**Philosophy of Science in the Public Interest:**

**Useful Knowledge and the Common Good**

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ABSTRACT

The standard of disinterested objectivity embedded within the US Data Quality Act (2001) has been used by corporate and political interests as a way to limit the dissemination of scientific research results that conflict with their goals. This is an issue that philosophers of science can, and should, publicly address because it involves an evaluation of the strength and adequacy of evidence. Analysis of arguments from a philosophical tradition that defended a concept of useful knowledge (later displaced by Logical Empiricism) is used here to suggest how the legitimacy of scientific findings can be supported in the absence of disinterested objectivity.

**1. Introduction**

 As Anglo-American philosophy of science became a professional discipline in the twentieth century, its emphasis on semantic and logical analyses precluded a discussion of the uses of science, which meant that debates over science in the public interest were largely banished from the discipline. Although a considerable number of philosophers and social constructivists would come to question that approach and the assumption of “pure” science as the locus of analysis, scientists and journalists, worried by what appears to be a recent and unprecedented incursion of commercial and political interests in scientific practice, have called for a return to an ideal of pure science characterized by disinterested objectivity as a way to avoid the adverse effects that these extra-scientific factors may have on research priorities (Baltimore 2004; Ferber 2002; Germain 2004; Kennedy 2003, 2004; Krimsky 2003; Mooney 2005). Such a call typically includes the demand to either eliminate the consideration of all extra-scientific factors and /or enforce a strict boundary between pure and applied science.

 Appeal to this ideal poses two related problems and its use has had serious scientific and social repercussions. First, if disinterestedness is considered a necessary condition for the legitimacy of science then, if it is shown that the science is not disinterested, the legitimacy of the science can be questioned. Second, if there is any doubt about the disinterestedness or completeness of the data or conclusions based on the data, then it is safe to demand more research in the absence of which favored science policies may continue. Political and industry groups have appealed to one or both of these conditions to support government deregulation. Most recently limits on the dissemination of scientific research results by federal agencies has also been defended on the basis of disinterested objectivity. The US 2001 Data Quality Act directed the White House Office of Management and Budget (OMB) to “issue guidelines . . . that provide policy and procedural guidelines to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies.” Objectivity, as defined by the OMB “focuses on whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased” (AAAS 2005; thecre.com 2001; Weiss 2004).

 A former lobbyist for Phillips Morris, Jim J. Tozzi, was the original author of the Act that was inserted into a 700 page-spending bill in 2001 by a Republican Congresswoman from Kansas. Subsequently, Tozzi established the Center for Regulatory Effectiveness (CRE) that is designed to combat what he calls the “regulation by information” that has come to dominate the Internet age. Tozzi has used the Act and its idea of objectivity to file petitions against the EPA on behalf of automakers, the NIH on behalf of the Salt Institute, and both the EPA and OSHA on behalf of DuPont. In all of these cases, his tactic has been to argue that the data being disseminated by the various federal agencies for global warming, the effect of dietary salt on high blood pressure, or the possible respiratory problems associated with the manufacture and use of Teflon products, lack objectivity because the evidence is not complete and the agencies have clearly been biased by their interests in health effects (Cook and Bero 2006; ombwatch.org 2007; Weiss 2004). A similar tactic has also been obvious in the Bush administration’s resistance to environmental regulations on the basis of dissenting opinions that have been used to cast doubt upon the objectivity of evidence for the human contribution to global warming.

 Because of the Data Quality Act, the question of how to characterize objectivity is crucial and philosophers of science ought to address this issue in order to find a sense of objectivity that can be reconciled with the concept of science in the public interest, while at the same time countering the claims of the CRE. A significant contribution to the philosophical analysis of objectivity is that by Lloyd who distinguished two methodological and two ontological senses of the criterion. Her first methodological meaning of objectivity was that which is “*detached*, disinterested, and unbiased, that is, invested in no particular point of view or *not* *having* a point of view” (Lloyd 1995, 353). While Lloyd rightly questioned the feasibility of this standard, if we take seriously the ideal of science in the public interest, a finer distinction between bias and interest is required. “Bias” could perhaps best be used to refer to (scientifically) unfounded personal or group beliefs that prejudice the interpretation of data, whereas “interest” could refer to a reasoned and clearly articulated concern for the consequences and applications of research. Given this distinction, then the concept of disinterested objectivity would not be necessary for the legitimacy of science. Although we need to recognize and eliminate as much bias as possible, the interests involved are not to be denied, but rather made transparent so that we may critically evaluate which of them ought to play a fundamental role in the determination of science in the public interest.

