General Article

HOW DO PEOPLE KNOW?

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To fully understand processes of knowing and knowledge acquisition, it is necessary to examine people's understanding of their own knowing. Individual and developmental differences in what it means to know something, and hence in the criteria for justifying knowledge claims, have potentially wide-ranging implications. In providing support for a claim, young children have difficulty differentiating explanation of why a claim makes sense and evidence that the claim is true. Epistemic understanding progresses developmentally, but substantial variation remains among adults, with few adults achieving understanding of the complementary strengths and weaknesses of evidence and explanation in argument. Epistemic understanding shapes intellectual values and hence the disposition (as opposed to competence) to exercise intellectual skills. Only its most advanced levels support a disposition to engage in the intellectual effort that reasoned argument entails. The sample case of juror reasoning illustrates how epistemic understanding underlies and shapes intellectual performance.

When I claim that something is the case, how do I know? What justification do I regard as sufficient to warrant my making the claim and sufficient to demonstrate its correctness if I am asked to do so? Are there individual or developmental differences in this regard, and, if so, of what consequence are they? Most knowledge about intellectual differences addresses competencies, rather than dispositions to use competencies (Stanovich, 1999). I claim here that people's epistemologies—what they take it to mean to know something—in addition to entailing varying criteria for justifying claims, influence the ways in which they are disposed to use their intellectual skills. It is likely, moreover, that epistemologies influence the acquisition of new knowledge (Kuhn, Garcia-Mila, Zohar, & Andersen, 1995). What one takes as a reasonable standard for accepting that something is true should affect when and whether a new assertion is accepted and hence the likelihood of belief revision and conceptual change.

THEORETICAL EXPLANATION VERSUS EVIDENCE

Much of the current literature on people's criteria for justifying claims focuses on the relative strength of theoretical explanation versus evidence as justification for causal claims (Brem & Rips, in press; Cheng, 1997; Kuhn, in press; Kuhn & Felton, 2000; Rips, Brem, & Bailenson, 1999). Explanation appears to be the clear victor in this competition. Explanations of causal mechanism are more influential than covariation evidence in causal attribution (Ahn & Bailenson, 1996; Koslowski, 1996; Slusher & Anderson, 1996). People seek mechanism information rather than covariation data to test causal theories (Ahn, Kalish, Medin, & Gelman, 1995). People offer mechanism explanations rather than covariation evidence when asked to justify their causal theories (Kuhn, 1991). People are more likely to acknowledge and interpret covariation evidence if they have a mechanism theory in place (Kuhn, Amsel, & O'Loughlin, 1988). Finally, people's evaluations of individual components of an argument begin to cohere over time, so as to be consistent with the theoretical explanation on which the overall argument rests (Holyoak & Simon, 1999). People appear, then, to depend on explanations that allow their claims to "make sense," to themselves and to others.

Yet recent research shows that the preference for explanation over evidence is dependent on context (Brem & Rips, in press; Rips et al., 1999) and on the strength of the evidence (Kuhn & Felton, 2000). Also, the preference diminishes developmentally (Kuhn & Felton, 2000), and disappears (in favor of a preference for evidence) among highly able university undergraduates (Brem & Rips, in press). These findings are consequential in light of the well-noted liabilities of explanations: They lead to overconfidence, they inhibit examination of alternatives, and, most seriously, they may be false (Brem & Rips, in press; Kuhn, 1991; Shafir, Simonson, & Tversky, 1993).

In one line of work (Flaton, 1999; Kuhn, Weinstock, & Flaton, 1994; Weinstock, 1999), my students and I explored juror reasoning as a real-world context in which to examine how people justify knowledge claims. Jurors are charged with the task of making and justifying a claim that one of a set of possible verdict choices is the correct one. Our findings are consistent with the work of Pennington and Hastie (1992) in indicating that jurors commonly rely on a narrative explanation of "what happened" and endorse a verdict consistent with that narrative. We have found, however, substantial individual variation: Some individuals are characterized by a *satisficing* model, in which the construction of a plausible narrative is sufficient to dictate the corresponding verdict choice, testimony inconsistent with this narrative is disregarded, and alternatives are not considered. At the other end of a continuum lies a *theory-evidence coordination* model in which evidence figures heavily, multiple alternatives are considered, and the alternative that has the most consistent and least inconsistent evidence associated with it is the alternative that is chosen. In addition to being predictive of verdict choice, with satisficers

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more likely to endorse extreme verdicts than individuals who use the theory-evidence coordination model (Kuhn et al., 1994), these individual differences are stable: Individuals displayed similar forms of reasoning in justifying their verdict choices in two unrelated trials (Weinstock, 1999).

