Chapter Six
Science, Values, and Democracy in the Global Climate Change Debate

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This chapter develops and applies ideas drawn from and inspired by John Dewey's work on science and democracy to the field of international relations (IR). I will begin by presenting Dewey's views on the nature of democracy. Next, his related views on the philosophy of science receive close attention. I will show that scientific and policy inquiry are inextricably related processes, and that they both have special requirements in a democratic, global context. IR is no stranger to debates in the philosophy of science.[1] Nevertheless, there are significant challenges in applying Dewey's ideas to IR cases. To overcome these challenges, I demonstrate that a Deweyan approach to philosophy of science provides insight into how international actors can address a major international crisis of our day: global climate change.

Deweyan Democracy as Social Inquiry

There is a traditional way of thinking about democracy as a particular relation between the governors and the governed. If the democracy is direct, the relation is one of identity: the people as a body govern themselves; when we vote in a public referendum, the voters both create the law and are subject to it. If the democracy is representative, then the relation is one of representation, usually

(but not necessarily) understood as a mirroring of the values, desires, or will of the people in appropriate fashion.[2]

Dewey's approach to democracy differs radically from these orthodox conceptions. Democracy for Dewey is not about government at all. Of course, democratic societies require governing institutions, which are constituted in certain ways, but this is a secondary consideration. The question of how to govern follows from the central idea of democracy, rather than the other way around. For Dewey, democracy is primarily a social ideal and a way of life, a virtue of individual characters and societies. Democracy exists wherever there is a significant *sharing of experience* by way of communication and an engagement in shared activities and situations, leading to *cooperation* on resolving shared problems, along with the appropriate respect and weight given to the contributions of each and the consequences for each of shared activities.

Central to Dewey's theory of democracy is the concept of a *public*. A public, for Dewey, is any group of people who are united by undergoing the consequences of some exchange or activity that they themselves did not initiate, what is termed an *externality* by economists. In contrast, purely private pursuits are those that only create benefits or burdens for those directly and willingly engaged in those transactions, without producing third-party effects. A "public" properly so called has to jointly recognize the existence of such a shared interest and form the goal of ameliorating those consequences. Dewey hoped that the strengthening of democracy would move democratic citizens from membership in diffuse, diverse, and temporary publics to formation of *the* Public, a more cohesive and engaged *demos*.[3]

Rarely, if ever, are the problems that bring publics into existence easy to resolve. The key way that publics resolve their problems is to engage in cooperative *inquiry*. This may surprise the orthodox political theorist, for whom the main tools of democracy are opinion, deliberation, debate, elections, and law-making. These may be necessary in the pursuit of particular inquiries, but they are not, by themselves, adequate to the job of cooperative inquiry into shared social problems that is the central feature of democracy. The goal of inquiry in general is to produce judgments warranted by evidence and experiment, judgments which will resolve the problem that initially spurred it and return the previously disrupted situation to a stable equilibrium. There are examples of successful inquiry from many areas of human life, but the shining examples are to be found in the celebrated achievements of science.[4] So we now turn to the philosophy of science in order to understand the nature of inquiry.

Dewey's Philosophy of Science

Over the long span of his career, one of Dewey's main concerns was the philosophy of science,[5] the analysis and critique of the nature, methods, and results of science. This may come as a surprise, even to many Dewey scholars,

since Dewey rarely used the phrase "philosophy of science."[6] None of his major works appear to be dedicated to that topic, unlike those explicitly addressing education, political philosophy, epistemology, logic, metaphysics, art, and religion.

Nevertheless, philosophy of science is a central concern of Dewey's that can easily be identified in his life and works. First, Dewey was an active experimental scientist, first in psychology and later in pedagogy. Second, he was clearly well-read in the history of science and at least in the popular science writing of his day, as his references in books and correspondence show.[7] Third, he was deeply concerned with issues of philosophic and scientific method, as evidenced in his very earliest writings.[8] Fourth, his writings on science are often contextualized in more general discussions, because Dewey believed in the continuity between scientific, pre-scientific, and commonsense knowledge-making activities. As a result, his writings on philosophy of science are embedded in his more general works of epistemology (e.g., *The Quest for Certainty* and *Knowing and the Known*) and logic (e.g., *Essays in Experimental Logic* and *Logic: The Theory of Inquiry*). A careful study of those works reveals that at the center of Dewey's work is a sophisticated philosophy of science. Dewey frequently remarked that his writings on logic conceived as the theory of inquiry and modeled on the practice of science were situated at the core of his philosophy and life's work.[9]

To understand Dewey's philosophy of science requires that one understand his theory of inquiry; his theory of inquiry is, in other words, at the core of his philosophy of science.[10] In order to explicate Dewey's conception of democracy as a form of inquiry, and especially its implications for the role of science and expertise within democracy, I start with an overview of Dewey's theory of inquiry in general. It is important to emphasize that this theory of inquiry, while applicable to and often drawn from the practice of science, also applies to inquiry generally, including commonsense and ethical inquiry.

Dewey's theory of inquiry is *two-dimensional*. Along the first dimension are the antecedents and consequences of inquiry (see **Figure 1**), or what leads to inquiry and what inquiry produces. Along the second dimension is the internal structure of inquiry (see **Figure 2**), or what Dewey calls "the pattern of inquiry." Along this dimension, inquiry proceeds through a series of interlocking and reciprocal phases, each of which is defined by its functional role.

For Dewey, all inquiry is spurred by a *perplexity* or an *indeterminate situation*.[11] This account is in stark contrast with the orthodox assumption that inquiry begins with an abstract problem or the posing of an already-formulated question (of which Plato, Immanuel Kant, and Bertrand Russell are exemplars). On this traditional view the problems inquiry tries to solve – or the questions it asks – are either arbitrary (anything goes) or given by the goals of knowledge in general (e.g., the purpose of inquiry is to discover the objective laws of nature). For Dewey, perplexities (or indeterminate situations) are felt, not known, and the problem to be solved is something discovered in the course of inquiry by

trying out different problem-statements. An indeterminate situation is *objective*, that is, its indeterminacy is a concrete feature of a situation. A situation is inclusive of the agent or agents acting in an environment, as well as the features of that environment involved in that activity (this might include even extremely distant objects while excluding nearby features of the environment that are irrelevant to the agents' activity).[12] The indeterminacy is a discoordination, imbalance, instability, or disequilibrium in the interactions between agent and environment. That indeterminacy frustrates the practice or activity being pursued, as opposed to a settled or unified situation, where the activity is smooth and habit-driven. This objective situation manifests in the agents' experience as a feeling or mood of doubtfulness, uncertainty, or hesitancy; agents who believe their situation is doubtful without the corresponding felt indeterminacy in their situation do not need inquiry, but psychotherapy: rather than feeling doubtful they are possessed by a "mania of doubting."[13] On the other hand, there can be no practice of inquiry without an indeterminate situation. An inquiry-type process without a genuine, felt perplexity is make-work: an artificial problem with no genuine significance, without the possibility of making genuine progress (pragmatists often point to philosophical figments like Descartes' attempt to doubt his beliefs *in toto* or the "problem" of the existence of the external world as examples of such pseudo-problems).

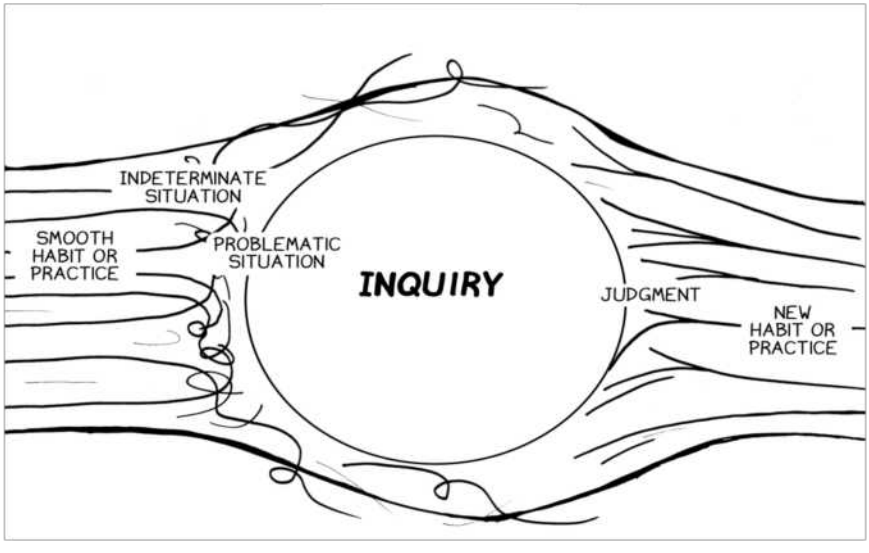

Figure 1: The Context of Inquiry, including the antecedents and consequences of inquiry.[14]

If the *perplexity* motivates an attempt to settle it (as it need not, if it is relatively minor or the agent chooses simply to ignore it), then Dewey would mark it as a "problematic situation." What is crucial is that the feeling of perplexity or indeterminacy does not lead straightaway or necessarily into inquiry: one must also *recognize* the situation as one requiring inquiry to resolve it and make a *choice* to approach in that way. Furthermore, it is important to point out that the agents do not yet have a conception of the *problem* they face. *A problem-statement* is arrived at through inquiry, rather than given prior to inquiry.