 Section 2 below will offer a brief look at the background that produced the concept of disinterested objectivity. Section 3 will then turn to a necessarily broad overview of the salient features of an alternative tradition of useful knowledge among Anglo-American natural philosophers. Section 4 will conclude with suggestions for how elements from the useful knowledge tradition can be used to bring additional support to recent works that have sought to make philosophy of science socially relevant and to explain how scientific knowledge claims can have legitimacy and epistemic privilege in the absence of disinterested objectivity (Haack 2003; Giere 2003; Kitcher 2001, 2002; Koertge 1995; Kourany 2003; Longino 1990, 2002).

**2. Background**

 Although Neurath believed that philosophers of science should be actively involved in social policy, his vision was soon eclipsed by the detached stance of Logical Empiricism (Howard 2003; Reisch 2005; Richardson 2003). As Carnap wrote, his intent was to exhibit the “purely logical, formal character to which” a system of knowledge “owes its independence from the contingencies of the real world” (Carnap [1928] 1967, vi; cf. Hempel 1965, 9–10, 489). Analytic philosophy contributed to this trend as well. Bertrand Russell, for example, rejected what he called the “more utilitarian aspects of science” because he found it “very difficult to admire” uses of science that increased the “total production of commodities” and made “wars more destructive,” whereas “pure science” was “the most godlike thing that men do” (1923, 158–160). These two strands of philosophy produced an elevation of pure science, the establishment of an ideal of disinterested objectivity as the hallmark of scientific method, and the subsequent retreat to “the icy slopes of logic” (Neurath [1929] 1979, 317).

 This was actually a rather brief retreat, however, and it was never unanimous. As early as the 1960s, philosophers of science, including Carnap and Hempel, began to question the assumption of pure science (Lloyd 1995; Friedman 2003). In the 1970s works by Kuhn ([1962] 1970), Feyerabend (1975), and Laudan (1977) produced alternative and popular images of science that opposed its characterization as a pure, value-free enterprise unaffected by social factors and applications. Many other works followed that exhibited the social nature of scientific inquiry and showed how seemingly extra-scientific values could have epistemic import, although these discussions remained largely internal to the discipline and did not explicitly address the issue of science in the public interest (e.g., Fine 1996; Hull 1988; Longino 1990; McMullin 1983). Interestingly, some of the early critics of the detached scientific stance typically saw themselves as proposing a radically new ideal to replace what they characterized as a long tradition of objective knowledge dating back at least to the writings of Francis Bacon.

 While Popper retained a rather robust sense of objectivity, for example, he was critical of what he saw as Bacon’s naïve account: “Bacon held that, to prepare the mind for the intuition of the true essence or nature of a thing, it has to be meticulously cleansed of all anticipations, prejudices, and idols.” Indeed, Popper went on to claim that for Bacon “purging the mind of prejudices is conceived as a kind of ritual, prescribed for the scientist who wishes to prepare his mind for the interpretation (the unbiased reading) of the Book of Nature” (1968, 279). By the 1980s sociologists of scientific knowledge offered a new line of attack on objectivity, once again claiming novelty, and once again tracing the ideal of disinterested objectivity back to the seventeenth century, as Shapin and Schaffer did, for example, when they attributed to Robert Boyle and early members of the Royal Society an “empiricist language-game” that denied the human contribution to knowledge (1985, 67, 79). Kitcher is the latest in this line of criticism. In his discussion of the “myth of purity” he attacked not only Bacon who “stressed the importance of unprejudiced observation and the patient accumulation of empirical data,” but also Bacon’s followers: “The detached scientific stance, dedicating ourselves to the pursuit of truth and ignoring the mundane distractions, is psychologically far more complex than the first members of the Royal Society imagined” (2001, 109, 29). Actually, Bacon and his followers belonged to a tradition that sought “useful knowledge,” which embodied the antithesis of a detached, disinterested objectivity.