THE SOCIAL DIMENSION OF JUSTIFICATION

The prevalence of narrative as a mode of justification in jurors' reasoning may be regarded as further support for the power of explanation over evidence. A potential criticism of the findings from research on individual jurors' reasoning, however, is that they are a misleading product of examining thinking outside of its natural social context. People confer in addressing complex real-world problems; rarely must they act without the benefit of others' input. Indeed, the social dimension of reasoning appears particularly germane in the case of jurors' reasoning. Use of juries rests on the assumption that 6 or 12 heads will be better than one in reaching a well-reasoned and hence fair decision (Ellsworth, 1989). It is therefore consequential, both theoretically and practically, to ask whether deliberation with other jurors enhances the quality of reasoning supporting a juror's verdict decision. Two recent studies relevant to this question have produced conflicting results.

The first, by McCoy, Nunez, and Dammeyer (1999), examined college students' justifications of their verdict decisions after viewing a videotaped summary of an actual murder trial. Some students provided their justifications after participating in 12-person mock jury deliberations, whereas others provided their justifications prior to deliberation. Using the interview and coding system developed by Kuhn et al. (1994), McCoy et al. found that the group assessed after, as opposed to before, deliberation demonstrated slightly higher levels of reasoning on some of the dimensions of the coding system (see Table 1 for a list). (Performance of both groups, however, remained well below optimum.)

Participants in the postdeliberation group were asked to "report the verdict they personally believed in after deliberations regardless of the verdict chosen by their jury." Nonetheless, it is likely that these college students, who were fulfilling a course requirement, felt some demand to include in their supporting reasoning at least some representation of elements of the group discussion, especially in response to follow-up questions such as "What other factors went into your decision to choose that verdict?" "Was there any other evidence that influenced you?" and "Was there anything in the trial that suggested this was not the right verdict?" The higher performance in this condition thus supports the view that group reasoning is

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Table 1. *Dimensions of juror reasoning*

I. *Representation of verdict criteria.* Did the juror correctly represent the criteria that must be met for selection of a particular verdict, as presented in the judge's instructions?

II. *Use of evidence*
IIA. *Representation of evidence.* Testimony for each trial was analyzed with respect to the number of distinct pieces of direct evidence it contained, and the number of these mentioned by the juror was counted.
IIB. *Judgmental use of evidence.* Utterances including references to evidence were categorized based on whether they reflected direct acceptance of the evidence as fact or reflected some effort to evaluate the evidence, by assessing its credibility or meaning in relation to external, real-world knowledge, in relation to other evidence, or in relation to the witness providing it. Scores were assigned based on how frequently judgmental use of evidence appeared in the protocol.
IIC. *Synthesis of evidence.* Five types were distinguished: (a) no synthesis of evidence—the juror cited only single pieces of evidence with no attempt to connect them; (b) narrative synthesis—multiple pieces of evidence were combined into a narrative (that then served as the rationale for verdict choice); (c) simple corroboration—two or more pieces of evidence were connected in an attempt to corroborate a specific claim; (d) integration—multiple pieces of evidence were connected to build an argument that served either to support a verdict or to aid in the evaluation of other evidence; and (e) combination—integration in conjunction with one of the other types.

III. *Relation of evidence to verdict*
IIIA. *Simple argument.* In one or more arguments, accurately represented evidence was drawn on to support or discount a verdict. (Score was number of arguments offered.)
IIIB. *Counterargument.* Evidence that was not consistent with the juror's own verdict choice was cited (either spontaneously or in response to the question of whether such evidence existed). (Possible scores were "no attempt," "unsuccessful," "partially successful" [because representation of evidence or of verdict criteria was faulty], and "successful.")
IIIC. *Discounting of alternative verdicts.* An argument was made as to why verdicts not chosen were incorrect. (Possible scores were "no attempt," "unsuccessful," "partially successful" [because representation of evidence or of verdict criteria was faulty], and "successful.")
IIID. *Justification of alternative verdicts.* An argument was made as to how an alternative verdict might be supported. (Possible scores were "no attempt," "unsuccessful," "partially successful" [because representation of evidence or of verdict criteria was faulty], and "successful.")

