Introduction: Cognitive attitudes and values in science

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This special section grew out of a workshop on "Cognitive Attitudes and Values in Science" that was held at the University of Notre Dame in June 2013. Although each of the papers included in this volume approaches the topic in different ways, they all explore the central theme of how careful attention to the range of cognitive attitudes available to scientists and the differences between them might help to generate more careful and insightful ways of thinking about the appropriate roles for values in science. This introduction to the special section begins with a brief overview of recent literature on cognitive attitudes and its relevance for thinking about values in science. The second part provides a summary of the articles in this section, highlighting the distinctive contribution that each makes to discussions about the central theme.

Cognitive attitudes are evaluative responses directed toward some sort of content, such as hypotheses, theories, models, propositions, or other forms of representation. While belief and associated probabilistic judgments such as degrees of belief (levels of confidence or credence) have traditionally received the lion's share of attention from philosophers of science and epistemologists, recent scholarship has drawn attention to the nuance and variety of epistemic and practical attitudes that real scientists adopt in the course of inquiry (e.g., Elliott, 2013; Elliott & McKaughan, 2014; McKaughan, 2007, 2008, 2012; van Fraassen, 1980; Wray, 2001). In addition to believing, there are a variety of other forms of qualified, partial and tentative attitudes that play an important role in scientific practice. Intentional mental states of this sort, or the speech acts used to express them, are sometimes marked by attitude verbs such as accept, assume or presuppose, hypothesize or conjecture, predict, speculate, guess, suspect, entertain, judge to be worthy of pursuit, and so on.

For example, consider the literature on belief and acceptance. C. S. Peirce is among the earliest to insist on a principled distinction between belief and scientific acceptance (Peirce, 1898, 56), but the account in Jonathan Cohen's monograph, *An Essay on Belief and Acceptance* (1992), is among the most influential today. Cohen builds a number of conditions into his accounts of belief and acceptance, some more controversial than others. One of the ways that Cohen contrasts these two attitudes turns on the issue of voluntary control. Whereas believing a proposition, *p*, is often regarded as for the most part involuntary − largely a matter of passively finding oneself with the conviction that *p* is the case − acceptance is explicitly defined as a mental act that is under one's direct voluntary control. To accept that *p*, in this sense, is to adopt or commit oneself to a policy of treating *p* (and what one concedes to be deductive consequences that follow from *p*) as true in one's conscious reasoning whether or not one feels *p* to be true. Keith Frankish gives an example, which we can borrow independently of the particularities of his own view of acceptance, of a situation in which what one believes and what one accepts as a basis for action can come apart:

> Suppose I believe that the gun in my desk drawer is unloaded. And suppose I am now offered a small sum of money for taking the weapon, aiming it at the head of a loved one, and pulling the trigger. In deciding whether or not to accept this offer, I might, quite reasonably, refrain from relying on the proposition that the gun is unloaded (Frankish, 2004, 134–135).

Clearly, one can believe that the gun is loaded without accepting it as a premise in one's deliberative reasoning or actions and one can accept that it is loaded without believing that it is. In other situations, such as the choice to trust someone who has let one down in the past or the decision of a rescue team to continue the search for workers who were trapped in a collapsed mine, practical considerations might lead one to accept a proposition as a basis for action that one doesn't have good reason to believe (McKaughan, 2013).

This strategy for distinguishing between belief and acceptance locates the latter more clearly in the domain of action. There have been many other attempts to employ "belief" and "acceptance" to distinguish between two kinds of assent (see, for example, Alston, 1996; Bratman, 1992; Buckareff 2004; Cohen, 1989, 1992; da Costa & French, 1993, 2003; Engel, 1998, 1999, 2000; Frankish, 2004; Harman, 1986; Kaplan, 1981, 1996; Maher 1990, 1992, 1993; Lehrer, 1983, 2000; Levi, 1997; Perry, 1980; Stalnaker, 1984; Ullman-Margalit and Margalit, 1992; van Fraassen, 1980; and Velleman, 2000). Indeed, the fact that authors use these terms to mark a bewildering variety of different distinctions, in very different ways, and for such different purposes, is one indication

of the need for a more uniform and finely-grained analysis of cognitive attitudes. But the analysis that we have provided here already highlights an important point for those who are interested in the connection between cognitive attitudes and values in science. To the extent that acceptance is voluntary and can be oriented around concerns that are not limited solely to the aim of forming an opinion about what is true, practical considerations can clearly be relevant to acceptance in ways that, at least arguably, they are not relevant to belief. In the gun-in-one's-desk-drawer example, factors such as one's values and tolerance for risk legitimately contribute, alongside one's epistemic opinion, to one's decision whether or not to accept that the gun is unloaded. Similarly, in scientific contexts where the acceptance of a model or theory can have important effects on society, a range of non-epistemic values may also have an important role to play (Elliott and Willmes 2013).

