

On the Communication of Values between Scientists and the Public

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Dialog between scientists and the public that involves values is problematic in part because both parties tend to assume 1) that science is objective and human values are subjective and 2) that the resulting sharp boundary between them must be steadfastly preserved. Comparative psychology can clarify our understanding of this boundary because it informs our understanding of the relation between values in science and values in society.

A continuing tension. Scientists and the non-scientific public often struggle to communicate successfully over issues that involve religious, ethical, political, and other values. Successful communication has been at times especially difficult in psychology where it has been argued by many that a science of behavior should guide the re-engineering of society's values (e.g., Skinner, 1971). Humanist critics continue to disagree and say instead that a science of behavior ignores what human values *are*.

The origin of the tension in a conventional assumption. We think this disagreement arises from an assumption mistakenly held by both scientists and the public about the nature of science. That assumption is that science provides objective, value-free answers to basic questions about the natural world and human nature. Science is assumed in this way to be in a privileged and authoritative position to provide objective answers. On this same assumption, however, it is seen to be in no position to answer questions having to do with values in ethics, religion, art, politics, or more generally on the meaning of the human condition. The authority that science confers is in virtue of the methodological constraints for verifiable, repeatable, objectively accessible results. The traditional view is that these methods shed no light on values. Thus scientists who tip their toes into the murky subjective and political waters of values are immediately suspect by both other scientists and the public and are thought to overreach the proper bounds of science. Past attempts by scientists to blur the lines between science and politics have sometimes produced negative public reaction, as in the cases of the eugenics movement and of research on race and intelligence. At the same time, members of the public who try to influence scientific policy on behalf of religious or other values are reminded by scientists that science must be left alone to be guided from within. Recent debates of this type include those on cloning and stem-cell research, the Human Genome Project, and even climate science. In all of these cases the dialogue between scientists and the public displays deep-seated fears by both sides about blurring what is assumed should be a rigid boundary between science and human values.

Negative consequences of the conventional assumption. On the one hand, the public sees science as not having any moral relevance to social policy because

it sees science as providing only objective information. On the other hand, it sees science as sometimes having dystopian consequences for social policy. Scientists tend to dismiss these sinister consequences as misrepresentations of science, and blame the political use of science, not science itself, which they feel remains objective and blame free. Conversely, scientists are wary of the public's control over the direction and aims of scientific research for fear of limiting scientific progress. The result of this tension is an unsatisfactory conflict between science and the public, with each often talking past the other. We believe the traditional view of science as objective and value-free exacerbates this conflict and pushes scientists and the public further apart than they need be.

An alternative assumption and a common negative reaction to it. We propose an alternative to assuming there are "objective" methodologies on the one hand and "subjective" values on the other. Our view declines to draw a sharp line between the objective and the subjective. It holds that science, though aiming at objectivity, is itself a value-laden enterprise, if for no other reason than that it is a human activity. Talk of objectivity or value-free results in the sciences ignores the ethical values embedded in scientific decisions, methods of data collection, interpretations of data, funding sources, peer review, and other individual and social practices that constitute science.

Some scientists and members of the public suspect any view that assumes there might be values intrinsically embedded in the scientific process because it might devalue the usefulness of scientific method. They suspect that a value-laden science would strip science of its authority and make it just another political activity among all others. They suspect also that the dialogue between science and society would become contaminated by vague, unexpressed, perhaps even inexpressible, moral assumptions not open to critical evaluation. The end result of this suspicion is a retreat to the polarizing view of science as necessarily value-free and thus not appropriate for understanding values. We think this suspicion misconstrues the problem.

A possible solution. We believe the traditional assumption needs to be critically reevaluated. We see two parts to this reevaluation. First, scientists might critically reflect more on the place of values, especially moral values, in their own research and might try to understand the implications of their research for the public's values. We intend for this recommendation to result in less, not more, fear about "blurring" the boundary between the sciences and the humanities. Consider, for example, a traditional role model of an "objective" scientist heroically struggling against the dark forces of irrational subjectivity, such as Galileo's struggle with the church. We see such a struggle as anachronistic and counterproductive to the goal of a working dialogue between scientists and the public because it assumes a far too strict division between objective features of science and the necessity of human values. We do not believe modern historical research that critically examines how Galileo himself may have been driven by his own values "blurs" any important or meaningful boundary between science and values. We therefore advocate a different role model, one in which scientists more openly acknowledge the role of values in science. We believe that to do otherwise – and not to question how science is determined by the broader cultural context within which it develops – is simply bad science. Agreement or consensus need

not be a goal, but honest and informed scholarship is essential. Part of the challenge of such research is that it requires a conscious and explicit effort to come to terms with what values are and how we can understand them. It does not, however, call for the imposition of a strict boundary between the methods of science and the values of ethics, politics, religion, or esthetics *before* it is known what that boundary, if any, is.