Inquiry has a number of functionally-related phases. Dewey remarks that there is nothing special about the number of phases (though he usually identifies five) or their boundaries. The logic of inquiry is an interpretive framework, though one with some prescriptive bite. In some situations, it might be useful to differentiate more phases, whereas in others, it is better to collapse them into fewer.[15] Nevertheless, for many purposes, the following list of phases is useful. These phases do not resemble a step-by-step linear process, as exemplified in the "The Scientific Method" cartoon taught in primary school.[16] Rather, they are a set of mutually coordinated phases with complex feedback loops and recursive processes (see **Figure 2**).[17]

In the initial phases of inquiry, inquirers must take stock of the situation. Through a process of *observation,* they determine the *facts of the case*. These are the relatively fixed conditions of the situation that constitute the landscape of the problem. The status of facts is always provisional, in at least two senses. First, inquirers may be mistaken in their observations. They may wrongly take the conclusions of a prior inquiry as factually authoritative when they are not exportable to this new context. When facts are represented in language (as they necessarily must be, given the social nature of inquiry), then there is the possibility of using inadequate or unsuitable means of symbolic representation. Certain facts may turn out to be irrelevant, too coarse or imprecise, and thus will need to be revised or replaced with more relevant or precise observations. Subsequent processes of observation refine our sense of the fixed features of the situation.

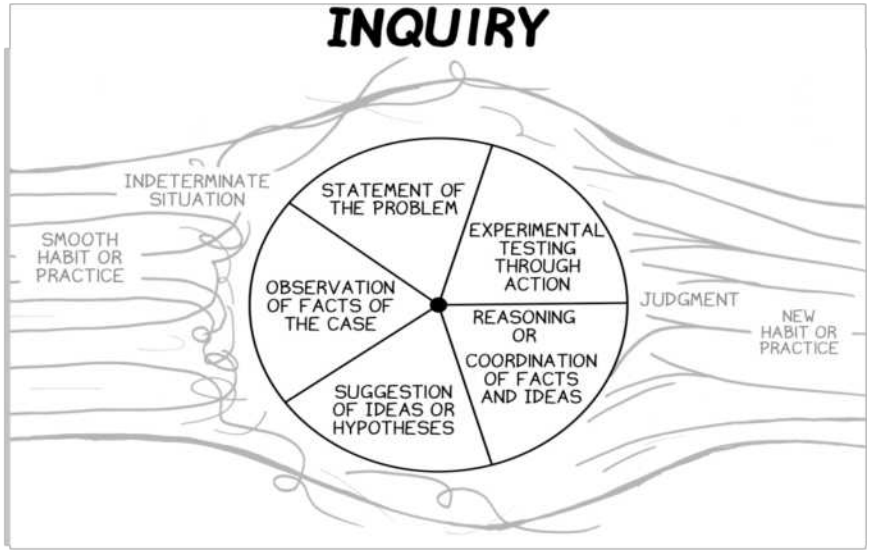

Figure 2: The Pattern of Inquiry. Here is the internal, functional structure of the phases of inquiry, plus the context in which inquiry takes place.[18]

Gathering the *facts of the case* leads inquirers to a *statement of the problem*. Problem-statement is an attempt by the inquirer to clearly identify the source and nature of the perplexity or indeterminacy in the situation, based on an interpretation of the facts. As a product of inquiry, the problem-statement is neither given in advance nor unchanging throughout the process. The statement of the problem may go through several revisions during inquiry. As Dewey was fond of pointing out, "a problem well put is half-solved."[19] On the other hand, a problem poorly-put will frustrate any attempt at solution. However, inquirers can only certify that they have properly stated the problem once they have solved it.

The *facts of the case* and the *statement of the problem* together *suggest* several *hypotheses* or problem-solutions (sometimes Dewey calls them "ideas"). "Suggestion" in Dewey's sense is not only a psychological process by which ideas arise, but also an epistemic process in which an inquirer uncovers possible ways the situation might unfold. There should be several alternative suggestions on offer; if the suggested resolution was *univocal*, it is doubtful that there would be any call for inquiry in the first place, for the situation would be determinate. Indeterminacy in the situation means that from the outset, there are conflicting tendencies, and this conflict appears in the *suggestion* phase as a plurality of hypotheses. As opposed to *facts*, which attempt to capture fixed conditions of the situation, hypotheses attempt to capture the *possibilities* inherent in the situation, possibilities that could be used to initiate actions that eventually

resolve the indeterminacy. This phase of inquiry captures relations between hypothetical action and expected consequences. In commonsense inquiry, it might produce a relatively simple hypothetical ("If I head due north, I'll hit the river, and then I'll know how to get home."), whereas in more complex, scientific inquiries, the hypothesis might be related to a larger theoretical-conceptual structure or representative model.

The inquirer engages in *reasoning* in order to develop further hypothetical and observational materials and to coordinate them with one another. While in some broad sense of the term we might say that "reasoning" is just inquiry itself, Dewey uses the term in a more narrow sense to refer to a specific phase of inquiry. Dewey's account of the activity reasoning has few surprising or controversial features from a commonsense point of view, though unlike traditional philosophical accounts of "Reason," as an innate faculty of the mind producing knowledge of its own accord, reasoning is an activity inquirers engage in that is only one component of inquiry. Reasoning can take many forms: deductive logical inferences, mathematical calculation, analysis and clarification of concepts, thought experiments, linking the hypothesis to broader theories, abstract modeling, refinements or revisions of existing hypotheses based on new observations, and conceiving new observations and experiments to be performed. All of these operations serve the same purpose of driving the articulation and coordination of facts, problem-statement, and hypothesis towards the resolution of the problem.

Another necessary phase of inquiry is *experimental testing*, in which the hypothesis is put into practice in limited, tentative, or controlled fashion in order to assess the effectiveness of the hypothesis in resolving the problematic situation. This phase is importantly different in function from observation aimed at determining the facts of the case. All intelligent inquiry requires *experimental testing* in some form.[20] Dewey sometimes describes this as *the* central insight of the scientific revolution.[21] The requirement of experimentation may be satisfied in the most limited sense by making a novel prediction, such as Einstein's prediction of the gravitation deflection of light, or performing a natural experiment, such as John Snow's epidemiological studies on cholera. Stronger testing requires deliberately manipulating the situation and monitoring outcomes, as in a genuine laboratory experiment. No inquiry can be considered satisfactorily resolved from a logical point of view where experimental testing has not occurred. It is important, too, to mark the crucial *functional* difference between observation, which determines the factual conditions of the situation, and experimentation, which tests the adequacy of a hypothesis for resolving the problematic situation.

The conclusion of inquiry is a *judgment*, in which the hypothesis is asserted as the proper problem-solution *and* then put into practice in a way that effectively removes the initial disruption and feeling of indeterminacy in the situation. Reaching the conclusion of inquiry is a holistic process. No phase of inquiry takes precedence over others, and all are judged by their capacity for

mutual coordination. However, it is not a matter of the phases of inquiry merely cohering with one another; there are important differences in *functional role* between facts, problem-statements, hypotheses, inferences, and experimental results. Given these functional relationships, the phases must be coordinated for the sake of effectively transforming perplexity into resolution, the indeterminate situation into one that is settled and determinate enough to afford untroubled activity. Dewey uses the term "functional fitness" to capture these features of judgment.[22]

Science, Values, and Democracy

Given Dewey's account of scientific inquiry, it may seem odd to regard it as central to an account of *democracy*. In light of the technical, fact-driven, problem-solving nature of inquiry, Dewey's account would appear to more appropriately describe a *technocratic* form government. The important difference between an inquiry-driven democracy versus an inquiry-driven technocracy is the role that *social values* play[23] and the relationship between *experts* and *the public.* In any inquiry where the problem or its resolution is of *public interest*, democratic values should feature strongly.

There are two roles that values generally play in any inquiry. The first is a *direct* role in which values act as reasons in themselves for decisions that shape inquiry. The second is a relatively *indirect* role in which values guide inquiry through determining how to use reasons to make uncertain choices.[24] In the direct role, values figure as reasons to make a choice (analogous to premises in an argument), whereas in the indirect role, values are presuppositions that shape decisions about methodology. Values play an indirect role by determining the appropriate criteria for what constitutes strong evidence that a decision should be made.[25] Values play a direct role in answering the following kinds of questions: Who is included in the community of inquiry? Should an indeterminate situation be settled by inquiry or some other method of fixing belief (for instance, faith or stubbornness)? Which problematic situations should receive the highest priority? What resources will be devoted to inquiries? As an ethical matter, what kinds of methods ought inquirers use in conducting experiments involving humans, animals, and ecosystems? What kinds of applications should the results may be put to? These are external constraints on the practice of science, belonging to what some philosophers call the "context of discovery" and "context of application."[26] The role of values here is more or less obvious and well-acknowledged.[27]

More controversial than these direct roles, there are indirect roles that values ought to play in the *internal* aspects of science: the characterization of facts, the suggestion of hypotheses, reasoning, and testing. The reason that values play an indirect role in even these internal phases of scientific inquiry is that they always involve some degree of uncertainty. The existence of

uncertainty is what allows some flexibility in decision-making criteria, where social, ethical, or political values can play an indirect, guiding role.[28]

