situations wherein the judge's final estimate *approaches* the advice from situations wherein it *overshoots* the advice; in contrast, the WOA does not distinguish situations wherein the judge's final estimate *approaches* the advice from situations wherein it *moves away* from the advice. As an example, consider a judgment for which the judge's initial estimate is 80 and the advisor's recommendation is 100. Here, WOE = 0.25 both when the judge's final estimate is 95 (i.e., when it approaches the advice) and when it is 105 (i.e., when it overshoots the advice); WOA = 0.75 both when the judge's final estimate is 95 (i.e., when it approaches the advice) and when it is 65 (i.e., when it moves away from the advice).

Thus, these formulae suffer from the *potential* problems of undefined or ambiguous values. Still, the observed data largely appear to cooperate with the formulae: in the overwhelming majority (perhaps up to 95%) of observed decisions, the judge's post-advice estimate appears to fall within the range of the pre-advice estimate and the advice. It is good practice for researchers using these formulae to peruse their data to determine what proportion of the decisions comprises either an "out of range" value (i.e., an instance in which the judge's final estimate overshot or moved away from the advisor's recommendation) or an undefined value. Researchers should also analyze their data both with and without these problematic values in order to determine whether the conclusions reached are identical in both cases.

Fourth, WOE and WOA both have lower bounds of 0.00 (because their numerators are absolute values) but do not have upper bounds. Values greater than 1.00 occur when the judge's final estimate overshoots the advice (WOA) or moves away from it (WOE). Harvey and Fischer's (1997) formula, in contrast, is unbounded on either side. It takes on negative values when the judge's final estimate moves away from the advice, and values greater than 1.00 when the judge's final estimate overshoots the advice. However, Harvey and Fischer noted that the vast majority of actual shifts did fall between 0.00 and 1.00.

Fifth, the formulae treat shifts that are similar in their *relative* change as equivalent. For example, according to both Harvey and Fischer's (1997) measure and WOA, a judge who shifts from 80 to 85 after receiving a recom-

mendation of 100 has shifted by the same proportion (i.e., 0.25) as another judge who shifts from 60 to 70 after receiving the same recommendation. Yet, research has shown that the distance between pre-advice estimates and advice has an influence on a judge's propensity to accept advice (Yaniv, 2004b). Thus, it is reasonable to question whether the two judges in the above example have been equally influenced by the advice.

Finally, it should be noted that, as ratios of differences, all three advice-utilization measures discussed above (WOE, WOA, and Harvey & Fischer's, 1997, index) are susceptible to the numerous (and serious) measurement problems associated with both difference scores (Cronbach & Furby, 1970; Edwards, 1995) and ratios (Cronbach, 1943; Firebaugh & Gibbs, 1985).[5]

Regression-based approaches

An altogether different way of measuring advice utilization is based on Brunswik's (e.g., 1955, 1956; see also Slovic and Lichtenstein, 1971) "lens model." Advice utilization is assessed by regressing the judge's final decision on all sources of advice simultaneously (e.g., Harvey et al., 2000; Hedlund et al., 1998; Hollenbeck et al., 1995; Phillips, 1999; see also Brehmer & Hagafors, 1986). If the judge were allowed to express a pre-advice opinion, this too could be included in the set of predictors (e.g., Lim & O'Connor, 1995). If each judge faced several decisions, it is possible to compute utilization indices within, rather than between, judges (for a discussion of utilization indices, see Cooksey, 1996; Azen & Budescu, 2003). One can use various methods of assessing the importance of each source of advice (and the pre-advice opinion, if existent): correlation or regression coefficients for each source of advice (e.g., Brehmer & Hagafors, 1986; Phillips, 1999), or increases in the percentage of criterion variance explained (i.e., ΔR^2) when the focal source is added to a model containing the other sources (e.g., Harvey et al., 2000; see also Cooksey, 1996; Azen & Budescu, 2003; Budescu & Azen, 2004).