**3. Useful Knowledge**

 Seventeenth-century natural philosophers often included explicit discussions about the epistemological and methodological aspects of scientific investigation that we recognize today as issues central to the philosophy of science. In *The New Organon*, Francis Bacon produced such a work when he took the concept of useful knowledge from the practical arts and brought it to bear on natural philosophy (Perez-Ramos 1988, Sargent 1999). Although he urged his readers to keep their biases in check, he wrote that the idols of the mind “cannot be eradicated at all” because they are “inherent in the very nature of the intellect.” Indeed, “all that can be done is to point them out, so that this insidious action of the mind may be marked and reproved” ([1620] 1874, 27). In order to mitigate the influence of the idols, a cooperative research process was required that would incorporate elements from various segments of society so as to introduce intersubjective checks on individual biases (53–66). The ideal of disinterested objectivity, however, would have run counter to his purpose.

 As should be well known, Bacon wrote: “I entreat men to . . . deal fairly by their own interests, and laying aside all emulations and prejudices in favour of this or that opinion, to join in consultation for the common good” because the “true ends of knowledge” are “not for pleasure of the mind, or for contention, or for superiority to others or for profit, or fame, or power, or any of these inferior things; but for the benefit and use of life” (21). This practical use represented the ultimate goal of knowledge, but usefulness had an epistemic aspect as well. Although the idols of the mind may make one prone to adopt one theory rather than another, it is not likely that all theories will work equally well. Thus, putting knowledge to use can provide an additional check on the influence of the idols. Bacon rejected the traditional distinction between episteme and techne and instead sought to “render science active” in order to understand “nature in action” (I, aph. 24, 89)

 This relation between knowledge and utility was the basis of Bacon’s famous (though often misquoted and misunderstood) aphorism: “Human knowledge and human power meet in one, for where the cause is not known, the effect cannot be produced” (I, 3, 46). The knowledge that Bacon sought was of causal processes operative in nature and the production of effects was a reliable, although not decisive, indication of the accuracy of such knowledge. Quite simply, if one wants to produce useful effects, causal knowledge is necessary and the production of effects can provide reliable evidence that one has indeed achieved an understanding of the causal processes at work. As he explained more precisely toward the end of Book I: “truth, therefore, and utility are here the very same things. And works themselves are of greater value as pledges of truth than as contributing to the comfort of life” (110, aphorism 124; cf. aphorism 73; Perez-Ramos 1988; Sargent 1999). While theoretical truths may provide the basis for practical applications, it is also the case that work in the practical arts may uncover truths about natural processes. Practical interests, as well as epistemic interests, are an integral part of the scientific process and thus should be part of the subject matter of philosophy of science.

 In the next generation, members of the Royal Society joined together for a cooperative research effort and cited Bacon as their inspiration. Fellows who closely followed Bacon’s advice included Robert Boyle, who often prefaced his experimental histories with suggestions for how his investigations could aid human health and welfare. In his *Spring of the Air*, for example, Boyle wrote that he had two considerations, one practical and one epistemic, for pursuing his inquiry: “The Ayr being so necessary to human life . . . any considerable discovery of its Nature seems likely to prove of moment to Man-Kinde.” On the other hand, “the discovery of the nature of the Ayr, will probably discover to us, that it concurs more or less to the exhibiting of many *Phaenomena*, in which it hath hitherto scarce been suspected to have any interest” (2000, 1: 157–159; cf. Sargent 1995, 35–41). In a work devoted to *Some Considerations touching the Usefulness of Experimental Natural Philosophy*, Boyle clearly rejected the distinction between theory and practice. As Bacon had before him, he noted both that “man’s Power over the Creatures consists in his Knowledge of them” and that practical ability could also lead to causal knowledge because the production of “unusual Effects”, may “either hint to us the causes of them, or at least acquaint us with some of the Properties or Qualities of the things concurring to the production of such Effects” (Boyle 2000, 6: 434).