Uncertainty requires that inquirers make choices in all of inquiry's phases. For example, in looking at slides of rat livers to determine cancer rates in rats exposed to a toxin (dioxin), researchers have to develop criteria (implicitly or explicitly) that are more likely to overestimate or underestimate the rates of cancer.[29] Of course, researchers will try to be as *accurate* as possible, but this process inevitably falls far short of securing results with complete certainty about each case. Since 1978, three groups of researchers looked at *the same set* of rat-liver slides, with widely divergent counts of the number of tumors. In 1990, a group of seven pathologists made an assessment based on new, clearer criteria for judging rat liver abnormalities; still, the pathologists had to resort to majority votes to determine how to apply those criteria in order to settle many cases. Judging which abnormalities are cancerous involves *borderline cases* leading to uncertain categorization. Because researchers are making choices under conditions of uncertainty, they need to consider the *risks* associated with the different options. If they underestimate the number of cancerous livers (say, by choosing only very clear cases), there is the possibility that regulations of the toxin may be too permissive. As a consequence of lax regulations, the toxin may be used in ways that are dangerous to public health. On the other hand, if they overestimate the rates of cancer (say, by assuming all borderline cases are cancerous), it may lead to burdensome overregulation, leading to harmful economic consequences such as lost jobs and losses for investors. To fail to consider such consequences in determining and applying these criteria is negligent and irresponsible. Therefore, inquirers should contemplate the social consequences of determining and applying experimental criteria in as clear and rigorous a fashion as possible.

Neglecting social consequences is a general problem at most, if not all, stages of scientific inquiry. Due to the uncertainty in choosing the most promising hypothesis, explanation, or problem-solution, one ought to consider the social consequences of pursuing different alternatives (e.g., does the hypothesis make some assumptions about gender or race that might cause harm?). Social values are also relevant when deciding on the statistical factors that determine the rate of false-positive versus false-negative judgments. Carl Cranor argues that in many cases, because of conventional requirements on statistical significance and ignoring social consequences, we accept far too high a rate of false negative judgments.[30] Each phase of the scientific process requires decisions, made under uncertainty, and those decisions require consideration of social, moral, political, and other values at stake in the decision. This is not special to science, but an extension of general, ordinary, everyday standards of responsible decision-making to scientists.[31] When scientists or scientific fields turn instead to *mere* conventional criteria to make such decisions (such as applying a conventional level of statistical significance testing to all tests, regardless of context), they are acting negligently, and in some circumstances

encouraging irresponsibility, because they fail to consider the relevant social consequences of their decisions.[32]

So, where there is uncertainty in science and the potential for social consequences, inquirers must use value-judgments to guide inquiry. When they recognize the need to consider values within inquiry, the next question is: Whose values?[33] Should the scientists decide which values are pertinent? Should they merely follow their conscience? If science is a purely private pursuit, then that would be perfectly sensible. However, if the research is a *public* concern in the minimal sense that it has consequences for those who are not participants in the activity, then inquirers have a duty to give some consideration to the interests and values of these parties. Recall Dewey's explanation of how a public comes into existence in this way: the existence of the public implies a public interest that needs to be considered. How best to ensure that public interests and the values of affected parties may vary from case to case: in some simple cases, where values are widely shared and uncontroversial, conscience and empathy on the part of the researchers may sometimes suffice; in general, however, it may be better to consult the affected parties directly in some form of *public representation*.

Much of contemporary natural and social science, especially the science at issue in public policy, is a public concern in a much deeper sense than having effects on third parties. Science policy takes place not in isolated research labs but in complicated, often international networks of research groups. It draws large amounts of funding from public sources such as federal grant-making institutions like the National Science Foundation (NSF) and takes place, at least in part, in public institutions such as research universities. Through its impact on regulations, corporations, and personal choices and beliefs, the consequences of this research and its applications are extensive. The conscience of the researchers or the internal decision making of isolated groups is no longer enough to secure responsible consideration of public values. Instead, what is needed is to *democratize* the pursuit of science in the sense of bringing the values of the public, directly through deliberation and public comment and indirectly through structures and modes of representation, into the pursuit of science *at every stage*.

At this point, my argument has come full-circle. I began by proposing a Deweyan approach to democracy as a form of social inquiry, whereby inquiry is modeled in part on the practices of science. This model runs the risk of reducing a political conception of governance to a mere technical endeavor – that is, *technocracy* rather than democracy. Then, I pointed to the crucial role that *values* play in every stage of the scientific process, demonstrating that inquiry is more than a purely technical, value-neutral activity. Finally, I argued that science is a public institution that, returning to Dewey's political theory, ought to function democratically. This does not mean, of course, that members of the public should vote on whether or not to accept the conclusions of science.

Instead, the public must be involved or represented when their values are at stake.

The Role and Responsibility of Experts

Returning to the model of democratic politics understood as a form of cooperative social inquiry, it is important to clarify the roles of the public versus experts. It is hard to imagine that for any sizable public an unstructured, direct democratic activity such as joint inquiry would even be possible, much less effective in resolving complex problematic situations. So it becomes necessary to reflect on structures and institutions that can effectively manage the twin roles of publics and experts, balancing the needs for folk and technical knowledge and skill in a single problem-solving process.

A traditional picture delimits three groups in democratic decision-making: the people, the policy-makers, and the scientific experts. The role of the policy-makers is to represent the interests of the people in constructing policy. They consult with the scientific experts to determine the factual and predictive information necessary to constructing policies that effectively serve the interests of the people. Science is an isolated and linear process moving from basic research to ready-to-serve, plug-and-play knowledge available for application. The relationship between policy and science is then a *query-response* model, whereby the interaction of science and policy is nothing more than policy-makers querying scientific experts for information, and scientists responding from a ready-made store of knowledge.[34]

It is beyond the scope of this chapter to provide a thorough critique of this model of science-policy interaction. There have already been many critiques of the query-response model, whether principled, philosophical or practical. Scholars have proposed alternatives, from replacing experts with ranking schemes for automatically assessing the quality of published evidence,[35] to giving experts much more political power than they presently have. Mark Brown criticizes the notions of scientific and democratic "representation" underlying this query-response model, or what he calls "the liberal-rationalist tradition."[36] He offers an alternative account of *democratic representation.* Representation is conceived neither, in political terms, as mirroring the will of the constituents nor, in scientific terms, as mirroring nature's structure absent political values. Instead of directly engaging in critique of the query-response model or liberal-rationalist tradition, I will focus on setting out an alternative based on the Deweyan approach to democracy and science developed so far. Along the way, my analysis will indicate some differences between the traditional query-response and Deweyan models.

First, we should eschew the dichotomy between policy-makers and scientific experts. Policy-makers in a Deweyan democracy are just expert inquirers, and ought to be selected in part based on their expertise and success in

resolving past policy inquiries. While scientists are experts in predicting and explaining within biology, physics, engineering, and other fields, policy-makers are experts in policy making, conceived as a proposing, testing and implementing policy instruments to resolve problems of public interest. Both scientists and policy-makers are experts at different types of inquiries, and the experts generally are those with the skills necessary to guide the problematic situations to successful resolution.

Likewise, both policy-making and scientific experts ought to be thought of as public representatives. This may be obvious in the case of elected policy-makers who represent the interests of their constituents, but it follows for experts as well, given my arguments about the role of values and democracy in science. An account of how these experts would represent the public interest is complicated by several factors. First, they cannot represent by mirroring the values and interests of the public. Since the public sphere is often a site for the expression of multiple, conflicting values and interests, it is far from clear how such mirroring would even prove possible.[37] Second, experts are unelected. Obviously elections serve as a check on whether the politicians properly represent their constituents' interests; on the other hand, democratic accountability cannot be reduced to voting alone.[38] Still, many policy-makers are not directly elected, but nonetheless are overseen by public officials and are thereby subject to indirect public control. Scientists in their representative capacity are not obviously subject to such controls. So, a third complicating factor is that the jobs of experts, unlike those of political appointees and bureaucrats, yield to little or no political oversight.

In institutions of higher learning, it is important for preserving academic freedom that scientists not be subject to such oversight. So how can they still be held responsible as representatives of the public? Any sort of direct control or oversight of scientists by public officials may turn out to be ineffective and inefficient. One option is to attach "strings" or stipulations to public grant funding for scientific research projects, for instance, requirements of social responsibility along with intellectual merits in awarding research monies. On a broad scale, this is already done through decisions about what types of grants to fund or what areas of research emphasis to prioritize. Justifications to the U.S. Congress by agencies like the National Institutes of Health (NIH) and NSF emphasize the beneficial social consequences produced by the research they fund. More fine-grained control has been pursued through NSF's "broader impacts" criterion with mixed results.[39] Although this approach falls short of requiring social responsibility in the internal decision-making processes of scientific inquiries, it could be expanded to include such criteria. Another possibility is for scientific societies to include requirements of social responsibility into their professional codes of conduct.[40] These codes already include various professional ethics guidelines, but most fall short of encouraging social responsibility and public accountability. In some situations, the responsibility of making decisions about the social value of research may be

better left to individual scientists.[41] In others, that delegation of responsibility may be too great a burden for them to bear.