Consider the application of a regression-based procedure like the ones described above to the standard "one Judge, one Advisor" setup, which has typified most JAS research and for which WOE, WOA, and Harvey and Fischer's (1997) measure were created. Regression-based procedures, unlike these measures, would avoid the use of difference scores and ratios. In addition, their use is consistent with the suggestion of Edwards (1995) and Cronbach and Furby (1970): if one component of a difference score is endogenous, this component should be used as the criterion in an analysis that controls for the other (exogenous) component of the difference score. (With regard to the JAS, we would typically assume that both the judge's initial estimate and the advisor's recommendation are exogenous, whereas the judge's final estimate is endogenous.) It would also be possible to further extend this procedure by examining the extent to which the interaction between the judge's initial estimate and the advisor's recommendation explains incremental variance (i.e., beyond the main effects of the variables themselves) in the judge's final estimate.

Regression-based approaches therefore possess several important advantages over the aforementioned formulae. One disadvantage of the former, however, is that advice utilization for *each judge* can only be measured when he or she makes a series of decisions. In contrast, the formulae can be used when each judge makes only one decision; alternatively, if several decisions are made, advice utilization can be assessed for *each decision* within each judge (and hence, if desired, intra-judge changes in advice utilization can be assessed). Regression-based approaches may also be problematic because the advisors may not be independent (and, consequently, their advice may be correlated) under a number of circumstances. For example, advisors will not be independent if they have access to the same information, or can discuss information prior to giving individual advice. Independence among advisors can often not be assumed; in instances where advisors' estimates are extremely highly correlated, multicollinearity may create problems if regression coefficients are used to estimate the weight the judge gives to each advisor and his or her own pre-advice opinion (if available). In these cases, it is recommended that researchers instead employ utilization indices to reflect the relative weight given to each source (see Azen & Budescu, 2003; Cooksey, 1996).

Though several utilization indices exist, two in particular bear mentioning. The first, the "usefulness index" (Darlington, 1968), is the percentage increase in criterion variance explained (i.e., ΔR^2) when the focal predictor is added to a model containing all the other predictors. (Here too, the criterion is advice utilization and the predictors are the estimates of each advisor and, if available, the judge's own pre-advice estimate.) The usefulness index is a special case of the second index, the dominance weight (Azen & Budescu, 2003; Budescu & Azen, 2004). The dominance weight (or, more specifically, the general dominance weight) is the average percentage increase in criterion variance explained (i.e., *mean* ΔR^2) when the focal predictor is added to models containing all possible subsets of the other predictors. The dominance weight therefore encompasses a predictor's direct effect (i.e., considered by itself), total effect (i.e., conditional on all other predictors—equivalent to the usefulness index), and partial effect (i.e., conditional on subsets of predictors). From

[5] Here, we are discussing advice utilization as a dependent variable. It can also be used, however, as an independent variable—for example, when predicting the accuracy of the judge's final decision. In such cases, too, these measures are problematic (cf. Edwards, 2002).

both a conceptual and empirical standpoint, the dominance weight is the "gold standard" for predictor importance indices (LeBreton, Ployheart, & Ladd, 2004).

Another disadvantage of all the aforementioned regression-based approaches is that they cannot be used when the focus is on testing the fit of various mathematical models of advice utilization to actual data (e.g., Budescu & Rantilla, 2000; Budescu et al., 2003). In particular, the fit of different advice-aggregation models on the part of the judge (e.g., median, unweighted mean, preference for one advisor only) cannot be compared in this way. Results of studies that do adopt an explicit model-testing approach indicate that judges' aggregation policies approximate the unweighted mean of the advisors' estimates (Budescu & Rantilla, 2000), or the weighted mean when judges can take additional information (e.g., the advisors' accuracy rates and the number of cues seen by each advisor) into account (Budescu et al., 2003; see also Fischer & Harvey, 1999).

Summary and conclusions

The assessment of advice utilization differs somewhat, based on whether the decision task involves choice or judgment. In either case, no method is without drawbacks. Nonetheless, the inclusion of judge initial (pre-advice) choices or judgments is desirable unless proscribed by the nature of the research questions. Moreover, in the case of judgment tasks, regression-based approaches seem preferable under most circumstances.

Diverse as they are, the advice-utilization methods reviewed above nonetheless share an important commonality: a particular definition of the term "advice." The next section questions this definition and therefore, indirectly, the definition of "advice utilization."

What is advice?

In the English language, "advice" is defined as a "recommendation regarding a decision or course of conduct: counsel" (Merriam-Webster's collegiate dictionary). In the extant JAS research, the best explication of the role of the advisor is perhaps the one given by Sniezek and Buckley (1995). According to them, advisors "formulate judgments or recommend alternatives and communicate these to the person in the role of the judge" (p. 159). Most studies, however, define advice not at the construct level, but at the operational level. The definition of advice has been determined by the experimental design, although, optimally, the converse would hold true.

