

Uncertainty as a Fundamental Scientific Value

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Abstract The author argues that, though social scientists generally value tolerance for ambiguity, and some even assert a fundamental indeterminacy in human systems, there is still a discipline-wide discomfort with uncertainty and ambiguity. It is argued that this distaste for uncertainty derives from a distorted view of the classical physical sciences, a view that ignores the essentially critical and radical foundations of scientific practice. The drive for certainty, it is argued, is essentially unscientific, in that certain, or adequate, forms of knowledge can only recapitulate the already known and in their dogmatic and institutionalized forms prevent the development of genuinely new knowledge. In contrast, uncertainty is defended as a positive condition, generative of new knowledge because it is open to discovery and to the mystery of the other. The conclusion drawn from this analysis is that the social sciences can only progress if uncertainty, or mystery, is protected and cultivated through a scientific discourse constituted in local and concrete terms (rather than in general and universal ones) and through a self-reflective and self-critical research praxis.

Keywords Mystery · Uncertainty · Science · Knowledge · Indeterminacy · Ambiguity

Mainstream contemporary social science has a decidedly uneasy relationship with uncertainty. Ours is an intellectual tradition that (particularly in the United States) has long been dominated by a naturalistic framework; a framework where humans and human institutions are modeled in straightforwardly materialistic and deterministic terms; where the unpredictable vagaries of human life are constructed as error, or variability; and where research design seems principally aimed at erecting impenetrable bulwarks (i.e., research controls) against such unscientific messiness. But this vision of science is starting to seem a little naïve, even old-fashioned (though I'm confident that it remains the dominant version of class-room science). It

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is undoubtedly still the case that a good many social scientists long for the fantasy of a perfectly adequate causal model of human life but the reality of research in human contexts makes that ideal seem unrealizable, even undesirable.

Of course, social scientists accept the reality of uncertainty or ambiguity at different levels (or perhaps in different stages of grief). Even the most deterministic and reductionist kind of science must recognize some inherent uncertainty in the process of generating scientific knowledge. We all know, for example, that scientific theories and their associated empirical findings are provisional and subject to challenge—“that we can be sure of nothing in science is an ancient truth” (Peirce 1935, p. 57). In methods and statistics classes, we teach students to employ a kind of Popperian falsificationism (i.e., the “null” hypothesis) wherein no theory can ever lay claim to absolute certainty (Popper 1959). Even the APA lists “tolerance for ambiguity” (APA 2007, p. 15) as an educational value and as a positive learning outcome for undergraduate psychology majors (though we seem to value that same quality much less in professional research).

So, it would be a mischaracterization (even a caricaturization) to claim that traditional naturalistic social science demands perfect certainty. Uncertainty is an inevitable part of any scientific activity and this is why, presumably, social science students should learn to tolerate it. But, of course, “tolerance” is the appropriate word here. For a deterministic and mechanistic social science, ambiguity is clearly not a positive state. Under such a philosophy of science, we tolerate ambiguity because we must—because we encounter it everywhere in the human world—but we would much rather eliminate it. We take it as given that “the central function of scientific inquiry is to reduce uncertainty” (Glimcher 2005, p. 25) and so we expect that increasing levels of control and more precise forms of measurement will inevitably reduce the amount of ambiguity we are required to tolerate.

There is, however, a counter-current to this way of thinking about uncertainty and ambiguity. There are some in the social sciences who conceive of ambiguity, not as a function of the inadequacy of reason nor as a species of measurement error, but as an inherent quality of human systems. There is a fairly large body of research suggesting a fundamental indeterminacy, not only at the quantum level, but also at the level of the synapse, of the cortical neuron, of the cortical network, and at the level of individual behavior (see Glimcher 2005 for a review). This way of framing ambiguity or uncertainty in terms of a fundamental indeterminacy is very visible in the pages of *Integrative Psychological and Behavioral Science* (IPBS), particularly in articles written from a systems perspective. Ole Elstrup (2010), for example, argues that “the ways of humans cannot be grasped by means of simple straightforward linear logic” (p. 83). His contention is that human systems are complex, so much so that “the general properties of the human system cannot be derived from the parts that give rise to these properties” (p. 84). What this means from a systems perspective is that “in certain dynamic physical systems . . . causes can be known and yet their effects are intrinsically unpredictable” (Smith 1991, p. 774). Variability in the measurement of human phenomena, then, is not a reflection of error, but “is a measure of the intrinsic indeterminacy of human behavior” (Smith 1991, p. 775).

