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Pragmatic Rationalism: Popper, Bartley and varieties of rationalism

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ABSTRACT

Rational discussion guides, but does not compel individual decisions, and the best process of inquiry and decision should vary with a person's goals and situation. Sir Karl Popper noted that after a result of observation or experiment has been obtained by independent researchers, scientists agree to reject as false theories that are contradicted by accepted facts. Popper, though, wrongly assumed this consensus also applies to acceptance for purposes of research. In reality researchers develop competing theories about which evidence is currently in conflict, and sometimes even refuting the theories in their current form. Further, Popper asserted that only negative arguments should be used in rational inquiry. In reality, productive inquiry involves also positive arguments, even in science. Positive considerations such as which basic theories are justified by the researcher's preferred metaphysics, or what theories in applied science are justified by existing accepted basic theories, are also used productively.

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During the Enlightenment or Age of Reason, from the late 17th to early 19th century, rational inquiry and discussion contributed to the creation of both modern science and representative democracy. However, how reason should function, and how it should best be used in the future has never been clear.

During the Age of Reason itself, the nature of rationality was never a settled question, with a single clear answer. The role of evidence in rational assessment was then a key dividing issue between different schools of rationalists. In the last century, Sir Karl Popper, my late teacher, took up this long-standing debate, and made important advances in understanding the best role of rationality in science and society. However, much confusion has remained, as reflected in disputes among Popper and his followers, particularly those involving the views of Popper's former student W. W. Bartley.

Much of the confusion has, I believe, come from a failure to distinguish between different types of rationality. The first type of rationality is *rational inquiry*, in which people weigh the logical implications of rival solutions to problems, often in a social process involving discussions and sometimes decisions with multiple individuals involved, publications, and so on. Examples of rational inquiry include scientific research, in which theories to explain observations are proposed and assessed, and democratic political processes, in which alternative public policies are proposed and debated, candidates nominated and their merits disputed. Of course, both in science and politics inquiry can be more flawed or more effective in sorting out the best theory, social policy, or candidate.

As well as rational inquiry, beliefs and decisions can be rational. *Rational belief* has at least two meanings: a basic and a stronger meaning. The basic meaning of the claim that a belief is rational is that the belief reflects the realities of the situation that a sane person would know. The stronger meaning of 'rational belief' is that the belief is strongly influenced by a prior, extensive rational inquiry, preferably conducted in consultation with others. *Rational decision* also has basic and stronger meanings. The basic meaning is that the individual's decision serves his or her interests and goals, in accord with the person's basic beliefs. The strong sense of 'rational decision' is that the personal decision is influenced by an extensive rational inquiry, in consultation with others.

With these distinctions in mind, we can see that rational *inquiry* is only desirable when there is a need and time available. And nature of the inquiry and the participants should vary with the issue and context. Science is an example of when there is both time and need, and extended rational inquiry is desirable. Science is an unending, multi-generational search for truest and fullest explanation of the world of our experience, and the long time horizon means benefits of inquiry outweigh other considerations. A contrasting case is when a person has to decide what flavor of ice cream cone to order at a shop, and many are in the queue behind him or her, waiting to order. Here, an immediate, intuitive decision is preferable to spending time on critical analysis of the relative merits of the flavors. Here, the benefits of time spent on rational *inquiry* do not outweigh the costs.

The decision on flavor of ice cream is usually rational in a weak sense, reflecting the person's preferences, but not in the strong sense of being preceded by a rational inquiry. In between these two extremes of scientific research and choice of a flavor of ice cream, there is a huge variety of appropriate kinds of rationality—including major life decisions, political debate, and voting decisions. What kind of rational inquiry—whom to consult, what issues to discuss, how to discuss, and how long it should last—will vary with the purpose of the inquiry or the decision, and the situation. In that sense, whether rationality is needed, and what kind and how much is appropriate is a *pragmatic* decision: the best process depends on the goals of the individuals or groups involved, and situation.

This sense of 'pragmatic', I should make clear, is different from the American philosophical movement which held that 'truth' and 'usefulness' are identical, and has been called 'Pragmatism'. Truth and usefulness are not identical, because a theory being useful in one case, or even many cases, does not mean that the theory is fully true. Popper was right to follow the normal sense of truth as 'correspondence to reality,' with the guidance of logician Alfred Tarski, who showed the traditional meaning is definable and defensible in formal logic. This meaning of truth is relatively straightforward, even though ascertaining what claims are true is often quite difficult. Rational inquiry helps, even though it is never fully conclusive.

When we accept a pragmatic view of rationality—that there are different kinds of rationality, and when to use them should vary with the goals and situation—some of Popper's analysis holds up, but some needs to be seriously modified.

Popper on Rationality in Science, and Beyond

Karl Popper's analysis of rationality in science and beyond had important new insights, but also significant weaknesses. His theory of refutation is strong and holds up, but his theory of the 'acceptance' of theories is weak, and needs change.

