John Dewey is First and Foremost a Philosopher of Science

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There can be no doubt that John Dewey had a philosophical interest in science. The term appears in every volume of his 38-volume collected works, hundreds of times in each of many of them.[1] However, looking at the last several decades of work by Dewey scholars, this interest seems like it must have been superficial, rather than a deep and significant feature of his body of work. Reading the contemporary literature on Dewey, or attending sessions at the Society for the Advancement of American Philosophy, it seems clear that Dewey's primary interests lie elsewhere—education, ethics, political philosophy, art, religion, naturalistic metaphysics. Though Dewey frequently discussed science, the scholarship would lead to to believe that he didn't have much of a philosophy of science, or if he did, that it didn't play much of a role in his philosophical oeuvre.

I contend that this trend in Dewey scholarship is entirely misleading, when it comes to Dewey's own interests and emphasis on science and philosophy of science, and that the resulting view of Dewey's body of work is distorted as a result. I will argue that Dewey was first and foremost a philosopher of science, and that Dewey's philosophy of science is at the center of his thought and body of philosophical work. No accounting of Dewey's contribution to the history of philosophy is complete without a major focus on Dewey's philosophy of science. No analysis of any part of Dewey's work is accurate without tracing its connections with his philosophy of science.

The thesis of this paper is a provocation. With a philosopher whose work is as extensive and organic as Dewey's, it is in a way a fool's errand to try and pick out one component as more important than the others. In another way, however, it serves as a valuable and revealing shift of emphasis. Dewey's thought about

[1] "Science" occurs 491 times in LW 16, 430 times in LW 5, 412 times in LW 13, and 370 times in LW 4. Compare the term "technology," which appears in 30 volumes, never more than 54 times in a single volume; "democracy," which appears in 35 volumes, never more than 201 times. The search terms "nature" and "politic*" (i.e., "politics" or "political" or "politically" etc) are comparable to "science," whereas "experience" and "education" appear even more often.

science, and the role of science in other areas of his philosophy, have been too long neglected by Dewey scholars. I believe we learn a lot about Dewey's philosophy by centering his philosophy of science, as well as correctly the distorting emphasis that has settled into the literature.

In the first part of this paper, I will discuss Dewey's academic career, particularly his work as a scientist and his long-standing interest in philosophy of science. In the second part, I will provide an overview of the three main areas of Dewey's philosophy of science: his theory of inquiry, his metaphysics of science, and his account of the role of science in society. In part three, I will show that engaging Dewey's philosophy of science is necessary to understand other elements of his philosophy, such as his ethics and his philosophy of art.

Dewey as Scientist and Philosopher of Science

Dewey began his career not only as a philosopher but also as a practicing scientist in the field of psychology, and later pedagogy. Dewey's allegiances as a graduate student allegiances at Johns Hopkins were split, between the Hegelian George Sylvester Morris and the experimental psychologist G. Stanley Hall. Each was deeply influential on Dewey's early career. Hall trained Dewey in the emerging field of experimental psychology. Many of Dewey's early writings concerned scientific psychology, including his 1887 *Psychology* textbook and many of his early papers, such as the highly influential "Reflex-Arc Concept in Psychology" (1896), which was one of the most important and influential papers in the first half-century of the field.[2]

Another major early focus of his writings was method—in science, psychology, and philosophy, e.g., "Kant and Philosophic Method" (1884), "Psychology as Philosophic Method" (1886), and "Galton's Statistical Methods" (1889). The phrase "scientific method" appears in 36 of 38 volumes of his *Collected Works*, and 535 times in his collected correspondence. Much of twentieth century philosophy of science was centrally concerned with the nature of scientific method, and it is clear why Dewey's contemporaries and students thought of him as a philosopher of science.

Dewey was also practically involved in setting up scientific institutions, including the psychology laboratories at University of Michigan and University of Chicago (Martin 2002). Dewey set up the Laboratory School at Chicago, probably the first empirical pedagogy laboratory. Dewey helped develop the idea that one could study pedagogy empirically, through experimental interventions. After his move to Columbia in 1904, Dewey became less active as an empirical scientist, although he worked as a silent collaborator on Myrtle McGraw's experiments with the physiological development of twins (Dalton 2002).^[Thanks to Larry Hickman for drawing my attention to this connection.