In another recent IPBS article, Alaric Kohler (2010) makes this argument more explicitly. He suggests that, rather than ignoring or attempting to eliminate the

significant statistical variability inherent in research on human systems, we “should take this state of affairs seriously, as a fundamental characteristic of living beings, rather than treating it as a methodological problem or even as an unachieved state of science that ideally should reach a point where there are no such outstanding results” (p. 46). From this perspective, ambiguity or uncertainty are not regrettable evils to be someday fully eliminated; they are inherent properties of human (and other organic) systems. According to Kohler, the nature of an organic system is such that “the whole definitely has properties that parts have not and is an open system that can develop new actions and . . . is made of components which themselves can change functioning over time autonomously” (p. 47). In this kind of open system “human action and experience are not fully predictable from the past, neither are they always fully defined at the present time” (p. 52). But, and this is the main point, this unpredictability is not a measurement error; it is a function of genuine possibility, of agency: “[the] inexactitude of formal models should be considered the result of genuine activity, the ‘margin of freedom,’ rather than the physicists’ concept of ‘margin of error’” (p. 46).

This acceptance of indeterminacy, in large part, seems to be fueled by the phenomena themselves, by a recognition that the simple, linear, fully deterministic approach to science has not produced any representations of human life that particularly resemble it. But there is still a sense of wistfulness about the necessity of accepting indeterminacy. The social scientist seems always to wish for something a little more definite: “it would be nice if it was possible to simulate human behaviour, individual or social, by means of equations that by known interactions would model the way in which the specifics are generated in general” (Elstrup 2010, p. 84). There seems to be a tension between, on the one hand, our need to recognize agency and genuine possibility and, on the other, our desire to perfectly and adequately represent our world, including its human inhabitants.

But this view, that the sole or primary purpose of science is to adequately represent (predict and control) the natural world, is, I would argue, a distorted one. It is based on an idealized version of the classical (i.e., Galilean) physical sciences that enshrines certainty as immutable natural law. In so characterizing science, however, we forget that in the early Enlightenment, as modern science was struggling into being, it did not do so by attempting to conserve or guarantee the certainty of accepted forms of knowing. Enlightenment science arose as a fundamental challenge to the most sacred and unassailable certainties. We forget that science, in its inmost promise, is essentially anti-dogmatic, iconoclastic, adventurous, and anything but certain. So it is something of an irony that many of the most powerful contemporary forms of dogmatism derive from science itself, from its modern incarnation as a rhetoric of certainty.

It was perhaps inevitable that as the institutional forms of science gathered socio-political power, they would also take on the conservative, establishment rhetorics (of which certainty is just one) that consolidate that power. But there is something about this insistence on certainty that is inherently corrosive to the scientific enterprise. Sigmund Koch (1981) argues that this desire for scientific certainty is an essentially “fear-driven species of cognitive constriction, a reduction of uncertainty by denial, by a form of phony certainty achieved by the covert annihilation of the problematic, the complex, and the subtle” (p. 264). For Koch, the desire for certainty is a kind of pathological fantasy, unrealizable and thus unrealistic.