 The pursuit of the practical and epistemic goals of useful knowledge continued in the work of Benjamin Franklin who made significant contributions to electrical theory in addition to his invention of the lightening rod, the idea for which came from his experimental trials that revealed lightening as an electrical phenomenon that travels the path of least resistance. Because of its significance for saving lives, Franklin did not patent his invention, but, in conformance with the useful knowledge tradition’s ideal of the common good, he freely communicated the manner of its manufacture and use (Franklin 1752, 565–567; [1774] 1941; cf. Cohen 1990). Humphry Davy was part of this tradition as well. In his *Elements of Chemical Philosophy*, he wrote that he approved of the way in which Bacon and Boyle had both recognized the need for experimental and theoretical investigations and he was critical of what he saw as Berzelius’s overemphasis on “positive knowledge” (1812, 11–15). Some of Davy’s most significant contributions to useful knowledge came from his use of the newly invented voltaic pile to produce electro-chemical analyses of various compounds that led both to his discovery of the elemental nature of chlorine and to the miner’s safety lamp that saved the lives of miners as well as the investments of mine owners.

 By the mid-nineteenth century, however, a subtle shift was taking place in philosophy of science that owed its origin to David Hume’s reintroduction of the distinction between epistemic and practical concerns in the resolution of his problem of induction. Hume did not discount the practical value of the assumption that the future will be like the past because it had proved to be a “great guide to human life”, but, he wrote, “our conclusions” from experience lack epistemic status because they are “not founded on reasoning or any process of the understanding” (1777/1993, 23, 21). John Stuart Mill acknowledged Hume’s influence and further contributed to the separation of theory and practice when he wrote, in *The Positive Philosophy of Auguste Comte:* “The philosophy of a science thus comes to mean the science itself, considered not as to its results, the truths which it ascertains, but as to the process by which the mind attains them . . . –in a word, the logic of science” (1866, 50).

 Mill followed Comte in tracing the development of positivism to Bacon (which contributed to the type of misunderstanding of Bacon’s philosophy evident in Popper’s account), but he rightly noted that it was “probably first conceived in its entire generality by Hume” (1866, 8–9; cf. Snyder 2006, 100­–147). William Whewell was much more aligned to Baconian than Comtean induction, yet in his *Philosophy of the Inductive Sciences* he also contributed to the ideal of disinterested objectivity when he supported the distinction between epistemic and practical concerns: “It may be universally true,” he wrote, that “Knowledge is Power; but we have to do with it not as Power but as Knowledge” (1847/1984, v. 2, Bk. XII, Ch. XI, 238). In addition, Whewell defended the unbiased nature of scientific inquiry when he claimed that the idols of the mind might pervert inquiries into politics or morals but “in that Natural Philosophy with which we are here concerned, there is little opportunity for such influences” (237). Although Mill and Whewell were both interested in basing social reform on science, their philosophical discussions of the nature of evidence, however inadvertently, contributed to the ideal disinterestedness. Thus the detached stance of Logical Empiricism did not spring up over night as a reaction to cultural or political factors but had its roots, partially at least, in this earlier emphasis on logical analysis and pure science.

 Yet, as mentioned above, the ideal was never universally endorsed. John Dewey rigorously defended the useful knowledge tradition well into the twentieth century and rejected all artificial distinctions, particularly Russell’s distinction between pure and applied science (1929, xvii–xviii). Dewey argued that applied science may “be more truly science” than that which is “conventionally called pure science” because application is “not something external and arbitrary” to natural events, but represents a discovery “of opportunities for interactions” with nature that were “previously hidden” (134–135). Useful knowledge is not “identical with ‘commercialized’ use”, which represented an “appalling incident” of history that had been “disastrous both to science and to human life.” It was the notion of pure science “detached from human concerns,” however, that had likely “conspired to reinforce this moral deficiency” by establishing yet “another class-interest” of “aloof specialists” (136–137).