[2]In 1943, it was voted the most important article in the first 50 years of *Psychological Review* (Langfeld 1943, 154, table 3, col. 1; cited by Hickman 2004, 157). According to Google Scholar, it has been cited 1,828 times.

What's more, even though he had stepped away from doing empirical work himself, he remained conversant in a variety of areas of empirical science, and if anything, broadened his interests. He was especially aided in this through the influence of his daughters, Evelyn and Jane. Evelyn became a major resource for Dewey on new work in experimental schooling. In addition to pursuing her own research, Evelyn studied existing experimental schools and their operation, writing the empirical chapters for their co-authored *Schools of To-Morrow*, while Dewey wrote the theoretical chapters. Jane Dewey, on the other hand, became a quantum physicist, an important early figure in the field of quantum optics. Jane trained with Bohr and worked with Heisenberg, and probably had a significant influence over Dewey's references to Heisenberg and Dirac in his later works. Besides citing recent scientific work, Dewey also quoted popular science writers like Lancelot Hogben throughout his later works.

Though contemporary philosophers tend not to think of Dewey as a philosopher of science, his contemporaries, students, and successors—such as Hans Reichenbach, Felix Kaufmann, Sidney Hook, and Sidney Morgenbesser—thought of him *primarily* in that way.

Dewey's Philosophy of Science

Dewey's philosophy of science has three main parts, each of which matches a longstanding area of interest in philosophy of science:

1. Epistemology of science – What Dewey preferred to call logic or the theory of inquiry, concerned with issues such as the nature of theories, confirmation, scientific method, the theory-ladenness of observation, and the value of novel evidence
2. Metaphysics of science – Concerned with issues such as scientific realism, the analysis of causation and laws of nature, reductionism, emergence, pluralism, and naturalism
3. Science and society – including the interplay of science and values and the relationship between science and democracy.

Each of these topics merits lengthy treatment on its own; I will briefly touch on some of the core ideas in each area, to give a sense of their interest and contemporary value.

Theory of Inquiry

The centerpiece of Dewey's philosophy of science is his "logic," i.e., his theory of inquiry.

While Dewey's writings on logic and inquiry were broad enough to encompass a variety of types of non-scientific and common sense inquiries, Dewey regarded science as the prototypical and best developed form of inquiry.

While I have addressed the details of Dewey's theory of inquiry elsewhere (Brown 2009, 2012), I can touch on a few major themes here.

First, Dewey's theory of inquiry is situational. For Dewey, scientific and other inquiries arise from disruptions of some practice or activity, and aims first and foremost to remove that disruption so that the practice or activity can recommence.

The situational nature of inquiry means that its results are not necessarily or immediately applicable in other situations. They are highly context-dependent, and any generality must be established by future inquiry.

Dewey draws a distinction between observations or data, which help us understand the problematic situation that has disrupted practice, and experiments, which are tentative tests of proposed hypotheses.

The role of hypotheses in inquiry is to represent possibilities that can be relied on to solve the problem that incites the inquiry.

According to Dewey, *all knowledge*, properly so called, requires experimental testing. Science provides the blueprint for successful inquiry.

Metaphysics of Science

Dewey also makes several contributions to what philosophers of science today might call "the metaphysics of science."

Dewey takes a particularly nuanced position on the debate between scientific realism and constructivism.

Dewey is a non-representational realist about the contents of experience, which means that he holds a realist attitude about the objects that we interact with in experience.

Furthermore, Dewey allows that scientific instruments and techniques might extend our perception and action, aligning him closely with the instrumental realism of Ian Hacking.

On the other hand, entities that appear in merely hypothetical propositions, i.e., that refer only to possiblities for future development of the situation, because we do not interact with them individually in experience, are not regarded as "existential." This means that Dewey is an anti-realist about certain kinds of entities.

The line between existential and hypothetical is not permanent and fixed, but may change from situation to situation, as inquiry develops.

Finally, because inquiry changes our practices and activities, and we directly interact with real things in the course of those practices and activities, Dewey holds that inquiry can alter or create its objects. This echoes constructivism, but is not committed to absurd versions of constructivism.