In other words, research on advice giving and taking has itself paid insufficient attention to defining the term "advice." It would be preferable to base the definition of "advice" on theory and empirical results, rather than simply adopting dictionary definitions of advice. A perusal of the advice literature, and related literatures, leads us to conclude that the primary operationalization of advice as a specific recommendation (e.g., "Choose X") is overly narrow. Specific recommendations may not always match judges' goals for the advising exchange (Gibbons, 2003; Horowitz et al., 2001), and are perhaps among the less preferred forms of advice by judges (Gibbons, 2003).

Heath and Gonzalez (1995) found some evidence that advice occupies a much greater construct space than its conceptualization to date. They indicated that input from others was sought because it could help decision-makers make better decisions and avoid mistakes, help them think about new information, help them organize their thoughts, and help them become more confident in their decisions. Furthermore, advice could include the provision of social support needed for the decision.

Cross, Borgatti, and Parker (2001), too, issued a powerful appeal for a broader conceptualization of advice. According to these authors, "there has been little investigation into what really flows when organizational members go to each other for work-related advice, although it is often assumed that more than simple answers passes between the parties" (p. 216). These authors identified five types of advice: solutions, meta-knowledge, problem reformulation, validation, and legitimization. Based on multi-dimensional scaling, Cross et al. concluded that these types of advice were ordered along a single dimension in the aforementioned order, and that an advisor who provided one type of advice was also likely to provide all the "lower" types of advice. They speculated that the ordering might reflect the "semantic distance from the prototypical kind of response that we ordinarily expect when we ask others for information" (p. 220) such that advisors might naturally provide solutions first, and then the other, less concrete, types of advice. Gibbons (2003) also argued, and found supporting evidence, for expanding the construct space of advice. She proposed extending the definition of advice to include elements such as the provision of emotional support, the endorsement of the judge's initially chosen alternative, the provision of information or reasoning regarding the decision, the suggestion of a new alternative not initially considered by the judge, the provision of assistance for the judge to gain greater self-insight, and/or the provision of assistance toward the decision process. Others (Goldsmith & Fitch, 1997; Horowitz et al., 2001; Schlosser & Gelso, 2001; Whittemore, Rankin, Callahan, Leder, & Carroll, 2000) have also conceptualized the advisor's role as a provider of socio-emotional support in addition to task-related developmental recommendations, problem-solving assistance or recommendations of specific courses of action. In addition to these types of advice, behavior such as recommending *against* one or more alternatives could also be considered advice.

Extant JAS research has also included some types of behavior that could be interpreted as forms of advice. For instance, advisors have been asked to provide estimates of how confident they are in their recommendations (Savadori et al., 2001; Sniezek & Buckley, 1995; Sniezek & Van Swol, 2001), or to provide confidence intervals around their point estimates (Yaniv, 2004b; Yaniv & Kleinberger, 2000). Similarly, advisors have been asked to provide written elaborations or justifications for their recommendations (Sniezek & Van Swol, 2001; Van Swol & Sniezek, 2005; see also Jungermann, 1999) and also any additional information that the judges may specifically request (Van Swol & Sniezek, 2005).

Having a clear understanding of the diverse types of behavior that are considered part of the advice construct will improve JAS research in a number of ways. Broader definitions of advice will require researchers to formulate new measures of advice utilization/discounting and may even lead to new insights in terms of the central findings of the JAS literature. For instance, advice discounting could be less likely for emotional support, which Gibbons (2003) found to be one of the preferred forms of advice. Considering alternative forms of advice could also help uncover individual differences in preferences for giving and/or receiving specific types of advice. Moreover, the extent to which a judge utilizes a specific recommendation may depend on the temporal order of the recommendation relative to other aspects of the advice interaction (Goldsmith, 2000)—e.g., a specific recommendation may be more palatable to the judge if it follows emotional support. Thus, future research should seek to further investigate the dimensionality of advice. In particular, we believe that taking a latent factor approach to the study of the advice construct may provide this much needed clarification. Advice may best be conceptualized as a higher-order model, where the general "advice" factor subsumes a number of lower-order (i.e., narrower) advice facets. These lower-order facets could include, among others, the provision for a specific recommendation, the provision against a specific recommendation, and the provision of guidance on *how* to make a decision. We believe that the focused study of the entire construct space of "advice" is one of the most profitable (and needed) avenues for future research.