Such considerations raise a host of questions that we would like to see addressed in the years ahead. Might, for example, disputes over the proper roles for non-epistemic values in responding to situations of underdetermination be clarified by analyzing the range of cognitive attitudes available to scientists in such situations (e.g., belief *vs.* acceptance) and the sorts of values that are relevant when adopting particular attitudes? Might the literature on values in science be strengthened by reflecting on the cognitive attitudes that scientists adopt toward simplified models or toward technoscientific artifacts and the sorts of epistemic, ethical, and pragmatic values that promote the aims associated with those attitudes? Is it important to clarify what cognitive attitudes scientists are adopting when they propound claims as voices of authority in policy contexts, given that different sorts of values may become relevant to their work as a result? With these sorts of issues in mind, the workshop's call for papers invited contributions to the following sorts of questions:

(1) What are the major cognitive attitudes that scientists have employed and that they could employ? How should these attitudes be individuated, defined, and characterized?
(2) Which cognitive attitudes are most appropriate to take toward particular products of scientific activity (e.g., models, hypotheses, technoscientific objects, claims made for regulatory purposes, etc.)?
(3) What criteria are available for evaluating whether the cognitive attitudes adopted by scientists in particular contexts are appropriate?
(4) What categories of values (e.g., epistemic, ethical, and pragmatic) promote the aims associated with particular cognitive attitudes?
(5) In what ways can and should scientists clarify their cognitive attitudes in scientific papers, in assessments used for policy purposes, and in communication with the public?
(6) How can the analysis of cognitive attitudes promote more sophisticated approaches to delineating the proper roles for values in science?
(7) How can the analysis of cognitive attitudes promote more sophisticated communication between scientists, policy makers, and members of the public?

Much work remains to be done in order to be in a good position to answer such questions. But we believe that each of the articles included in this special section raises, in a distinctive way, fundamental issues that illustrate how careful attention to cognitive attitudes can contribute to the literature on how values appropriately influence science.

The first article, by Matthew Brown, draws on John Dewey's account of scientific reasoning in order to challenge those who attempt to defend the ideal of value-free science by making a distinction between belief and action. As Brown correctly observes, proponents of the value-free ideal often maintain that only evidential considerations (i.e., considerations that bear on the likely truth or falsity of a theory) are relevant to epistemic evaluation, while they concede that non-evidential considerations are relevant to decisions about how to act, including the use or application of a theory. As part of his attempt to undercut this approach to defending the value-free ideal from a Deweyian perspective, Brown provides a particularly clear exposition of Dewey's epistemological framework. Brown claims that Dewey's epistemology is grounded in the concept of *inquiry*. Individuals engage in inquiry to resolve problematic situations. The conclusion of inquiry is a *judgment*, which is a decision to act in a particular manner in order to resolve the situation. Importantly, Dewey holds that all judgments are *judgments of practice*, which means that they "propose a course of action, rather than (merely) describing a state of affairs" (Brown, 2015). Therefore, for Dewey the classic equation of knowledge with justified true belief is replaced by the equation of knowledge with true judgment. Moreover, to say that a judgment is true is to say that it resolves the problematic situation that it is designed to address.

As Brown explains, Dewey's innovative epistemological framework yields an intriguing account of the cognitive attitudes that scientists employ. For Dewey, scientists employ two major cognitive attitudes. First, they *affirm* propositions. It is crucial to recognize that Dewey defined propositions in a very idiosyncratic manner, as symbolic representations that play an intermediate role in inquiry. Thus, to affirm a proposition for Dewey is to regard it as worthy of pursuit, to accept it tentatively as a representation worthy of further investigation. Second, Dewey claims that scientists *assert* judgments. We have seen that judgments are the final outcome of inquiry, and thus the attitude of assertion involves the stronger conclusion that a judgment is true (in the sense that it resolves a problematic situation). But the crucial feature of this framework is that Dewey has replaced the traditional cognitive attitude of belief with the attitude of assertion, and non-epistemic values are relevant to this attitude insofar as they help to determine whether a particular judgment resolves a problematic situation successfully.

Brown concludes that Dewey's framework challenges the "wedge" argument that various authors have used to maintain science's value-freedom. These authors acknowledge that non-epistemic values can play an appropriate role in scientific evaluations aimed at deciding how to act, but they insist that these values should not influence scientific evaluations directed at deciding what to believe (Giere, 2003; Mitchell, 2004). Kevin Elliott and David Willmes (2013) have turned this line of argument on its head and used it as a way of defending roles for non-epistemic values in science, insofar as they argue that cognitive attitudes other than belief are primary in most scientific practice. Brown takes their line of argument a step further and rejects traditional conceptions of belief and truth altogether. According to his alternative Deweyian account of the cognitive attitudes that scientists do and should adopt, there are no domains of science that must remain systematically value-free. Dewey's epistemology not only provides a challenging alternative to typical philosophical accounts of knowledge but, Brown argues, it supplies an enlightening description of different cognitive attitudes that play a role in scientific inquiry. Thus, it provides many points of potential interest even for readers who remain unconvinced by Brown's criticism of the belief-act distinction or by Dewey's overall epistemological framework.

Angela Potochnik approaches the role of values in science by revisiting the aims of science. She argues that different aims require different scientific products (i.e., models or theories) and provide