Note. Adapted from Weinstock (1999), which contains fuller detail and specific scoring criteria.

superior to individual reasoning. It does not indicate, however, that any change occurred, as a result of deliberation, in what an individual accepted as adequate justification for a verdict choice.

To investigate the latter question, Flaton (1999), in another study, interviewed individuals prior and subsequent to deliberation, in a pretest-posttest design employing the same interview and coding system as McCoy et al. (1999) and Kuhn et al. (1994). Flaton's participants were actual jurors who agreed to participate while awaiting trial assignment. The study was presented as an investigation of how individuals' thinking contributes to the jury process. Responses to two different trials were elicited, before and after deliberation with respect to one of them. In each case, the juror was asked to justify what led him or her to make that verdict choice. Analyses distinguished the justifications jurors initially offered for their verdict choices (presumably, what they regarded as adequate justification for the choices) and their responses to follow-up probe questions (e.g., "Was there anything in the trial that suggested this was not the right verdict?").

Flaton (1999) found negligible difference between the quality of reasoning supporting postdeliberation verdict choice for the trial regarding which deliberation had occurred and the quality of reasoning supporting verdict choice for the nondeliberated trial. This was the case for both initial justifications and responses to follow-up probe questions. Nor was there substantial difference in the quality of reasoning on the deliberated trial prior and subsequent to deliberation, again for either initial or follow-up responses. Jurors did frequently change their verdict choices following deliberation (38% did so), casting doubt on the interpretation that the deliberation had not been sufficiently engaging to induce change; it was only the quality of their reasoning that did not improve. Flaton also examined the possibility that only the subgroup of jurors who changed their verdicts following deliberation would show improved reasoning as a result, but neither was this the case. These findings, together with Weinstock's (1999) finding that individual differences in the reasoning supporting jurors' verdict choices are stable across varying trial content, suggest that the individual differences identified are not readily modifiable by content differences or by short-term social or other experiential factors—a conclusion that enhances their implications.

The relevant literature leaves it far from clear exactly how, and under what circumstances, social interaction affects reasoning. Discussion with other people is likely to expose an individual to new ways of thinking (Levine, Resnick, & Higgins, 1993; Moshman, 1998; Resnick, Levine, & Teasley, 1991; Rogoff, 1998; Staudinger & Baltes, 1996; Tetlock, 1983). To what extent and in what manner, however, are these new modes of thought appropriated by the individual? A number of possibilities exist (Baron, 1988; Chan, Burtis, & Bereiter, 1997; Chinn & Brewer, 1993; Kuhn & Lao, 1998; Kuhn, Shaw, & Felton, 1997), with not much data to allow one to choose among them. As a result of the social experience, the individual is likely to become aware that alternative modes of thought exist. In addition, the individual may (or may not) choose to incorporate these new modes into his or her own performance. Implicated here is the possibility of changes at an epistemic level, changes in which the individual comes to regard the new modes as superior, desirable, or necessary to good performance. These are changes at the meta-level of what an individual knows about knowing, rather than at the level of the skills that are entailed in acquiring knowledge (see Fig. 1).

Of most direct relevance in the present context is this third possibility. Do changes in epistemic criteria, and in understanding about knowing more broadly, occur frequently or predictably? Is social discourse a common or powerful catalyst? And do developmental and individual differences of this sort figure importantly in explaining individual differences in cognitive performance? The remainder of this article is addressed to these questions.