At a minimum, both scientific and policy experts should elicit public feedback through effective methods of deliberative participation, such as citizen juries or deliberative polls. Deliberative participation should be supplemented with other processes of democratic representation. Mark Brown refers to a number of distinct elements of democratic representation. First, there must be authorization or a formal process by which representatives are given the authority to act on behalf of constituents.[42] Second, accountability in a democracy involves accountability or processes by which constituents sanction or reward representatives, asking them to give an account of their actions.[43] Third, there needs to be participation or forms of direct and active engagement between representatives and constituents.[44] Fourth, representation demands deliberation or dialog between and among citizens and representatives, which makes explicit their values, arguments, and policy proposals.[45] Fifth, there should be resemblance or the (perceived) likeness between constituents and representatives, especially with respect to demographics, shared social perspectives, values, or beliefs.[46]

In Pitkin's terms, the first two are *formal* modes of representation, and the last is a *descriptive*.[47] Elections serve both to authorize and to hold accountable. Citizen juries and town hall meetings are both deliberative and participative, while protests involve participation without much deliberation, and closed-door meetings amongst representatives can involve deliberation without participation. These representative processes should take place in parallel with the analytic and empirical methods that focus on descriptive, explanatory, and predictive elements of inquiry.[48] Useful, adequate models of policy and expertise will interweave policy-making expertise, scientific expertise, and public deliberation.

Normative and Positive Research Methods

Inquiries focused on description and explanation, policy and action, as well as normative evaluation display striking similarities. Scientific, practical, and ethical inquiries are forms of inquiry, all following the same general pattern. Furthermore, as I have shown above, each type of inquiry implicates the others. This conclusion goes against the grain of traditional discussions concerning positive and normative research methods in IR theory. In the traditional framework, researchers are either engaging in positive social science (a part of political science) or normative theorizing (a part of ethics and political philosophy). This divide has its origins in the philosophy of positivism, which was committed to a strict dichotomy of facts and values, a strict empiricism about factual and scientific knowledge, and a belief that values are irrelevant to scientific inquiry. While in the actual practice of most IR scholars these two approaches to IR research have been worlds apart, pragmatists see them as

deeply interrelated, as parallel types of inquiry and as complementary moments in *any* particular inquiry.

Any genuine inquiry – ranging from the most abstruse exercise in scientific theory-building to the most everyday instance of practical problem-solving – is a response to a felt, objective problematic situation. Without the existence of that discord, there is no authentic inquiry. It is a sham, a form of make-work. The goal of inquiry is to transform that situation so that the initial difficulty is resolved. Inquiry changes lives and worlds. As such, all genuine inquiry is *practical* in the sense that it alters human practices, the lived environment, and thus involves ethical evaluation. So, whether inquiry is aimed at adjudging values or understanding facts is a matter of emphasis, not an exclusive either-or choice.

A pragmatist approach to IR ought to eschew an absolute dichotomy between normative and positive research methods. Any attempt to understand the international scene will change our perceptions of it, and thus affect our lives, values, and interests at that level. Scholarly inquiries must therefore be conducted responsibly, sensitive to their social implications and policy relevance. Any attempt to refine an ideal theory will depend on understanding the actual situation of international politics, as well as psychological, sociological, technological, and other kinds of practical limitations on the theory. Any attempt to resolve problems of international relations will need to rely both on the understanding of what is going on and ideals about what would be better, on both positive and normative research methods. In the example of global climate change (discussed below), it would be a mistake to institute absolute separations between policy-relevant scientific inquiry, policy-making inquiry, and the clash of social and ethical values.

Attending to the role of values in science and the implications of science for policy requires us to not only dissolve the normative/positive split, but also reconfigure the relationship between theory and practice in IR. Many foreign policymakers and some IR scholars perceive a significant gap between IR theory and practice, or ideas and policies – some even going so far as to question the value of IR scholarship altogether.[49] Other IR scholars eschew policy relevance as a threat to the autonomy of IR as a social science.[50] Part of the problem reflects a tendency among scholars to choose overly specialized and narrow topics for their research projects. Neither specialization nor a limited subject-matter is an intrinsically vicious quality of research. Indeed, they can be instrumentally beneficial to the research efforts of a wider community of inquiry; however, they can also be detrimental qualities if research is guaged only by its practical benefit or impact. Highly specialized or pure research is often pursued because it promises easy gains or "low-hanging fruit," not because it is intellectually, practically, or politically significant.

Another contributing factor to this controversy is an outmoded and invidious distinction drawn between "pure" or "basic" and "applied" research.[51] This distinction is founded on two related mistakes: (1) that there is a linear

process starting with basic research into fundamental matters, generating knowledge that facilitates applied research, which then can be packaged for policy advice and practical application;[52] (2) that basic research is more pure, more objective, more intellectually valuable, and more difficult than applied research. Dewey had very little time for this distinction or the valuing of pure over applied science:

> The glorification of "pure" science... is a rationalization of an escape... a shirking of responsibility. The true purity of knowledge exists not when it is uncontaminated by contact with use and service. It is wholly a moral matter, an affair of honesty, impartiality and generous breadth of intent in search and communication.[53]

And further,

> When the achievements of the engineer are disparaged under the name "applied" science, it is forgotten that the inquiries and the calculations required to produce these achievements are as exacting as those which generate the science called "pure." Pure science does not apply itself automatically; application takes place through use of methods which it is arbitrary to distinguish from those employed in the laboratory or observatory.[54]

To prefer pure to applied research, intellectual independence to social relevance, is a distorted and one-sided way of evaluating the significance of scientific research. The positive and normative dimensions of research – whether witnessed in projects to understand causal patterns of international relations phenomena or those creating guiding ideals for international politics – are inextricably related. Thus, the approach I have so far outlined demands that inquiry, whether positive or normative, focus on genuine problems of practical or social significance, not purely scholastic or arbitrary intellectual exercises.[55]

Of course, an inquirer must be careful: to confuse a normative ideal for an actual fact would be a form of mere wishful thinking.[56] Advocates for the entanglement of fact and value may appear to be making this confusion, a willingness to support ideas or theories because they are valued rather than because they are warranted by the facts. Philosophers have been right to point out the difference between facts and values in order to avoid wishful thinking. For instance, if you find that the Lamarckian theory of evolution (whereby acquired traits are passed on from one generation to the next) best fits your preferred ideology, it would be a grave mistake to accept it despite its lack of evidential support (as occurred in the later part of the Lysenko affair in the Soviet Union). However, philosophers of science have overstepped when elevating that *functional* difference to an absolute or ontological difference; they cause positive harm when they attempt to erase the functional role of values in inquiry entirely.

Challenges of the International Context

Applying Deweyan ideas of democracy and social inquiry to the international context raises a variety of difficult challenges. The first challenge, already addressed above, is the difficulty of coordinating cooperative public inquiry on an international scale. A second challenge is the existence of many undemocratic nations which must participate in international politics. A third is the lack of international political institutions and structures that are democratically structured or that have the authority to enact change.

The challenge of engaging with groups spread across the world and coordinating cooperative inquiry on an international scale is a technical problem. This is especially problematic in situations involving the intervention of several nations, where the desire to cooperate towards the shared goal competes with national interest and the desire to gain differential benefit. One model for successful international cooperation is contemporary science. Many projects in science involve collaborations across several national and continental boundaries. The global cooperation of inquirers, both within and across disciplines, is required in order to produce and evaluate knowledge. Despite national loyalties, German scientists as Germans are not supposed to (and usually do not) support one another over and against Chinese scientists as Chinese. Even rivalries and competition function positively, especially when an area of inquiry is healthy, contributing towards the achievement of shared goals.[57]

The scientific community of inquiry can provide a model for international political cooperation. When a problematic situation rises to the level of international interest, then the affected public has a reason to collaborate with other groups in order to reach a successful resolution, regardless of national interests. The interests and values of the affected public may structure what counts as a successful inquiry. These public concerns are legitimate claims on the responsible pursuit of inquiry and therefore should be made and addressed without secrecy. In some cases, adversarial processes may be helpful for balancing conflicting group interests. What is illegitimate, however, is the privileging of sectional interests over sound principles of intelligent inquiry, especially those implicating evidence-based reasoning. This strategic behavior distorts the process of inquiry, encourages selfishly motivated competition instead of scientifically-spirited cooperation, and typically generates poor outcomes.[58]

According to some commentators, the United Nations encapsulates the problems of the second and third challenge.[59] It represents sovereign nations, not peoples, regardless of the legitimacy of the regimes that govern those nations. According to UNIS Vienna,

> The UN is not, and was never intended to be, a world government. As an organization of sovereign and independent States, it does only what Member States have agreed it can do. It is their instrument.[60]

The second and third challenges both question the existence or possibility of legitimate, authoritative democratic institutions capable of fostering international cooperation to resolve shared problems. If institutions like the UN are subject to the will of the national governments that comprise them, and many of those governments are undemocratic, uncooperative, or both, then there seems to be no possibility of moving international politics forward on the model of a Deweyan community of inquiry.