Finally, in considering what advice is and what it is not, it is important to delineate advice from information about the task obtained by other sources (direct observation, a textbook, a newspaper, an internet website, etc.). To the extent that there is similarity, as Harvey and Bolger (2001) noted, research on advice-taking should exploit what is known from research on (task) information acquisition. Schrah et al. (2006) attempted to contrast advice—defined by them as a specific recommendation from an advisor—and task information on choice tasks. According to these authors, there are two main differences. First, there is a difference in granularity. Acquiring information concerning one attribute on one alternative, in itself, provides little clue as to the correct alternative. That is, information is merely descriptive in nature. In contrast, advice constitutes a prescriptive or evaluative summary of the task information. We would caution that this distinction becomes much fuzzier when advice is construed more broadly and includes the provision of task information. Second, according to Schrah et al., there is a difference in perceived trustworthiness. Advice is often greeted with uncertainty and mistrust due to questions about the advisor's expertise and intentions. In contrast, task information is (rightly or wrongly) viewed as being factually correct—perhaps because the judge does not associate another person quite as closely with task information as he or she does with advice.

Judge–Advisor Systems and the organizational sciences

We believe that the JAS research has great potential to inform, and be informed by, other areas of psychology. Thus, this section follows Naylor's (1984) original and Highhouse's (2001) renewed call for further integration and "cross-fertilization" (Highhouse, 2001, p. 314) between judgment and decision-making research and the organizational sciences. To quote Naylor's original words, both disciplines "have much to say to each other" (p. 2). Still, as Highhouse laments, this cross-fertilization has not yet occurred to the extent that it could.

The first few sections below consider areas of the organizational sciences that could benefit from the application of findings from the JAS literature. The overarching theme here is that difficult decisions are not made in a social vacuum.

Employment decisions

Whereas employment decisions have traditionally been studied from the organization's perspective, researchers in the organizational sciences have increasingly begun to focus on the job candidate's perspective (Anderson, Born, & Cunningham-Snell, 2001). A stream of research for which the advice literature is particularly relevant is that of job choice. Applicants' employment decision-making has traditionally been studied in terms of content (i.e., which job attributes and other organization information cues interact with the job context and candidates' individual differences to influence attraction to an organization and intent to apply) and process (i.e., how job attributes are combined in order to arrive at a final decision; see Highhouse & Hoffman, 2001, for a review). Important economic variables such as the labor market have been incorporated in some employment decision-making models (e.g., Anderson et al., 2001). Yet, much of the job choice research has looked at the

job applicant as if he or she made decisions without the help of others. For instance, Slaugher and Highhouse (2003) argue that

"choices among job alternatives are almost never made in isolation. Individuals choosing among jobs are likely to consult those with whom they have social contact, such as friends, and those individuals for whom the decision will have indirect yet important consequences, such as family members" (p. 12).

Thus, the advice-taking and advice-giving literature could be informative in the investigation of the social context of job choices. Important questions pertain to the individual differences that lead job seekers to ask for advice, how often job seekers ask for advice, who they consult for advice, at what stage in the job search/choice process they seek advice, and what type of advice they seek. For example, less confident job seekers might solicit advice to a greater extent than more confident job seekers (cf., Cooper, 1991), or, relatedly, job seekers who find the job choice task to be highly difficult may seek out more advice (cf., Schrah et al., 2006). Furthermore, less experienced job seekers might discount advice less than their more experienced counterparts (cf., Harvey & Fischer, 1997).

Another important employment decision that may involve the use of advice is the decision to voluntarily quit from one's current job (see, e.g., Griffeth & Hom, 1995; Lee & Mitchell, 1994). Except when employees quit impulsively, they would presumably first discuss the issue with spouses and perhaps other individuals whose opinion is valued and/or who may be affected by the decision. Receiving advice might provide employees with previously unconsidered aspects of the decision (cf., Heath & Gonzalez, 1995). For example, talking to his or her spouse might lead an employee to realize that quitting would be very difficult given the financial costs associated with leaving the organization (i.e., continuance commitment; Meyer, Stanley, Herscovitch, & Topolnytsky, 2002), whereas advice from a coworker might make the employee realize that he or she "owes" it to the company to remain there because the company paid for his or her higher education (i.e., normative commitment; Meyer et al., 2002). Thus, advice from others might lead an employee who wishes to quit to nonetheless refrain from doing so (the converse can also happen, of course).