DEVELOPING EPISTEMOLOGICAL UNDERSTANDING AS A FOUNDATION FOR KNOWING

In recent research (Kuhn & Pearsall, 2000), we investigated how young children justify simple knowledge claims when asked to do so. Below a certain age, we hypothesized, children would fail to distinguish between theoretical explanations and evidence as a basis for their simple knowledge claims, paralleling the confusion between theory and evidence as justifications for more complex causal inferences that we had observed in older children and adults (Kuhn, 1989; Kuhn et al., 1988, 1995). In this study, 4- to 6-year-olds were shown a sequence of pictures in which, for example, two runners competed in a race. Certain cues suggested a theoretical explanation as to why one would win; for example, one had fancy running shoes and the other did not. The final picture in the sequence provided evidence of the outcome; for example, one of the runners held a trophy and exhibited a wide grin. When the children were asked to indicate the outcome and to justify this knowledge, 4-year-olds showed a fragile distinction between evidence for their claim (the outcome cue in this case) and an explanation for it (the theory-generating cue). Rather, the two kinds of justification—"How do you know?" and "Why is it so?"—merged into a single representation of what happened, and the children tended to choose as evidence of what happened the cue having greater explanatory value as to why it happened. Thus, in the race example, young children often answered the "How do you know [he won]?" question not with evidence ("He's holding the trophy") but with a theory of why this state of affairs made sense (e.g., "Because he has fast sneakers").

Similarly, in another set of pictures in which a boy was shown first climbing a tree and then down on the ground holding his knee, the "How do you know [that he fell]?" question was often answered, "Because he wasn't holding on carefully."

Competence to apply

KNOWING STRATEGIES

Disposition to apply

Values

INQUIRY .... Is there something to find out?

ANALYSIS .... Can analysis be worthwhile?

INFERENCE .... Are unexamined beliefs worth having?

ARGUMENT .... Is there a point to arguing?

Meta-level Knowing: Procedural

What do knowing strategies accomplish?

When, where, why to use them?

Meta-level Knowing: Declarative

What is knowing?

Facts
v
Opinions
v
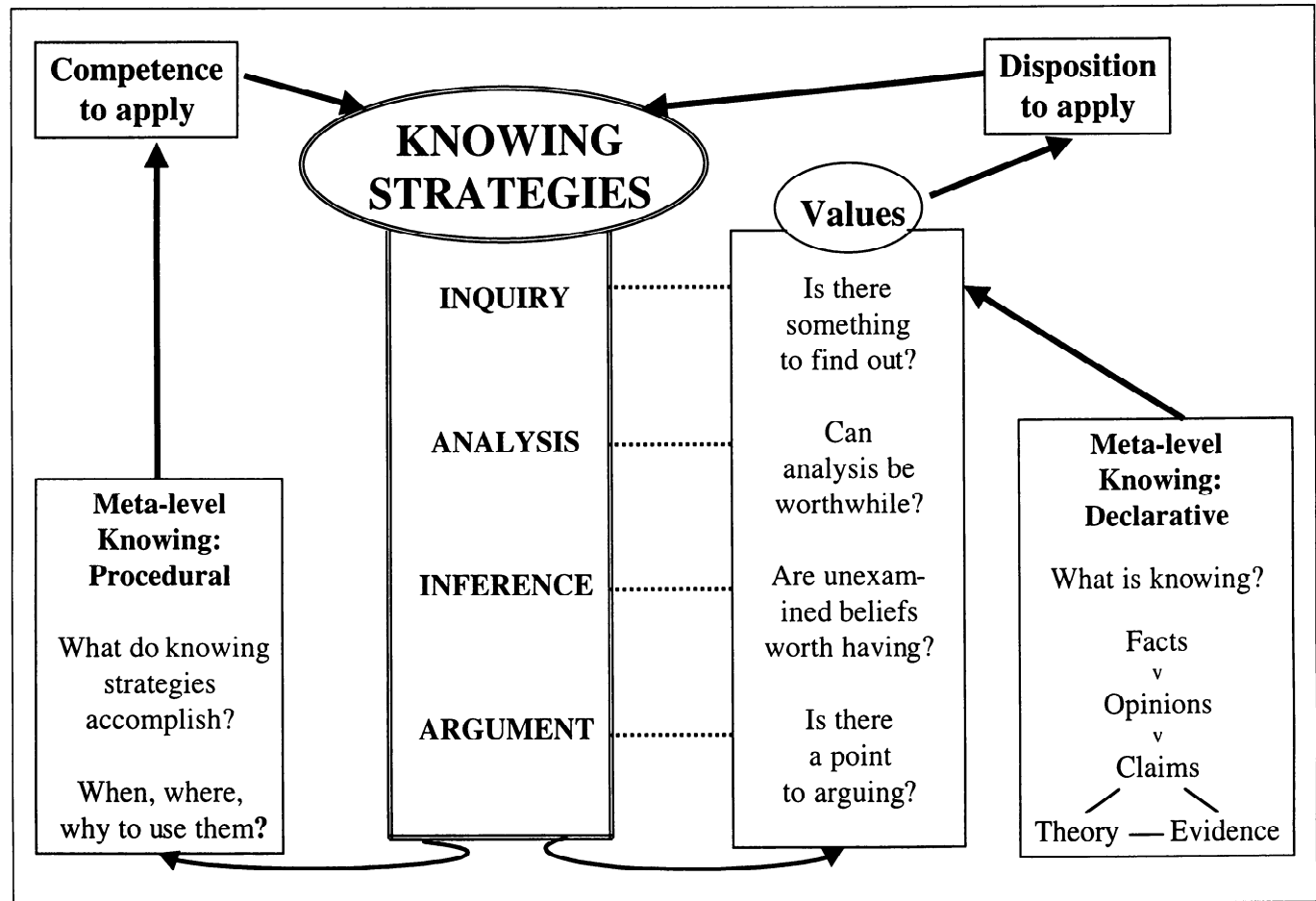Claims
/   \
Theory — Evidence