Dewey's theories of causation and laws of nature are similarly interesting and nuanced.

Dewey endorses William James' analysis of experience as containing connectedness, including causal processes.

But he treats causation as it appears in scientific inquiry, in terms like "A causes B" (where A and B are discreet events) as "logical not ontological."

This is not because he denies that there are real potentials or connections in nature, but rather because the discreet separateness of cause and effect is instrumental to finding a more complete, continuous account of those connections.

The case is similar with Laws of Nature. Dewey sees these more as inference heuristics than ontological connections. This is not because he is a nominalist, but because he is a situationist.

His view, in some ways, mirrors Nancy Cartwright's "nomological machines."

Science and Society

As I have already been suggested, scientific inquiry is directed towards transformation of our practices and activities.

The practices that scientists are trying to resolve are relatively abstract, removed from immediate need, and aim at a higher level of systematicity, compared to commonsense inquiry.

They are practices nonetheless, and they gain their significance via their myriad connections to practices concerning more immediate use and enjoyment. "Science is a practical art," Dewey tells us.

As such, scientific judgment is practical judgment, no different in form from value judgments or decisions about how to act. All such judgments form a continuum.

Thus, for Dewey, science is pervaded by values, in the ways that were later explored in depth by feminist philosophers of science.

Furthermore, Dewey sees science as playing a special role in democracy.

Rather than defining democracy as a particular form of voting or representation, Dewey things of it as a matter of publics coming together in cooperative inquiry to resolve shared problems.

Democratic governance is thus on the same continuum with science, evaluation, and decision-making.

This does not lead to a form of technocracy, but rather, a democratization of science put in service of the public interest.

Or, if you like, a "democratic technocracy."

This approach is potentially transformative for the way we think of the role of science in policymaking, including evidence-based policy and science advisors, as well as governance of science and technology

The Place of Science in Dewey's Philosophical Project

Dewey's philosophy of science is surprisingly important in understanding all of the other elements of his philosophy.

I will discuss two of the least obvious examples: ethics and aesthetics.

Ethics as Empirical Inquiry

For example, Dewey's ethical theory emphasizes the nature of ethical inquiry over the *a priori* determination of ethical criteria.

Dewey does not propose an ethical theory to rival utilitarianism, deontology, or virtue theory. And he does not think ethical evaluations of particular cases should proceed by applying such theories, as "applied ethics" often assumes.

Ethical theories, at best, provide us abstract and systematic ways of thinking about particular categories of moral factors, just as major scientific theories provide universal systems of meanings that may factor into particular cases.

What ethical evaluation and decision-making require are context-bound integrations of the moral factors that are present, through active ethical inquiry.

Dewey regards ethical inquiry as empirical and experimental, sharing the methods if not the subject matter of science. Facts of the case must be gathered, possibilities reasoned through, and potential situations experimentally tried out, to see how the stand up to future experience.

This claim might make us squeamish, if we didn't appreciate Dewey's philosophy of science.

Dewey is not suggesting that we replace normative categories with descriptive ones; nor that we derive ethics from a value-free account of nature.

Science, as we've said, is a practical art, laden with values. The only real difference is in the subject-matter: ethics is generally focused on problems regarding our conduct, whereas science is generally focused on problems regarding particular natural phenomena.

Science and Art as Counterpoints in the Rhythm of Life

Dewey's philosophy of art is highly dependent on his philosophy of science.

Dewey's account of the artist and the artistic process is in important ways in dialogue with his conception of science and scientific inquiry, as the original discussion of art in *Experience and Nature* (1925) makes clear.

Dewey's definition of aesthetic experience as culminating moment in the rhythm of experience depends on the complementary moment of indeterminacy central to his definition of inquiry and thus his logic of science.

Art and Science are complementary parts of the same movement of experience from stable, to precarious, and back again; from primary experience, to indeterminate situation, through problem-solving inquiry, back to a determinate situation.

Where as the scientist focuses on the indeterminacies and the problems, and the techniques we can develop to solve them, the artist focuses on the moment of return to equilibrium, that uniquely satisfying moment of culmination.

Furthermore, he directly refers to *Art as Experience* (1934) in his discussion of the formal aspects of inquiry in *Logic: The Theory of Inquiry* (1938).

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