Mentoring

The advice literature could also be relevant for mentor-protégé interactions (see Noe, Greenberger, & Wang, 2002, for a review). In essence, mentors serve as the protégés' advisors and provide two types of support to protégés: psychological and career-related (Kram, 1983; Noe et al., 2002). Some behavior posited to fall within these two categories certainly has an advisory nature and reflects the forms of advice discussed in a previous section of this paper. For instance, many forms of psychological mentoring approximate the social/emotional support aspect of advising. Similarly, some forms of career-related mentoring include behavior such as "sharing ideas, providing feedback, and suggesting strategies for accomplishing work objectives" (Noe, 1988, pp. 459), which resemble advice in which a new course of action or a particular alternative are recommended.

Given the expertise (or at least experience) differential inherent to traditional mentoring relationships, one would argue that protégés should not be overly inclined to egocentrically discount advice. However, mentors are often not protégés' formal supervisors (e.g., Fagenson-Eland, Marks, & Amendola, 1997), which implies that their recommendations may sometimes conflict with those of the supervisors. Consequently, the protégé has to decide whether to completely discount one of the options or, if not, how to weigh each of them relative to each other and, perhaps, relative to the protégé's own initial opinion. Advice might be preferred when it is proffered by the confident advisor (cf., Sniezek & Buckley, 1995) or the advisor who has most often been correct in the past (cf., Fischer & Harvey, 1999). Alternatively, the advice that was closest to the protégé's initial opinion (cf., Yaniv, 2004a, 2004b) might be preferred.

Socialization

Organizational socialization is the process by which employees learn the knowledge, attitudes and behavior needed to become an organizational member (see Bauer, Morrison, & Callister, 1998, for a review; see also Van Maanen & Schein, 1979). The information that newcomers acquire throughout this process falls into a number of socialization domains (see Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994; Cooper-Thomas & Anderson, 2002; Morrison, 1993, 2002 for models of newcomer socialization). Though there is no overall consensus, models include (among other domains): learning how to perform one's job (i.e., task mastery), clarifying one's role in the organization, becoming part of the workgroup (i.e., social integration), learning and adjusting to the organizational culture, learning the jargon used in the organization, and learning the organizational politics. Many factors can affect the socialization process and its outcomes, one of which is the newcomer's interaction with existing organizational members, or socialization agents. These agents can aid the newcomer's learning process by providing guidance, instructions, recommendations and social support (Louis, Posner, & Powell, 1983). Many of the interactions between the newcomer and his or her socialization

agents could thus fall into one or more broad types of advice that we identify above. Furthermore, newcomers engage in proactive socialization, and actively seek out information in order to better transition to their new environments (e.g., Griffin, Colella, & Goparauju, 2000); this is akin to judges deciding from whom, and at what time(s), to seek advice.

Bauer et al. (1998) indicate that there are still many unanswered questions in the socialization literature. The JAS literature could be particularly informative for one of these: determining how socialization outcomes are influenced when newcomers receive conflicting information from various socialization agents. For instance, newcomers might receive many "insider" tips on organizational politics (e.g., whom to trust, whom to "smooth-talk") or organizational culture (e.g., the power distance between employees and their supervisors). Here again, advice given by the more confident socialization agent (cf., Sniezek & Buckley, 1995), or the socialization agent the newcomer trusts more (cf., Sniezek & Van Swol, 2001) should be attended to most. Similarly, JAS research could provide answers in terms of which type of newcomer is most likely to accept advice from his or her socialization agents. For instance, newcomers with more previous work experience might be less likely to accept advice about new or different ways in which to perform their tasks than might novice newcomers (cf., Harvey & Fischer, 1997). Thus, by being less resistant to advice, the latter group might socialize more quickly to their new organization.

The above sections illustrate how the organizational sciences could benefit from the literature on advice giving and taking. However, the latter could also benefit from the former. Two ways in which this could happen are via the investigation of topics that have been traditionally studied in small groups research, as well as through the incorporation of more individual difference research in the advice literature.