Fig. 1. Meta-level competence and dispositional factors as contributors to intellectual performance.

Children who gave these kinds of responses to the "How do you know?" question were asked a follow-up question, "How can you be sure this is what happened?" This evidence prompt elicited a shift from a theory-based to an evidence-based response for some children on some items. Still, even with this prompt, 4-year-olds gave evidence-based responses on average to less than a third of the items, although almost all 4-year-olds exhibited a mixture of theory-based and evidence-based responses. These confusions between theory and evidence diminished sharply among 6-year-olds, who still made mistakes but who distinguished the evidence for their event claim from a theoretical explanation that made the claim plausible a majority of the time. These data do not imply that 4-year-olds can never answer "How do you know?" questions correctly. Indeed, children of this age do so commonly, when a justification for their claim is readily available (e.g., "How do you know it's a zebra?" "Because it has stripes."). Rather, the findings suggest that children who have not yet achieved the epistemological understanding in question do not sharply distinguish justifications of differing epistemological status when multiple cues that offer different types of justifications are present.

If by age 5 or 6 children have become sensitive to the epistemological distinction between theory and evidence, would they, we wondered, develop increasing appreciation for the relevance of evidence in supporting claims as they grow older? Another study (Kuhn & Felton, 2000) suggests that this appreciation does continue to develop. We asked eighth graders, community college students, and beginning graduate students to choose the stronger of two arguments in support of a claim. One argument provided a theoretical explanation that made the claim plausible, whereas the other provided empirical evidence that the claim was true, as in the following example:

Which is the stronger argument?
  A. Why do teenagers start smoking? Smith says it's because they see ads that make smoking look attractive. A good-looking guy in neat clothes with a cigarette in his mouth is someone you would like to be like.
  B. Why do teenagers start smoking? Jones says it's because they see ads that make smoking look attractive. When cigarette ads were banned from TV, smoking went down.

More important than the choices, however, are the reasons participants give in justifying their choices. We asked them what were the strengths of the argument they chose and the

weaknesses of the other argument. We also asked if the chosen argument had any weaknesses and the nonchosen argument any strengths.

Although graduate students did best, few participants exhibited understanding of the epistemic strengths and weaknesses of each argument type—characteristics that pertain to the form of the argument, rather than its content. Epistemic characteristics apply to any argument of a given general form; nonepistemic characteristics apply only to an argument of a specific content. Nonepistemic responses most often addressed the correctness of the claim (e.g., "This is a good argument because it's true"), rather than the quality of the argument supporting the claim. The percentages of students citing the epistemic strength of explanation (e.g., "It gives a reason") ranged from 30% among the young teens to 60% among the graduate students. The percentages citing the epistemic strength of evidence (e.g., "It's something that really happened") ranged from 11% to 76% across groups. The percentages of students citing the epistemic weakness of explanation (e.g., "It's only a theory" or "It could be wrong") were even lower, ranging from 0% to 26%, and the fewest students, 2% to 10%, cited the epistemic weakness of evidence (e.g., "It doesn't say why").

Understanding of the epistemic characteristics of arguments to justify claims builds on conceptual development at the most fundamental epistemological level of what it means to know something. A small, neglected literature in developmental psychology (see Hofer & Pintrich, 1997, for review) indicates that epistemological concepts of this broad scope are amenable to investigation and in fact undergo a predictable sequence of developmental change, although timing and the highest level achieved in this evolution are highly variable. Put simply, epistemological understanding of what knowing consists of progresses through three broad levels, which I refer to here as absolutist, multiplist, and evaluativist.