Things look more promising, however, if we make more consistent use of Deweyan evaluations of democracy. "Is this nation democratic?" is not a yes or no question for Dewey. On the one hand, democracy is an ideal that is always imperfectly realized. On the other hand, it is quite possible to realize degrees of democracy, even in the absence of widely accepted institutions of democracy.[61] In distinguishing "democracy as a social idea" and "political democracy as a system of government," Dewey writes:

> The idea of democracy is a wider and fuller idea than can be exemplified in the state even at its best. To be realized it must affect all modes of human association, the family, the school, industry, religion. And even as far as political arrangements are concerned, governmental institutions are but a mechanism for securing to an idea channels of effective operation… We object to the common supposition of the foes of existing democratic government that the accusations against it touch the social and moral aspirations and ideas which underlie the political forms. The old saying that the cure for the ills of democracy is more democracy is not apt if it means that the evils may be remedied by introducing more machinery of the same kind as that which already exists, or by refining and perfecting that machinery. But the phrase may also indicate the need of returning to the idea itself, of clarifying and deepening our apprehension of it, and of employing our sense of its meaning to criticize and re-make its political manifestations.[62]

Dewey's distinction is often taken as showing that the usual political institutions and mechanisms of democracy are not *sufficient* for a democratic society; but insofar as we recognize that democracy can be realized in degrees, we can see that they are also not *necessary* for partial realization of the social ideal of democracy. Deweyan democracy is in a sense both harder and easier to realize than those arrangements envisioned by standard democratic theories, according to which the political practices of suffrage, elected representatives, checks and balances, etc. are necessary and sufficient for democracy. Progressive realization of democracy is possible – to a point – without such formal institutional structures. On the other hand, full realization of democracy requires much more – it requires that the idea of democracy "affect all modes of human association."[63] On Dewey's account, democracy is not restricted to the official

government institutions; it is both deeper and more inclusive, involving personal habits, values, and all manner of formal and informal *social* institutions. These include relatively ad hoc and ephemeral organizations within the broader civil society. Dewey's vision of democracy is not statist. It is therefore possible for an authoritarian state to include democratic individuals, political groups, movements, and practices within it.

Despite non-ideal circumstances, a number of institutions and personal factors may provide the possibility of democratic action in the contemporary international context. First, officers of nondemocratic governments may sometimes adequately represent the interests and values of their citizens, and in some contexts they may even do so reliably. Second, there may be informal, unofficial mechanisms of interaction and participation in which citizens in nondemocratic countries can help guide the creation of policy according to their values. Even in completely autocratic nations, social protest actions can provide a way for citizens to interact with government leaders and participate in policy formation.[64] Local, unofficial interactions with low-level members of the government (discussions with local rulers at social events, religious meetings, or on the street) may likewise influence their decisions in concert with public values. Third, and more importantly, it is entirely possible that more informal, democratically-structured policy-making mechanisms can thrive in a vibrant civil society, benefiting from the benign neglect of government institutions or receiving official permission, even endorsement, from the regime. For example, citizen associations, neighborhood watch groups, protest movements, and NGOs can all play a role without being part of the official government. These groups and mechanisms can be sites of international collaboration without relying on undemocratic regimes. Fourth, such mechanisms may grow more formal and permanent in parallel with nondemocratic political mechanisms in the same state. Arguably, international scientific institutions exemplify international, democratic cooperation, even when they exist side-by-side with undemocratic governments. Finally, legitimate democratic institutions of international scope may pressure nondemocratic governments to accept conclusions that are contrary to their interests. The UN and other nations have sometimes pressured regimes to ameliorate human rights abuses.[65] External forces (e.g., economic sanctions) as well as internal forces (e.g., social unrest) will demand their acceptance. A more democratic and authoritative version of the UN is thus neither necessary nor sufficient for democratic international cooperation.

These considerations are admittedly speculative and skeletal. In order to flesh out what a Deweyan democratic account of IR might look like in practice, I will now turn to an analysis of a pressing problem requiring cooperative political inquiry on an international scale: global climate change.

Global Climate Change

The problem of global climate change is widely recognized by academics, policy-makers, and members of the public. The degree of scientific consensus about the existence and qualitative direction of anthropogenic climate change is impressive.[66] On the other hand, there is significant political and public controversy, both over the content and authority of the science, as well as what (if any) course of action should be undertaken. Scientists refine and solidify increasingly worrisome predictions, while the international community (and most national governments) make slow – if any – progress in addressing them. The three types of strategies that are most often considered in responding to the problem of global climate change are: (1) *Adaptation*: making changes to our lives, social and geographical arrangements to head of the major negative impacts of climate change on human populations; (2) *Mitigation*: Reducing climate change by making social and technological changes, especially by curbing greenhouse gas (usually carbon) emissions; and (3) *Geoengineering*: Intentionally engineering climate change in the opposite direction of current trends towards global warming, etc. Each of these approaches has its own significant problems. Governments have been slow to introduce or enforce regulations that would make the second option possible. The first option will require massive amounts of global injustice, as the impacts most definitely will not be evenly distributed according to geographic or socioeconomic factors, while the third poses even more complex issues, for instance, concerning the feasibility of large-scale projects and the ethical hazard of unintended harmful consequences.

The lack of progress on this issue can be blamed on a multitude of factors: under-informed publics, short-sighted political groups, unsympathetic media, multi-national corporations with conservative boards of directors (fearful that any response will lower world-wide consumption and corporate profits), and many others intent upon distorting the science and delaying a suitable response for strategic gain.[67] A Deweyan analysis of the climate change issue, on the other hand, shows that the scientific community must share the blame for not adequately responding to the problem. Reasons for this failure include distortions and misunderstandings of the nature of scientific inquiry, as well as poor interactions between the scientific and political communities, propagated in part by scientists.

Misunderstandings of the nature of inquiry (scientific or political) are pervasive in the current handling of the global climate change problem. They are epitomized in the very structure of the Intergovernmental Panel on Climate Change (IPCC), as evidenced in its mission statement:

> The IPCC is a *scientific* body. It *reviews and assesses* the most recent scientific, technical and socio-economic information produced worldwide

> relevant to the understanding of climate change. It does not *conduct any research* nor does it *monitor* climate related *data* or parameters.
>
> …
>
> Because of its *scientific* and intergovernmental nature, the IPCC embodies a unique opportunity to provide *rigorous and balanced scientific information* to decision makers. By endorsing the IPCC reports, governments acknowledge the *authority* of their *scientific* content. The work of the organization is therefore *policy-relevant* and yet *policy-neutral*, never *policy-prescriptive* (emphasis mine).[68]

The IPCC makes two related mistakes. First, they presuppose that there is an activity *separate* from inquiry which involves reviewing and assessing the results of inquiries independent of the context in which those inquiries take place (or at least, that such second-order inquiry has a fundamentally different form that does not involve the *conduct of research* or the *monitoring* of relevant *data*). Second, the IPCC mission to provide *policy-relevant* and *policy-neutral* judgments is misconceived, for it is impossible to realize.[69] According to the Deweyan pragmatist, it is impossible to reach warranted conclusions about complex and controversial issues without engaging in inquiry. With respect to the first mistake, the results of inquiry are warranted in the context of a *particular* problematic situation. Thus, their review and assessment irrespective of context proves implausible.[70] If the problem relates to policy, then inquiry into that problem is *necessarily* policy-prescriptive. If it is not a policy problem, then its policy-relevance cannot be established independent of a policy-prescriptive inquiry. The IPCC ought to take steps to democratize their inquiries and honestly report the ways in which values and policy considerations are already integrated into the process. In short, they should clarify that the kind of scientific/policy work they undertake is itself a form of inquiry.

Taking the massive amount of scientific research indicating the existence and nature of anthropogenic climate change as the facts of the case, inquirers can begin an international policy inquiry. Despite the enormous scientific effort bent on establishing these facts, they nevertheless remain tentative and propositional in this context, to be selected and revised by ongoing policy inquiry based on their *functional fitness*. The remaining stages of the policy inquiry include defining the problem, suggesting hypotheses, reasoning through the implications of each hypothesis, and engaging in experimental testing. Rather than stages in a purely scientific inquiry, they must constitute a cooperative effort by policy-making experts, scientific experts, and the public. They must be informed by the values of the affected publics. The inquirers involved must be willing to reevaluate and revisit the facts of the case in order to determine whether they are relevant and adequate for addressing the problem as defined by this inquiry. Moreover, the putative facts must be coordinated with a hypothesis that suggests how to resolve or mitigate the problematic situation. Inquirers must test the hypothesis (proposed policy solution) experimentally, checking the ongoing consequences of its adoption, and revising the hypothesis

in light of those results. To date, erroneous and pernicious concepts of policy-making, scientific inquiry, and science-policy interactions have delayed or distorted the course of inquiry.

So what is the way forward in an inquiry to address this international environmental, political and scientific issue? Democratizing the inquiry into global climate change requires reconsidering the role of public participation and representation in the different phases of inquiry. A first step would be to work toward a statement of the problem *as* a policy problem, rather than focus on the descriptive-explanatory characterization of the phenomena of climate change. Usually in policy-making contexts the nature of the problem is taken for granted. For instance, inquirers might ask: How can the international community reduce carbon emissions enough to mitigate or halt global climate change? The inquiry thus focuses on (a) how much reduction is necessary and (b) how governments can reach agreements to reduce emissions. The mistake is to assume that the characterization of the problem is given. As might be recalled, a central insight of Dewey's theory of inquiry is that "a problem well put is half-solved."[71] Given the difficulty in moving the global climate problem towards resolution, it is clear that we must reconsider the problem, perhaps taking an approach that considers the values of the public as well as the nature of the phenomenon.