Small groups research

The research literature on small groups (e.g., Kerr & Tindale, 2004) is a source of possible future research ideas for JAS scholars despite the fact that, as we have previously argued, the JAS is different from the undifferentiated groups traditionally studied in that literature. For example, the literature on social loafing (i.e., the reduction in effort and motivation when individuals' work is pooled compared to when it is not; see Karau & Williams, 1993, for a review) could be informative in that it would indicate the conditions under which advisors would be likely to exert more versus less effort in generating accurate advice. Based on this literature, we might expect advisors to exert less effort when their performance is unidentifiable. Another interesting avenue for future research involves group mental models or shared cognitions (see Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Salas & Cannon-Bowers, 2001). When JASs interact across a long period of time (e.g., Hollenbeck et al., 1995), it is likely that shared cognitions emerge such that judges and advisors learn (among other things) which advisor holds which type of knowledge, which advisor is more accurate in which situation, and whether advisors' confidence ratings are valid cues for advice accuracy. One can argue that judges who develop a more accurate cognitive representation of their JAS will be better equipped to make use of their advisors' recommendations, and, in turn, to have more accurate post-advice choices or judgments. Finally, Kerr and Tindale (2004) have observed that the egocentric advice-discounting effect is similar to the group decision-making finding that group members' post-group discussion opinions tend to converge back toward individuals' pre-discussion opinions.

Some JAS scholars have already started to make use of this literature. Harries et al. (2004) employed research on the effects of deviant opinions in (undifferentiated) small groups to shed light on the effects of outlying advice (i.e., advice that is far removed from the other advisors' recommendations). These authors drew on theories and empirical evidence from small groups research to interpret their finding that judges tend to discount outlying advice.

Thus, although undifferentiated small groups are not isomorphic with JASs, the former literature does serve as fertile ground for the latter. Equally, however, JAS research can inform small groups research (see, e.g., Luan, Sorkin, & Itzkowitz, 2004).

Individual differences

To date, most research has studied situational factors helping or hindering the exchange of advice, leaving a class of variables relatively unexplored. The few studies that have included individual differences have found promising results (e.g., LePine et al.'s, 1997, findings concerning how decision accuracy is influenced by intelligence and conscientiousness; Harvey & Fischer's, 1997, findings concerning task-related experience and advice discounting; and Koestner et al.'s, 1999, findings concerning individual differences in autonomy and advice taking). Still, there are many more ways in which individual differences can influence the giving and taking of advice, and the organizational sciences abound with information on how individual differences influence behavior. Some of the "Big Five" factors of personality (e.g., Mount & Barrick, 1995) could be especially informative to study in the context of advice discounting. For example, judges high in conscientiousness may be less likely to discount advice, especially if the recommendation comes from an expert source. Furthermore, it is possible that advisor conscientiousness interacts with

advisor confidence in determining advice discounting: the relationship between advisor confidence and advice discounting may be strengthened when the advisor is conscientious and attenuated when he or she is not. Similarly, highly agreeable judges might be less likely than less agreeable ones to reject freely offered advice. In addition, some of the features of the "need for closure" (Webster & Kruglanski, 1994)—e.g., wanting to make quick decisions, and disliking having to deal with inconsistent opinions or evidence—would appear to make this construct relevant to studies of advice discounting. Thus, individuals characterized by a high need for closure may be less likely, compared to those characterized by a low need for closure, to take advice. Other variables worth investigating are individual differences in terms of preferences for giving or taking particular types of advice. For example, some individuals may appreciate advice on *how* to make a decision, whereas others may appreciate a recommendation on *what* to decide. Valid questionnaire measures of individuals' preferences for giving and receiving particular types of advice have not yet been constructed; this represents an important avenue for future research. Finally, individuals with frontal lobe brain lesions are likely to experience interference with proper assessment and weighting of advice (Gomez-Beldarrian, Harries, Garcia-Monco, Ballus, & Grafman, 2004), and may therefore be especially likely to discount advice. More generally, research on the neural bases for advice utilization represents a new and exciting frontier for advice research.

Conclusions

We conclude this review of the advice literature by reiterating our enthusiasm for the potential for future research it offers. We heartily concur with Payne et al.'s (1993) statement that "the social context of decisions has been a neglected part of decision research and...is an area worthy of much greater study" (p. 255). Research on the giving and taking of advice has begun to address this lacuna. It is our hope that, by consolidating the literature and suggesting avenues for future inquiry, this review will provide a further impetus for such research.

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