At the absolutist level, the products of knowing are facts that are objective, are certain, and derive from an external reality that they depict. This absolutist conception is most likely to undergo radical revolution during adolescence, to be replaced by a multiplist (sometimes called relativist) conception of knowledge as opinions, freely chosen by their holders as personal possessions and accordingly not open to challenge. Only at the most advanced, evaluativist level is knowledge seen to consist of claims, which require support in a framework of alternatives, evidence, and argument (Chandler, Boyes, & Ball, 1990; Kuhn, 1999; Kuhn, Cheney, & Weinstock, in press).

The cognitive task underlying this evolution is the coordination of the objective and subjective components of knowing (Kuhn et al., in press; Kuhn & Weinstock, in press). It is achieved only gradually, over a prolonged period of years. A key event in this evolution is relocation of the source of knowledge from the known object to the knowing subject (Kuhn et al., in press). This evolution is most likely to be set in motion by the emerging multiplist's discovery of the ubiquity of conflicting assertions ("even experts disagree"), leading to awareness of the uncertain, subjective nature of knowing. This awareness initially assumes such proportions, however, that it overpowers and obliterates any objective standard that could serve as a basis for comparison or evaluation of conflicting claims. Because claims are subjective opinions freely chosen by their holders and everyone has a right to his or her opinion, all opinions are equally right.

The evaluativist reintegrates the objective dimension of knowing, by acknowledging uncertainty without forsaking evaluation. Thus, two people can both have legitimate positions—can both "be right"—but one position can have more merit ("be more right") than the other to the extent that that position is better supported by argument and evidence. It is only at the evaluativist level that justification of claims becomes a meaningful enterprise. If facts can be ascertained with certainty and are readily available to anyone who seeks them, as the absolutist understands, or, alternatively, if any claim is as valid as any other, as the multiplist understands, there is no point in expending the intellectual effort that the justification and debate of claims entails.

FROM BELIEFS TO VALUES, DISPOSITIONS, AND PERFORMANCE

Can epistemological beliefs help to explain individual differences in cognitive performance? The developmental data suggest that they have the potential to do so, given that not all individuals attain the highest levels of epistemological understanding and significant variability therefore exists in an adult population (Hofer & Pintrich, 1997, in press). Stanovich (1999) interpreted his recent work as indicating that some such "dispositional" cognitive variables (as opposed to competence variables) are necessary to account for individual differences in cognitive performance. Significant performance differences remain, he reported, after ability factors have been statistically controlled. In attempting to identify such dispositional variables, Stanovich considered a number of possibilities, including epistemological understanding, willingness to switch perspectives, willingness to decontextualize, willingness to consider alternatives, actively open-minded thinking (Baron, 1988), need for cognition (Cacioppo, Petty, Feinstein, & Jarvis, 1996), and need for closure (Kruglanski & Webster, 1996), and reported modest correlations among scales designed to measure such constructs.

In the juror reasoning work (Kuhn et al., in press; Weinstock, 1999), Weinstock and I have investigated epistemological understanding as the seemingly most fundamental and conceptually clear of these constructs. Theoretically, it should lead to performance differences, because the most advanced, evaluativist epistemology is the only one of the three broad levels that supports sustained intellectual inquiry and analysis.

More specifically, we have hypothesized that epistemological beliefs may influence intellectual values, which in turn influence the disposition to engage in intellectual activities, and, hence, intellectual performance (right side of Fig. 1). To the extent that variation in these factors is substantial, it may have a greater influence on performance than does variation in competence factors (left side of Fig. 1).

The implication is that knowing activities will be shaped by meta-level understanding, from multiple directions and at every phase of their execution (Fig. 1). I am referring now to knowing in its broad sense—the processes that come into play when existing beliefs about the world come into contact with new information and the individual must engage the knowledge-acquisition strategies that will reconcile the two. Knowledge acquisition comprises multiple phases (Klahr, 2000; Kuhn, in press; Kuhn et al., 1995), beginning with inquiry (i.e., formulation of the question that is to be asked of newly available information), continuing with analysis and inference, and concluding with argument (i.e., the use of newly constructed knowledge in reasoned debate).