Upon closer inspection, it is clear that there are multiple stages to the problem of global climate change, each of which involves different values. First, there are the causes of climate change. Even if inquirers ignore the input of humans, the global climate is still a complex and variable system. It changes over time in response to a variety of factors, such as volcanic eruptions, ocean circulation patterns, and sunspot cycles. Certain of these variations and causal factors have positive or negative consequences. For instance, the long-term tendency for climate to enter glacial periods could require humans to adapt or perish. It is only on the background of the workings of the global climate system that the human input – specifically the pollution of the atmosphere resulting predominantly from carbon emissions – causes climate change. It is not a linear causal process. Carbon emissions are also the by-product of processes that produce certain benefits, such as power generation, transportation, and economic development. An immediate reduction of such emissions would mean sacrificing these values.

Then there are the dire consequences of global climate change predicted by climate scientists. Most obvious is global warming, or the increase in mean surface temperature of the Earth. However, change in mean surface temperature is not of intrinsic significance. Instead, we must look at the ultimate effects in a way that is relevant to human interest, such as rises in ocean levels that will threaten coastal populations or threats to the viability of major crops in various regions. While it is beyond the scope of this chapter to give a detailed discussion of such effects, it is enough to say that many of the already existing and projected consequences are dire, and that they are not homogeneously

distributed across the globe and its populations. Not only will there be geographic injustices that disproportionately harm populations in coastal regions or areas that will become more arid, but also those who are already socioeconomically and politically disadvantaged. These populations lack sufficient resources to adapt and accommodate such disruptions. Poorer nations are even being asked to make greater sacrifices, such as curbing their own economic development, ceasing to strive towards levels of industrialization and welfare achieved long ago by developed nations.[72] Global climate change promises not only to create new global injustices but also to deepen and entrench existing ones.[73]

Once inquirers start to unpack the problem of global climate change in this way, asking what values are at stake at each level, public deliberation and representation assume a more prominent place in the process. The results of deliberative and representative political engagement may be widespread recognition that the current level of carbon emissions and the benefits that result are not worth the cost, that the experts are right about the effectiveness of reducing emissions, and then to the decision to sacrifice those benefits in order to curb emissions and slow the pace of climate change. However, even in ideal circumstances, that result seems implausible. First, the process is sufficiently far along that even reducing emissions to zero today will not prevent unwanted consequences, such as sea level rises and possibly the collapse of the West Antarctic Ice Sheet.[74] Second, many of the sources of carbon emissions and other greenhouse-gas pollutants are critical to human existence and have no ready alternatives. They are responsible for electricity generation, transportation of food and people, and agricultural and industrial production. Alternatives in each case exist, but many of these are not sufficiently developed, nor is the infrastructure in place to implement them widely and quickly. For example, clean alternative energy sources like wind and solar power will require long-term investments before the technology can come close to replacing our dependence on fossil fuels.[75]

Public deliberation is one method for addressing the serious conflict of values. On the one hand, inquirers value the benefits that result from the use of fossil fuels. On the other hand, they wish to avoid the consequences of global climate change. The problem arises in the clash of values. However, it should not be assumed from the outset that a statement of the problem demands the sacrifice of one particular set of values (e.g., productivity, development and progress associated with increased emissions) for another. First, public deliberation will establish evaluations of the different projected consequences of climate change and their significance. Understanding the nature of the problem in such detail – in effect, understanding it as a matrix of interrelated problems with multiple, competing values – will redirect efforts at broader, more inclusive solution. Furthermore, it may allow for some creative opening up of the problem-space. Inquirers might consider not only carbon emissions, but other causal factors in this complex global system, such as ground area covered by

snow and ice, cloud cover, other emissions such as methane, and social factors determining reliance on carbon or resistance to change.

It is dangerous in the contemporary political context to suggest creative ways of framing the problem. This is a tactic preferred by climate change deniers, corporate groups that would delay solutions, and those who seek to deny human responsibility for global climate change. Nevertheless, it may be possible to reappropriate these devious and dilatory tactics towards more positive ends. This reappropriation is possible if the scientific and policy experts take these questions and consider them in the course of responsible inquiry, accountable to the public rather than corrupted by corporate and partisan interests. For example, inquirers might ask: How can we act to mitigate, halt, or reduce global climate change independent of schemes to mitigate carbon inputs? This approach ties into the recent surge of interest in geoengineering.[76] It might also be asked what kinds of social and technological changes can be made to accommodate human activity to the effects of climate change (e.g. rise in global sea level) in order to minimize the negative impacts (e.g. displaced coastal communities).[77]

There is a need for extensive work at the very basic level of framing the global climate change problem. Given this unmet need, it is difficult to speculate further about how the inquiry should progress. Still, it is important to emphasize that at every step democratic deliberation and representation are necessary for incorporating and integrating the relevant social values. It is likewise important to recognize that any policy-relevant scientific inquiry must be undertaken in a way that is sensitive to the interests, values and concerns of affected publics. Moreover, any policy-relevant scientific inquiry is instrumental to a more comprehensive policy inquiry, and will therefore be (at least indirectly) policy-prescriptive. The most difficult requirement for inquiry to satisfy is the *experimental* requirement. Even in straightforward scientific inquiry into the climate change problem, experimentation by climate scientists is difficult and often indirect (though climate science is not entirely concerned with modeling). In the policy realm, this requirement is even more difficult to satisfy. Ultimately, the implementation of a policy response to the problem global climate change – whether it involves accommodation, mitigation, geoengineering or some combination of these – must be treated as an experiment.

Science as an international institution generally has taken a leading role in the attempt to address this global crisis. It remains to be seen whether it will do so in a responsible, democratic fashion. The approach of the IPCC so far has been inadequate. At a minimum, scientists must begin to think of themselves as representatives of the needs and values of their specific (as well as more global) communities, as no one is unaffected by this problem. The work of scientists must also be coordinated with international policy-making efforts, supported by people and governments around the world.

Democratizing climate change science and policy is not merely a public relations issue, or a matter of persuading the public of what scientists and

policy-makers already *know*. Rather, it is an attempt to transform the nature of the inquiry so that it is both politically legitimate and scientifically respectable. Currently, these two values seem to be at odds, because science and policy-making are widely perceived to be wholly separate pursuits. When scientific inquiry is treated as both independent from political responsibility and authoritative over policy-making, resistance is both a likely and reasonable response. It may look like denialism, avoidance, or the manufacture of false doubt. Nonetheless, we ought to resist the temptation to label this response a mere distortion of the science. It is a reasonable response to the widely accepted split between inquiry and action, science and politics. The better solution is to heal the split. In a bold new world, we should rise to this challenge as a global community; in the process, we might learn some critical lessons about the future of democracy and science in the international context.

Notes

1. Nuno P. Monteiro and Keven G. Ruby, "IR and the False Promise of Philosophical Foundations," *International Theory* 1, no. 1 (2009): 15-48. Patrick T. Jackson, *The Conduct of Inquiry in International Relations: The Philosophy of Science and Its Implications for the Study of World Politics* (New York: Routledge, 2011).

2. Participatory democracy, on such accounts, would then be a more complicated mix of direct and representative relations. I will discuss alternative accounts of political representation below, including Hanna F. Pitkin and Mark B. Brown. Pitkin, *The Concept of Representation* (Berkeley: University of California Press, 1967). Brown, *Science in Democracy: Expertise, Institutions, and Representation* (Cambridge, Mass.: MIT Press, 2009).

3. John Dewey, *The Collected Works of John Dewey*, 1882-1953, edited by Jo Anne Boydston (Carbondale, IL: Southern Illinois University Press, 1969-1991), *LW* 2:243-246.

4. This claim may strike the reader as an admission of scientism, or the view that all methods for discovering truth should be modeled after the techniques exemplified by the natural and physical sciences. However, that would be a mistake in several respects. On a Deweyan approach, different types of inquiry – natural- and social-scientific, humanistic, ethical, and commonsense – lie on a continuum, distinguished from one another not as different *kinds* of inquiry, but as having different characteristic subject-matters and techniques appropriate to their subject-matters. When the sciences are treated as exemplars

of inquiry, it is because their procedures are undertaken in an especially controlled and careful fashion, and it is the features of inquiry in general that we hope to glean from them. The error of scientism, on the other hand, would be to uncritically export the special results and techniques that work for *particular* subject-matters into other areas of inquiry where they have not yet proved themselves valuable, an approach that is rightly avoided. For a similar treatment of the scientism objection, particularly when levelled at John Dewey's theory of inquiry, see James Scott Johnston, *Inquiry and Education: John Dewey and the Quest for Democracy* (Albany: State University of New York Press, 2006), 40-44.

5. A more thorough explanation of Dewey's philosophy of science can be found in "John Dewey's Logic of Science." *HOPOS: The Journal of the International Society for the History of Philosophy of Science* 2, no. 2 (Fall 2012): 258-306. For an earlier account, see Hans Reichenbach, "Dewey's Theory of Science," in *The Philosophy of John Dewey*, ed. Paul Arthur Schilpp (New York: Tudor Publishing Company, 1951), 157-192.

6. The phrase "philosophy of science" does appear in a number of places in Dewey's *Collected Works*, including *Democracy and Education, MW* 9:293, *The Quest for Certainty, LW* 4:92,102, *Freedom and Culture*, LW 13:123, and *Knowing and the Known, LW* 16:146.