Second, we believe that it would be helpful for scientists to direct more of their empirical efforts to determining the precise effects values have on cognitive and social components of scientific practice. These efforts would contribute to an already rapidly expanding literature in the sociology, history, and philosophy of science, and in cognitive science and cognitive neuroscience that examines the effects values and theories have on the behavior of scientists (e.g., Freedman & Smith, 1996; Klahr, 2000; Pittenger, 2001). We believe comparative psychology is in a position to inform this literature on the relation between cultural values and that specialized component of culture that we know as science. Comparative psychology already informs our understanding of many human values that presumably have direct or indirect effects on science practice, such as cooperation, nurturance, reasoning and problem solving, altruism, deception, and communication and language. Consider more specifically that science practice, like so much of everyday life, involves cost-benefit tradeoffs between outcomes with different personal values. Scientists' decisions about what experiments to conduct and how to conduct them may be influenced by values such as, for example, the importance of career advancement (the likelihood of tenure, the likelihood of grants for research in different disciplines, etc.) and the degree of commitment to social relevance (research developing commercial artificial limbs versus "basic" research on mechanical servo mechanisms or dynamic interactive systems).

We speculate that how these complex values and cost-benefit tradeoffs affect the behavior of scientists may be analogous to how non-human animal behaviors involve a "balance between positive ('reward') and negative experiences ('punishment,' 'stress')" that "affects the efficiency of long-term behavior--defined as choosing strategies with the most profitable cost-benefit outcomes--in a 'complex' (multiple-choice) environment" (van den Bos, Houx, & Spruijt, 2002, p. 97). This kind of cost-benefit tradeoff might be common in both non-human animal behavior and scientific behavior; perhaps, for example, the experience of a pigeon awaiting food and/or electric shock is similar to that of a scientist awaiting a grant priority score. This kind of conditioned anxiety in non-human animals has been seen as analogous to many everyday human behaviors but not, so far as we know, everyday *scientific* behavior. Empirical investigation of this similarity could promote new perspective on how animal emotional behavior informs scientific practice. Another example of a researchable analogy between non-human animal behavior and the behavior of scientists involves affiliation and social support. Affiliation in animals has numerous social and health consequences and scientific affiliations are of great professional and personal importance to scientists. Researching the relation between affiliation in animals and affiliation in scientists should clarify the relation between social values in the two groups. Comparative psychology may also inform our understanding of dominance hierarchies in

science and the origins of socially directed behavior such as deception and cooperation in science. Further, we speculate that the origins of scientific instrumentation used to facilitate gaining control over laboratory processes might lie in part on the development of tool use in non-human animals. Additionally, animals engage in intuitive analogs of science-like behaviors such as exploring and behaving for the fun of it (play), and Bekoff and Allen (2002) have suggested that mammalian social play may inform our understanding of the evolution and development of cognitive skills, conflict resolution, fairness, and social morality. Peer review is but one aspect of science that involves such themes (Shimp, 1999, 2004, 2007).

We believe further research in all these topics in comparative psychology, combined with corresponding research on analogous topics in the actual practice of science will inform our understanding of the relation between effects of "values" in non-human animal behavior and analogous effects of values in scientific practice. In short, comparative research ought to improve our understanding of the appropriate relation between science and values, but there need not be a rigid divide between the two.

Summary and conclusions. Communication between scientists and the public about values has been and continues to be difficult and divisive. We attribute this difficulty in part to a too-starkly-divided belief in an objective science versus subjective values, and we believe redoubled efforts to better understand this belief, its origins, and its possible alternatives, might improve communication between scientists and the public. We emphasize that we do not see research on the effects of values in science as a threat to the authority or trustworthiness of science. Instead, we see this research as clarifying what the appropriate relation between science and values should be. An important component of research on values in science will be the development of a comparative psychology of scientific behavior, including that of comparative psychologists. This comparative research should clarify the evolutionary development of cognitive, social, and emotional components of those scientific behaviors that are influenced by values.

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