Procedural metaknowing (left side of Fig. 1) includes metatask and metastrategic understanding and management of the task and the strategies one has available to apply to it (Kuhn & Pearsall, 1998), and thus governs how knowledge-acquisition strategies are deployed. The epistemic understanding depicted on the right side of Figure 1 figures most prominently in determining whether these strategies are executed at all. As depicted in the figure, epistemic understanding informs intellectual values with respect to each of the phases of knowledge acquisition, and values in turn affect disposition to action.

Intellectual values, as conceived in our own recent research on them (Kuhn, Clark, & Huang, 2000), reflect one's conviction that intellectual investment is worthwhile, and thus differ from related constructs such as the degree to which one enjoys intellectual activities (Cacioppo et al., 1996). The following is one of the items we used to assess such conviction (Kuhn et al., 2000):

Some problems, like achieving world peace, are such difficult ones that they may not have a solution, just like scientists may never understand such difficult questions as the nature of matter. We have to accept that some things in life are too difficult to understand or change, and it's best not to worry too much about them. Do you strongly agree, sort of agree, or disagree? (If disagree) What do you think?

In samples of early adolescents and their mothers, from differing American subcultural groups, we found significant variation in both epistemological understanding and intellectual values, as well as some consistent associations between them, with intellectual engagement tending to be more valued the more advanced the level of epistemological understanding.

EPISTEMOLOGICAL UNDERPINNINGS OF REAL-WORLD REASONING

In our juror research, we sought to investigate the extent to which differences in epistemological understanding influence the way the juror task is performed. Weinstock (1999) addressed the question by asking jurors who participated in our juror reasoning research to also participate in individual interviews so their epistemological understanding could be assessed. The assessment instrument was the Livia problem (Kuhn, Pennington, & Leadbeater, 1983), in which the individual is presented conflicting historians' accounts of a fictitious war and asked whether and why the accounts are different, whether they both could be right, whether one could be any more right than the other, and whether certainty is possible. Although finer gradations can be identified, broadly speaking, absolutists see the accounts as reconcilable by resolving factual discrepancies, whereas multiplists believe the accounts are irreconcilable and a product of the respective historians' subjective views. Evaluativists treat the accounts as judgments that can be evaluated based on the arguments supporting them. Weinstock found that levels of reasoning on the Livia problem predicted performance on seven of the eight dimensions of juror reasoning summarized in Table 1. (Counterargument was the one exception.) These eight dimensions represent our analysis of cognitive skills entailed in juror reasoning. This analysis is a refinement of the original analysis by Kuhn et al. (1994). Table 1 provides an indication of how these dimensions are operationalized in a scoring system. Further detail is available in Weinstock (1999).

Interpretation of correspondences between any two cognitive variables (in this case, epistemological reasoning and juror reasoning) is limited when the two variables in question share a common association with age or, in this case, education (Kuhn et al., 1994; Weinstock, 1999). Such correspondences fall short of demonstrating that one variable psychologically informs or explains the other. For this reason, it is desirable to identify specific correspondences across the two domains, increasing confidence that the association is more than one mediated by a common third variable. Weinstock (1999) reported a number of such specific correspondences, for example, a correspondence between the judgment in the Livia problem that one historian's account had to be the true or correct one and the difficulty in supporting or discounting alternative verdict choices (Dimensions IIIC and IIID in Table 1) in the juror task. Another specific correspondence is one between the historians' accounts being treated as informed interpretations (rather than uncontested facts or mere opinions) and the judgmental use of evidence (Dimension IIB in Table 1) in the juror task. Most interesting is the correspondence with respect to certainty: Those subjects who believed certainty to be achievable with respect to the historical narrative were most likely to be highly certain that their own verdict decisions were correct in the juror task.

A qualitative sense of these correspondences is obtainable from case studies of individuals' reasoning across the two tasks. Some excerpts are presented in Table 2. Subject 53, who showed the absolutist's certainty in her epistemological reasoning, demonstrated great trust in the absolute truth of a story in her reasoning as a juror. She did not acknowledge the possibility of the evidence being used to tell a different story. Rather, the story she told constituted a single unassailable piece of evidence that dictated the conclusion. In contrast, Subject 96, who in her epistemological reasoning recognized claims as judgments, differentiated the evidence from theories of what might have happened and used the evidence critically to construct and evaluate theories in her juror reasoning. The reasoning of many participants fell in between these two extremes, with a number expressing the multiplist's view that any account has the same claim to legitimacy as any other. These excerpts offer a glimpse of how epistemological understanding influences people's justification of claims in a real-life context.