7. Dewey was an admirer of the popular science writing of Lancelot T. Hogben. He was also acquainted with modern physics by way of the influence of his daughter Jane.

8. For examples of early writings on these topics, see Dewey, *Collected Works*, "Kant and Philosophic Method," *EW* 1:34-47, "The New Psychology," EW 1:48-60, "The Psychological Standpoint," *EW* 1:122-143.

9. See Ernest Nagel's introduction to *Logic: The Theory of Inquiry* in Dewey, *Collected Works, LW* 12:ix-xxvii.

10. There are of course special issues in Dewey's philosophy of science that go beyond the core of his theory of inquiry, including his stance on realism versus constructivism, his understanding of causation, the nature of laws, and the nature of mathematics.

11. Between these roughly synonymous terms, Dewey prefers *perplexity* in popular writings (e.g., *How We Think* rev. ed.) and *indeterminate situation* in more technical philosophical writings (e.g., *Logic: The Theory of Inquiry*). To illustrate, in *How We Think*, he states that inquiry begins with "a state of doubt, hesitation, *perplexity*." *Collected Works*, *LW* 8:121 (emphasis mine). In *Logic: The Theory of Inquiry*, he declares that "it is of the very nature of the *indeterminate situation* that it evokes inquiry to be … uncertain, unsettled, disturbed." *Collected Works*, *LW* 12:109 (emphasis mine).

12. For more on Dewey's crucial but complex concept of a "situation," see Tom Burke, "What is a Situation?" *History and Philosophy of Logic* 21, no. 2 (2000): 95–113. For a different interpretation, see Matthew J. Brown, "The

Source and Status of Values in Socially Responsible Science," *Philosophical Studies* (forthcoming).

13. Dewey, *Collected Works*, *LW* 12:109.

14. For a similar account, see Philipp Dorstewitz and Shyama Kuruvilla, "Rationality as Situated Inquiry: A Pragmatist Perspective on Policy and Planning Processes," *Philosophy of Management* 6, no. 1 (2007): 80-95. Also, see Philipp Dorstewitz, "Dewey's Science: A Transactive Model of Research Processes," in *The Continuing Relevance of John Dewey: Reflections on Aesthetics, Morality, Science, and Society*, ed. Larry A. Hickman, Matthew Caleb Flamm, Krzysztof Piotr Skowroński, and Jennifer A. Rea (New York: Rodopi, 2011), 205–224.

15. Dewey, *Collected Works*, *LW* 8:207–208.

16. Dewey, *Collected Works*, *LW* 8:206–207. The cartoon version is probably an over-simplification of Dewey's account. See James Blachowicz, "How Science Textbooks Treat Scientific Method: A Philosopher's Perspective," *The British Journal for the Philosophy of Science* 60, no. 2 (2009): 303-344.

17. Brown, "Source and Status of Values."

18. For a simplified version of the pattern of inquiry represented in similar fashion, see Philipp and Kuruvilla, "Rationality as Situated Inquiry," and Philipp, "Dewey's Science."

19. Dewey, *Collected Works*, *LW* 12:112.

20. Dewey, *Collected Works*, *LW* 12: 117.

21. Dewey, *Collected Works*, *LW* 12: 289. Also, see *LW* 15: 88 and *MW* 14: 41.

22. Dewey, *Collected Works*, *LW* 12:113

23. Dewey is less clear about this point than we might like. According to Dewey, "There is no inquiry that does not involve judgments of practice." *Collected Works*, *LW* 12:176. He also writes: "The net conclusion is that evaluations as judgments of practice are not a particular kind of judgment in the sense that they can be put over against other kinds, but are an inherent phase of judgment itself." *Collected Works*, *LW* 12:180. And later, "to many persons the 'physical' seems not only relatively independent of social issues (which it is) but inherently set apart from all social context. The appearance of absence of conflict is to some extent a function of this isolation. What has actually happened, however, is that the influence of cultural conditions has become *indirect* … Social tendencies and the problems attending them evoke special emphasis upon certain orders of physical problems rather than upon others … The notion of the complete separation of science from the social environment is a fallacy which encourages *irresponsibility*, on the part of scientists, regarding the *social consequences* of their work." *Collected Works*, *LW* 12:482-483 (emphasis mine). That is, any scientific work, even in the physical or so-called "hard" sciences, has social, ethical consequences that the scientist has a

responsibility to take into account. This point has been developed in detail by feminist philosophers of science since the 1980s. My exposition will closely follow the work of Heather Douglas. See Douglas, "Inserting the Public into Science," in *Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*, ed. Sabine Maasen and Peter Weingart (Dordrecht: Springer, 2005), 153-169; "Rejecting the Ideal of Value-Free Science," in *Value-Free Science? Ideals and Illusions*, ed. Harold Kincaid, John Dupré, and Alison Wylie (Oxford: Oxford University Press, 2007), 120-141; "Inductive Risk and Values in Science," *Philosophy of Science* 67, no. 4 (2000): 559–579; *Science, Policy, and the Value-Free Ideal* (Pittsburgh: University of Pittsburgh Press, 2009); and "Engagement for Progress: Applied Philosophy of Science in Context," *Synthese* 177 (2010): 317–335.

24. Douglas, *Science, Policy, and the Value-Free Ideal*, 87–88, 95–108.

25. Douglas, "Inductive Risk and Values," 561.

26. The importance of the context/discovery distinctions has been consistently overstated. For instance, see Paul Hoyningen-Huene, "Context of Discovery and Context of Justification," *Studies in the History of the Philosophy of Science* 18, no. 4 (1987): 501-515.

27. Douglas, "Inductive Risk and Values," 563. See also Helen E. Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton: Princeton University Press, 1990), 83-85.

28. It is possible that values should play an even deeper role than Douglas argues for. See, for instance, Janet A. Kourany, *Philosophy of Science after Feminism* (Oxford University Press, 2010). Also, see Brown, "The Source and Status of Values" and "Values in Science beyond Underdetermination and Inductive Risk," *Philosophy of Science* (forthcoming). I will not pursue these more controversial accounts here.

29. This case is developed in detail by Douglas, "Inductive Risk and Values," 569–572.

30. Carl F. Cranor, *Regulating Toxic Substances: A Philosophy of Science and the Law* (New York: Oxford University Press, 1993), 71-78, 122-129, 135-137, and 153-157. Cited in Douglas, "Inductive Risk and Values," 566.

31. Douglas, *Science, Policy, and the Value-Free*, 71.

32. Douglas, *Science, Policy, and the Value-Free*, 68-70. Kourany, *Philosophy of Science*, 68-77.

33. Douglas, "Inserting the Public," 156.

34. The query-response model is sometimes referred to as "the linear model of science advising."

35. For discussion and criticism of these so-called evidence-based policy schemes, see John Worrall, "What Evidence in Evidence-based Medicine?" *Philosophy of Science* 69, no. S3 (2002): 316–330; Nancy Cartwright, "Evidence-based Policy: Where is our Theory of Evidence?" *Tech. Rep. 07/07*, Centre for Philosophy of Natural and Social Science, London School of

Economics, 2007; Cartwright, "Evidence-Based Policy: What's To Be Done About Relevance," *Philosophical Studies* 143, no. 1 (2009): 127–136; Cartwright, Nancy and Sophia Efstathiou, "Evidence-Based Policy and Its Ranking Schemes: So, Where's Ethnography?" (paper presented at the conference of the Association of Social Anthropologists, London, UK, March 2008); Cartwright et al., "Evidence-based Policy: Where is our Theory of Evidence? " *Journal of Children's Services* 4, no. 4 (2009): 6–14; and Jeremy Howick, "Against A Priori Judgements of Bad Methodology: Questioning Double-Blinding as a Universal Methodological Virtue of Clinical Trials." (paper presented at the meeting of the Philosophy of Science Association. Pittsburgh, PA., November 2008).

36. Brown, *Science in Democracy*, 92.

37. See Pitkin, *Concept of Representation*, and Brown, *Science in Democracy*.

38. Brown, *Science in Democracy*, 148, 215.

39. J. Britt Holbrook, "Assessing the Science-Society Relation: The Case of the U.S. National Science Foundation's Second Merit Review Criterion," *Technology in Society* 27, no. 4 (2005): 437–451. Holbrook, "Congress and NSF's 'Broader Impacts' Merit Review Criterion," in *Usable Science: A Handbook for Science Policy Decision Makers*, Science Policy and Research on Climate Change (SPARC), April 2010, 16. Holbrook and Robert Frodeman, "Answering NSF's Question: What Are the Broader Impacts of the Proposed Activity?" *Professional Ethics Report* 20, no. 3 (Summer 2007): 1-8.

40. Kourany, *Philosophy of Science*, 108-120.

41. See Douglas, "Rejecting the Ideal," 129-131, as well as *Science, Policy, and the Value-Free*, 73-75.

42. Brown, *Science in Democracy*, 206-215.

43. Brown, *Science in Democracy*, 215-219

44. Brown, *Science in Democracy*, 219-224

45. Brown, *Science in Democracy*, 224-227

46. Brown, *Science in Democracy*, 227-237

47. Pitkin, *Concept of Representation*, 11, 55-58, 213-35.

48. The so-called "orangebook" of risk assessment, *Understanding Risk*, provides a model for such deliberative-analytic processes. Paul C. Stern and Harvey V. Fineberg, eds., *Understanding Risk: Informing Decisions in a Democratic Society* (Washington, DC: National Academies Press, 1996). Also, see Matthew J. Brown, "Values in Science beyond Underdetermination and Inductive Risk." *Philosophy of Science* (forthcoming).