Even more than this, I would argue that the desire for certainty is essentially unscientific. Certainty as a cardinal scientific value obscures and devalues what is actually most important in scientific practice—namely, critique. When science is productive of new knowledge it is not because it has employed deterministic or mechanistic models, frequentistic analyses or operationalized variables (or any other method fetish); it is because it has applied a radical and ceaseless critique to already given forms of knowledge. The science of certainty and adequacy is one that seeks to conserve what we already take to be true but there is no revelation or discovery in this approach to knowledge. Science progresses, not by consolidating the known, but by challenging it and renewing it in the light of that which is genuinely other. We learn, then, not by projecting ourselves onto whatever is foreign (e.g., by controlling it) but by submitting ourselves to be transformed in an order of meaning that transcends what we already know. Thus uncertainty, or more positively, the mystery inherent in that which is other, is not the antithesis or problem state for knowledge, but is actually a positive condition. Uncertainty is, in fact, the necessary pre-requisite for all knowledge.

This notion that genuine knowledge is not accomplished in the outward projection of self but is, rather, dependent on the challenge inherent in the other has also seen some exposition in the pages of IPBS, though not in the radically epistemological formulation that I am giving it here. In his discussion of empathy, for example, Yair Neuman (2010) argues against a notion of empathy as “reading minds” and characterizes this as a fantasy that is “a form of projective identification where the particularity of the other and his uniqueness is substituted for a replica of one’s self particles” (p. 5). We do not know the other, he argues, when we project ourselves onto him, but we only impose on him what we already know. For Neuman, knowledge of another “is not a conduit to the inner life of the other nor a trivial interpretation of him. It is the demanding task of recognizing the individuality and singularity of the other through recognition of our own deficiency in trying to know the other” (p. 8). Knowledge comes, then, not so much by mastering and revealing that which is other but by opening ourselves to critique in the face of that other, a practice that “tells us more about our deficiencies and arrogance in understanding another mind than it tells us about the other mind. We learn what ‘our exuberances and deficiencies of interpretation are’ (Becker 2000, p. 423, as cited in Neuman 2010)” (p. 6). The pursuit of knowledge, on this account, is not the consolidation of given forms of knowledge but is “a way of saving the other (and myself) from being ‘naturally given’ by continuously and recursively examining our phantasy of knowing the other through semiotic mediation” (p. 6).

This idea that knowledge comes through the challenge of otherness is also reflected in Martsin’s (2010) discussion of identity formation. She argues that “identity is not a pre-existing state in one’s consciousness, but a semiotic construction that becomes created within and through an encounter with rupturing otherness, that makes the person aware of a possibility to be otherwise” (p. 68). Under this account, it is not just knowledge but identity itself that is made possible by a rupturing other, an other that “questions our existing way of being and pushes us to position ourselves in relation to that otherness” (p. 78).

These accounts elaborate how rupture and otherness, in all their uncertainty and ambiguity, are not scientific problems to be solved—they are the very genesis of knowledge, including, I am arguing, scientific knowledge. What I am suggesting here is

that, much more than tolerating a temporary ambiguity, or even accepting a fundamental indeterminacy, we should embrace uncertainty in an epistemologically axiomatic way—not uncertainty in the negative sense of scientific inadequacy, but uncertainty as a positive condition—that is, uncertainty as the mystery inherent in otherness.

From an epistemological point of view, the mystery of the other is a positive condition because it engenders in us a fundamental self-critique that is the necessary pre-condition for genuine knowledge. This is true, in part, because learning requires a kind of restlessness that challenges and re-figures our comfortable dogmatisms. In his discussions of fallibilism, Peirce (1935) makes a similar argument: “in order to learn you must desire to learn, and in so desiring not be satisfied with what you already incline to think” (p. 56). For Peirce, certainty is the death of inquiry because it is the death of curiosity, of adventure. Certainty is rooted in what he calls conservatism, or “a dread of consequences” and he contrasts this with science “which has on the contrary always been forwarded by radicals and radicalism, in the sense of the eagerness to carry consequences to their extremes. Not the radicalism that is cocksure, however, but the radicalism that tries experiments” (p. 61). For Peirce, it is “cocksure”, or self-satisfied, certainty that undermines science while it is the challenging, creative spirit of critique that pushes the discipline forward.