CONCLUSIONS

There is reason to think, then, that differing conceptions of what it means to know something influence how people know, in both the narrow sense of knowing how one knows something and the broader sense of how knowing processes operate. One person may accept "facts" as valid—as indications of "the way things are"—as long as no alternatives are conceived. Another may accept opinions as valid claims to truth, as long as they include explanations that make the claims plausible.

And a third may regard claims as no more than candidates in the representation of truth, with the path from candidacy to endorsement an often long and arduous one of evaluation in a framework of alternatives and evidence.

An implication with respect to the evidence-versus-explanation debate is that it is of lesser importance to establish people's preferences for one over the other. More important is that people achieve understanding of the epistemic strengths and weaknesses of each and hence their complementary relationship, each offering what the other does not—in a word, truth versus understanding. Each plays an indispensable role in reasoned debate. Which is better—evidence or explanation—depends on the function that one calls upon it to play in argument.

The broader claim I have made here is that one cannot fully understand the processes of knowing and knowledge acquisition that people engage in without investigating their understanding of their own knowing. There is much more that needs to develop than the procedural skills themselves that enable people to acquire new knowledge. It is the supporting structure schematized in Figure 1 that makes effective knowing possible. Meta-level management, depicted on the left side of Figure 1, is increasingly being recognized as a critical moderator of knowledge-acquisition strategies (Crowley, Shrager, & Siegler, 1997; Kuhn et al., 1995; Kuhn & Pearsall, 1998). Depicted on the right side of Figure 1, and less recognized, the path from epistemological conceptions to values to dispositions is an equally important one to explore in understanding how people know and how they believe they know.

Table 2. *Illustrations of correspondences between epistemological understanding (Livia problem) and juror reasoning (Weinstock, 1999)*

Subject 53
Epistemological understanding
(Are the accounts different?) No, they seem like they're the same. . . .
(Can someone be certain the accounts are correct?) By reading this they can be certain. It really explains. It gives details on what happens.
Juror reasoning
. . . when the father went out to go to the store, he went right upstairs to get the gun . . . they started fighting again when his father came back into the house and he just shot him right there . . . he shot him not once—he shot him four times—so he really meant to kill him.

Subject 96
Epistemological understanding
(Could both accounts be right?) They could because the North Livian talks about early setbacks, and his emphasis is on the later battles . . . when the North Livians won. . . . But the South Livian . . . stresses the earlier wins. . . . Neither one is a reality, each one is making a judgment. . . .
(Could one account be more right than the other?) . . . the accounts are based on their perspective. It would be interesting to see how somebody who is not either North or South Livian would see it.
Juror reasoning
. . . it wasn't like this was a situation where he had been fighting back. The only thing he had done was to have guns, but I saw that as an attempt to protect himself as well, not necessarily intent to kill. . . . I thought about the part about him getting the pets downstairs. I felt that that was not clear evidence that he meant to kill the father, that there was premeditation. He may have felt that whatever happened between him and the father . . . that he wanted them out of the way for their own protection. . . . The mother's testimony, at one point when the lawyer asked her whether she had seen the husband with a weapon . . . she said she didn't see him holding a gun. But somebody else did report he did have a gun.

An implication of the prominent role accorded to meta-level operations is that the locus of individual differences in intellectual performance may lie at a less obvious level than that of the performance itself. Because dispositional factors are not dictated by cognitive competence (Stanovich & West, in press), it will be necessary to search in the lesser-known border territory between personality and cognition to understand the role of disposition in mediating intellectual performance. People must want to know, and appreciate the benefits it confers, if they are to undertake the effort it requires.

Finally, although the focus here has been on individuals' thinking, I conclude with a return to the social. Values and dispositions are acquired in social settings, not in isolation, which is the way educators have tended to approach the teaching and learning of intellectual competencies (Resnick & Nelson-LeGall, 1997). Hence, to understand the acquisition of intellectual values and dispositions, and the ways in which they shape performance, it will be necessary to examine them in the social contexts in which they emerge and develop.

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