 According to Dewey, the Baconian dictum “knowledge is power” is “not extralogical” and the benefits are not “supererogatory” but rather “intrinsic to the logical method itself, which is just the orderly way of approaching new experiences so as to grasp and hold them” (1917, 850). Later, in his most vigorous defense of useful knowledge, he wrote that the “adulteration of knowledge is due not to its use, but to vested bias and prejudice, to one-sidedness of outlook, to vanity, to conceit of possession and authority, to contempt or disregard for human concern in its use” (1927, 345). Physical science is only responsible for the “materialism and commercialism of modern life” because of an artificial distinction between man and nature and the “most influential form of the divorce is the separation between pure and applied science, which generates honor for the pure and contempt for what is applied”. It is this “glorification of ‘pure’ science” that represents a “shirking of responsibility” (343–345).

**4. Conclusion**

 Dewey did not win the argument with Russell, and the powerful arguments of the useful knowledge tradition became lost as Logical Empiricism gained adherents and popular accounts of Pragmatism came to represent a type of radical relativism that scientists and philosophers of science saw as a challenge to the epistemic authority of science. But, a retrieval of the more moderate arguments from the useful knowledge tradition can be used to further an analysis of the way in which practical and epistemic interests may combine to form a more robust image of scientific method that is socially responsible as well. The above, necessarily brief, overview suggests that the ideal of disinterested objectivity, despite popular accounts to the contrary, was not necessary for the development of modern science but rather appeared as an historically contingent product of the late 19th and 20th centuries. Further, it is questionable whether such an ideal could ever in fact be achieved. Bacon argued that the idols of the mind that affect our interpretation of nature cannot be completely eradicated and similar arguments have been repeated in recent philosophy of science. Lloyd, for example, has argued that disinterested objectivity, characterized by the lack of a “point of view,” is dependent on the “ontological tyranny” that a knower can be independent from the reality to be known (1995, 353–356). Once that tyranny is removed, however, the only sense of objectivity that remains is a “socially-grounded” one (373).

 The detached stance of Logical Empiricism has had an inordinate effect on the general image of science. To counteract that effect, philosophers of science need to explain to policy makers, science advisers, journalists, and the general public how scientific knowledge claims can have legitimacy and epistemic privilege in the absence of disinterested objectivity. If philosophy of science is to contribute to the discussion concerning science in the pubic interest, arguments from the useful knowledge tradition can be quite helpful. Figures in the useful knowledge tradition appreciated the fact that extra-scientific interests were relevant for guiding and assessing research. Philosophers of science who acknowledge publicly the appropriateness of such interests make possible a detailed assessment of both their practical and epistemic value. Practical interests can be a legitimate guide for the evaluation of the quality and quantity of evidence. An epistemic assessment based on the weight of the evidence we have available concerning the human contribution to global warming, for example, may not reach the level of demonstrative proof, but it could still be strong enough to provide a basis for action, especially if the likely consequences of inaction are dire.

 The ideals of pure science and disinterested objectivity lead to unrealistic demands. As Kuhn and others showed so many years ago, there will always be some scientists with different opinions. Although feminist philosophers of science are right that minority voices should not be drowned out, especially when those voices belong to a clearly defined class, absence of complete agreement is only an issue for those who propose that scientific legitimacy requires an objective ground that would produce universal consensus. That demand places an excessive burden of proof on science and has been used by those who continue to “debate” the global warming issue as well as those who employ the US Data Quality Act to oppose even the dissemination of scientific information. In instances that call for action, the considered opinion of the overwhelming majority in science ought to outweigh expectations of disinterested objectivity, particularly given the extent to which the ideal can be manipulated by those who want to place personal, corporate, or political interests above those of the common good. It is not a mythic disinterested objectivity that gives scientific method an epistemic privilege. Rather, it is the ability to compile adequate evidence upon which to act while acknowledging the necessarily tentative nature of its findings. In the end, we need to recognize that practical interests as well as epistemic interests are a legitimate part of the scientific process and thus should be part of the subject matter of philosophy of science.

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