Science in its most productive and transformative forms, then, has always been challenge and critique, most especially of itself; but this critique is not possible from within absolutist and self-referential systems of knowledge. The universalized abstractions of the social scientific canon can only lead, as Emmanuel Levinas argues:

to coinciding with oneself, that is to certainty, which remains the guide and guarantee of the whole spiritual adventure of being. But this is why this adventure is no adventure. It is never dangerous; it is self-possession, sovereignty . . . Anything unknown that can occur to it is in advance disclosed, open, manifest, cast in the mould of the known, and cannot be a complete surprise (Levinas 1997/1981, p. 99).

Sigmund Koch (1981) makes a similar argument about the fundamental limiting force of certainty:

In the psychological studies, the attribution to any paradigm of a preemptive finality has the force of telling human beings precisely what they are, of fixing their essence, defining their ultimate worth, potential, meaning; of cauterizing away that quality of ambiguity, mystery, search, that makes progress through a biography an adventure. (p. 269).

Mystery, then, is a necessary condition for genuine, surprising, illuminating knowledge and we depend in a fundamental and irreducible way on the other to expose our limited self-referential thinking to that mystery. The individual tendency to permanently fix one’s own idiosyncratic abstractions as universal laws can only be ruptured by that mysterious other who denies the adequacy of such simplistic and essentially uninformative monologisms.

So, if it is indeed the case that mystery is the light in which we learn, then that mystery should be protected and cultivated. Above all, mystery should be protected from the dogmatism, or conservatism, that Peirce, Levinas and others feared, a

dogmatism most visible in the abstract and universal factual canons and atheoretical procedural regimes that determine so much of social science research. Such essentialism should be combated with rigorous critique, a critique enacted in the body of the researcher, in the praxis of research activity, and in our disciplinary discourse. Koch (1981) discusses this critical (particularly self-critical) attitude: “if significant knowledge is the desideratum, problems must be approached with humility, methods must be contextual and flexible, and anticipations of synoptic breakthrough must be held in check” (Koch, p. 268).

Though space forbids significant elaboration, I would argue, with Koch, Levinas and many others, that the social scientific researcher must learn to live in an insistent, axiomatic self-reflection and self-critique and that this critique must be central and visible in research praxis. That praxis must also permit the researcher to come before the other in humility, in the kind of vulnerability that makes it possible for the other to teach, to give to the researcher what can never be compelled (no matter how rigorous the research design)—that is, revelation, discovery, the not already known. Essentially, what I am arguing for is a research praxis that is centered, not in domination or conquest (i.e., prediction and control), but in submission to the mystery of otherness as the only genuine form of knowing. This way of thinking about science, which I maintain is more true to the scientific ideal than are modernist or objectivist conceptions, would also require a very different kind of disciplinary discourse. Rather than the acontextual, objective, and universalist discourse that populates canonical social science, our disciplines would require an inherently self-critical and concretely contextualized discourse, one that reflects the ambiguity, serendipity, idiosyncrasy, and fundamentally moral, relational, and interested quality of all knowledge production.

Though this account of science may, at least in some respects, seem radical, it reflects what the broader discipline has always been. The meaning of science has always been embedded in particular moral, political, cultural, and practical discourses and has always been valuable precisely because it can challenge and renew those discourses. But the authority of that challenge and the generative power of that renewal come only from the promise that scientific inquiry may reflect something more than simple, self-interested self-projection—may be more than merely an extension of individual or institutional interests. Science has authority only because it offers the narrow and fleeting possibility of a form of knowing that speaks, not just in my voice, but also with the voice of another—the voice of a planet, or of a star, or of a child. If science has ever realized that ideal, it is because its practitioners have embraced, and submitted themselves to, a mystery that, though it would always transcend them, could for a moment also speak to them.

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