49. See, for instance, Joseph Lepgold and Miroslav Nincic's *Beyond the Ivory Tower*. Notably, Lepgold and Nincic treat IR theory and scholarship as almost exclusively a matter of positive, rather than normative, research. *Beyond the Ivory Tower: International Relations Theory and the Issue of Policy Relevance* (New York: Columbia University Press, 2001), 1-27, 131. See also

Alexander L. George, *Bridging the Gap: Theory and Practice in Foreign Policy* (Washington, D.C.: U.S. Institute of Peace Press, 1993); Christopher Hill, "Academic International Relations: The Siren Song of Policy Relevance," in *Two Worlds of International Relations: Academics, Practitioners and the Trade in Ideas*, ed. Christopher Hill and Pamela Beshoff (London and New York: Routledge, 1994), 3-25; Lepgold, "Is Anyone Listening? International Relations Theory and the Problem of Policy Relevance," *Political Science Quarterly* 113, no. 1 (1998): 43-62; Bruce W. Jentleson, "The Need for Praxis: Bringing Policy Relevance Back In," *International Security* 26, no. 4 (2002): 169-183; and Arthur A. Stein, "Counselors, Kings, and International Relations: From Revelation to Reason, and Still No Policy-Relevant Theory," in *Being Useful: Policy Relevance and International Relations Theory*, ed. Miroslav Nincic and Joseph Lepgold (Ann Arbor: University of Michigan Press, 2000), 50-74.

50. For example, Jeffrey A. Frieden and David A. Lake argue that "the accuracy – thus relevance – of International Relations as a discipline requires that it become more scientific in approach." Frieden and Lake, "International Relations as a Social Science: Rigor and Relevance," *Annals of the American Academy of Political and Social Science* 600, no. 1 (2008): 136-156, 137.

51. For a careful defense of the distinction, see Ilkka Niiniluoto, "The Aim and Structure of Applied Research," *Erkenntnis* 38, no. 1 (January 1993); 1–21.

52. This is also the mistake underlying the query-response model of science, particularly when it is employed as a tool for guiding policy decisions.

53. Dewey, *Collected Works*, LW 2:344-5.

54. Dewey, *Collected Works*, LW 13:272.

55. For an account of scientific significance that combines intellectual and practical (including policy-relevant) factors, see Philip Kitcher, *Science, Truth and Democracy* (Oxford: Oxford University Press, 2001), as well as *Science in a Democratic Society* (Amherst, NY: Prometheus Books, 2011). For another view, see Matthew J. Brown, "Genuine Problems and the Significance of Science," *Contemporary Pragmatism* 7, no. 2 (2010): 131–153.

56. Douglas, *Science, Policy, and the Value-Free Ideal*, 87.

57. Philip Kitcher describes a quasi-economic social epistemology in which the self-interest of scientists leads to an optimal division of labor. See Kitcher, *The Advancement of Science: Science without Legend, Objectivity without Illusions* (New York: Oxford University Press, 1993), as well as "Authority, Deference, and the Role of Individual Reasoning in Science," in *The Social Dimensions of Science*, ed. Ernan McMullin (Notre Dame: University of Notre Dame Press, 1992), 244-262. For a summary of Kitcher's account, see P. D. Magnus, "Distributed Cognition and the Task of Science," *Social Studies of Science* 37, no. 2 (2007): 297–310, 305–306 .

58. Though I am unsympathetic to the approach, there is an extensive literature on game-theoretical approaches to addressing IR and foreign policy issues. See, for instance, Robert Jervis, "Realism, Game Theory, and

Cooperation," *World Politics* 4, no. 3 1988): 317-349, and Robert Powell, "Absolute and Relative Gains in International Relations Theory," *American Political Science Review* 85, no. 4 (1991): 1303-1320.

59. Maurice Bertrand, "The UN as an Organization. A Critique of its Functioning," *European Journal of International Law* 6 (1995): 349-359. Kim R. Holmes, "New World Disorder: A Critique of the United Nations." *Journal of International Affairs* 46, no. 2 (Winter 1993): 323-431.

60. United Nations Information Service (UNIS) Vienna, "Image and Reality: Questions and Answers about the United Nations," United Nations, 2007, www.unis.unvienna.org/unis/en/faq/index html (accessed December 1, 2012).

61. Frank Cunningham, *Theories of Democracy* (London: Routledge, 2002), 144-145. For an extension of this Deweyan degrees-of-democracy thesis to the international context, see Cunningham, "The Global Public and its Problems," in *Democracy in a Global World*, ed. Deen K. Chaterjee (New York: Rowman & Littlefield, 2007), 201-221.

62. Dewey, *Collected Works*, *LW* 2:235.

63. Dewey, *Collected Works*, *LW* 2:235.

64. Of course, this is a strategy with obvious risks and inconsistent rewards.

65. Member states participate in a UN-sponsored framework for the protection of human rights, which include non-binding declarations (for instance, the Universal Declaration of Human Rights), legally-binding treaties (for example, the UN Convention on the Rights of the Child), and various activities, such as hosting independent observers and human rights organizations (e.g. Human Rights Watch). There are also regional human rights regimes, consisting of charters and conventions among nations, such as the African Charter on Human and Peoples' Rights, the American Convention on Human Rights, and the European Convention on Human Rights. However, it goes without saying that in practice the efficaciousness of such regimes waxes and wanes. For a review of the empirical literature on human rights regime participation, see Emilie M. Hafner-Burton, "International Regimes for Human Rights," *Annual Review of Political Science* 15 (June 2012): 265-286.

66. Naomi Oreskes, "The Scientific Consensus on Climate Change," *Science* 306, no. 5702 (2004): 1686, as well as "The Scientific Consensus on Climate Change: How Do We Know We're Not Wrong? " in *Climate Change: What It Means for Us, Our Children, and Our Grandchildren*, ed. Joseph F. DiMento and Pamela Doughman (Cambridge: The MIT Press, 2007), 65-99. Also, see Susan Solomon et al., eds., *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007).

67. Thomas O. McGarity and Wendy E. Wagner, *Bending Science: How Special Interests Corrupt Public Health Research* (Cambridge: Harvard

University Press, 2008). Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2010).

68. Intergovernmental Panel on Climate Change (IPCC). "Organization." IPCC Secretariat, 1988, www.ipcc.ch/organization/organization.shtml#.UMPc03fcjLU (accessed December 1, 2012).

69. The denial of policy-prescriptiveness is belied by the fact that the IPCC produces a working group report that evaluates current policies and proposes new ones. Bert Metz et al., eds., *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007).

70. The scope of that context can be more or less broad.

71. Dewey, *Collected Works*, LW 12:112.

72. Roger A. Pielke, Jr. *The Climate Fix: What Scientists and Politicians Won't Tell You about Global Warming* (New York: Basic Books, 2010), 65-66.

73. Tom Athanasiou and Paul Baer, *Dead Heat: Global Justice and Global Warming* (New York: Seven Stories Press, 2002). J. Timmons Roberts and Bradley C. Parks, *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy* (Cambridge: MIT Press, 2007). Irene Dankelman, ed. *Gender and Climate Change: An Introduction* (New York: Earthscan, 2010).

74. Nathan P. Gillett et al., "Ongoing Climate Change Following a Complete Cessation of Carbon Dioxide Emissions," *Nature Geoscience* 4, no. 2 (2011): 83–87.

75. Most projections for large-scale wind and solar power production anticipate the arrival of this technology in 2030 or 2050. The obstacles include the intermittent nature of wind power, the cost and efficiency of photovoltaic solar cells, and the regional specificity (e.g., to windy and sunny locales) of both.

76. Dale Jamieson, "Ethics and Intentional Climate Change," *Climatic Change* 33 (1996): 323–336. Jay Michaelson, "Geoengineering: A Climate Change Manhattan Project," *Stanford Environmental Law Journal* 17, no. 1 (1998): 74–138. Shane J. Ralston, "Geoengineering as a Matter of Environmental Instrumentalism," in *Geoengineering and Climate Change*, ed. Wil C. G. Burns and Jason Blackstock (Cambridge University Press, forthcoming). Benjamin Hale and Lisa Dilling, "Geoengineering, Ocean Fertilization, and the Problem of Permissible Pollution," *Science, Technology, & Human Values* 36, no. 2 (2011): 190–212.

77. I do not intend to endorse these alternative framings of the problem, which may well be unhelpful, erroneous, or even deviously motivated. Nevertheless, they cannot be dismissed in advance. For critical takes on geoengineering, see especially Jamieson, "Ethics and Intentional Climate," as well as "The Ethics of Geoengineering," *People and Place* 1, no. 2 (2009), www.peopleandplace.net/perspectives/2009/5/13/the_ethics_of_geoengineering

(accessed December 1, 2012). Also, see Hale and Dilling, "Geoengineering, Ocean Fertilization." Social adaptations like migration of threatened populations is surely an enormous injustice (but may nevertheless be necessary, even in optimistic scenarios).

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