The foundation of Popper's view of refutation is his analysis of "the empirical basis" of science, meaning reports of observation and experiment, or 'basic statements.' Popper noted that when a scientist reports on an experiment, his or her description of the experimental set up has some generality, as it applies to the future. Popper holds that repetition by independent researchers is needed before a report of an experimental result is generally accepted by scientists. As Joseph Agassi (1975) has pointed out, this rule of general acceptance by scientists of observation reports after repetition by independent, qualified observers—and rejection of conflicting hypotheses—was in fact advanced by Robert Boyle early in the history of modern science.

Popper argues that while logic does not compel scientific researchers to agree with a repeated result, scientists have adopted a "convention" to treat a 'basic statement', as established. A basic statement is a statement of the result of an observation or experiment that has been corroborated by an independent researcher, or many researchers. The agreement of researchers to accept basic statements as true is for pragmatic reasons: "We need them [basic statements] in order to decide whether a theory is falsifiable, i.e., empirical. …We also need them for corroboration of falsifying

hypotheses, and thus for falsification of theories" (Popper, 1968, 100). In sum, we need Boyle's rule to have a common scientific assessment of how well scientific theories explain the results of observation and experiment. (The agreement on basic statements is *not* 'conventionalism' in the sense of viewing scientific theories as just convenient summaries of data, without truth claims.)

Popper also pointed out an important asymmetry of refutation and confirmation. Once a basic statement is accepted as true, it logically implies that any universal theory which contradicts it is false, i. e. refuted. That is, once a basic statement is accepted as true, any rational scientist—one who accepts logical implications—is bound to regard theories that are inconsistent with it as false, refuted. To use a common example, 'all swans are white' is refuted by an independently repeated observation of one black swan. In contrast, a confirmation of seeing one additional white swan tells us little more about the truth of 'all swans are white'.

Because of the great logical force of refutation, Popper urged researchers to express their theories in a testable form. And he labelled as 'scientific' only theories that are testable. Theories that are confirmable, but not testable, such as the claim, 'There exist fields of force in empty space—space free of matter,' Popper labelled as 'metaphysical'. Popper did acknowledge, though, that such metaphysical theories can and do guide scientists in their programs of research. The problem is that this makes metaphysics a part of scientific research, rendering 'testability' no longer a clear marker of science. W. W. Bartley recognized this, and it was the source of his first quarrel with Popper.

In spite of the original German title, *Logic der Forschung (Logic of Research)*, Popper (1968) in *The Logic of Scientific of Discovery* followed the Vienna Circle of positivists in focusing on the status of theories, rather than on extended research, and he assumed consensus within science on acceptance of the currently best scientific theory. Such consensus is, however, neither historically accurate nor desirable. Popper clearly stated that not only do tests of theories by observation and experiment eliminate some theories by refutation, but also that "*we choose the theory* which best holds its own in competition with other theories, the one which, by natural selection, proves itself fittest to survive." (My emphasis, Popper, 1968 p. 108) Such a consensus choice by scientists, Popper claims, is the theory that not only survives testing, but one whose predictions are also confirmed—or 'corroborated,' in Popper's terminology. However, consensus acceptance of corroborated theories for the sake of further research is contradicted by the history of field theory. I chronicled the history of rival views in my first book, *Fields of Force* (1974, 2014) there were both important research programs assuming particles and empty space, and rivals, assuming fields of force filling space. Scientists working in both rival programs made important contributions to the advance of electromagnetic theory.

In sum, history vindicates Popper's insight on the power of refutation of theories by reports following Boyle's rule: reports of observations and experiments, corroborated by independent researchers, can refute theories, and the refutations are not later reversed. However, history contradicts Popper's claim that there is always a consensus of researchers accepting the theory which has survived refutation—implying they base further research on the assumption of its truth.

In reality, different scientific researchers sometimes take different, rival pathways, and historically such rivalry has been productive.

Rationality and Political Policy

When we go outside science, to rationality generally, we see that the role of reason varies greatly, not only in extent—as in the example of flavor of ice cream cone, which involves no rational inquiry—but also in that the role of rational discussion is different depending on the goal, the people involved, and the situation. For example, in politics, rational debate over the merit of policies is just one tool of persuasion, and how much logical arguments help varies with the candidate and the electorate. Candidates also use slogans, emotional appeals, endorsements, and, alas, even lies, to win over voters.

Popper (1966) analyzed the role of rationality in politics in *The Open Society and Its Enemies*, and in shorter works. His analysis has important insights, but is frustratingly fragmentary, and at times confused and contradictory.

Popper's key important insight is that there is *feedback* on policy from voters, in which voters reflect their personal experience of the impact of policies in their political choices—their choices of parties and candidates. This feedback mechanism parallels the way that scientists use evidence to test theories in science, as Popper (1968) had described in *Logic of Scientific Discovery*. In science, scientists use observation and experiment to ascertain evidence that bears on what actually happens in particular cases—what happens under what conditions. Similarly, in politics, voters experience the impact of policies on their lives, and observe the impact of these policies on people they know or communicate with. As a result, voters may see which policies work and don't work, under what conditions. And, just as evidence can refute a theory, personal experience of a social policy can refute or confirm claims of its promised effects. For example, reducing government investment in families, education and health care can result in fewer job opportunities, and higher unemployment, not more jobs and lower unemployment. When the failure of promised benefits is lived experience, it can be not only convincing, but also motivating to voters—motivating them to choose better policies and better candidates.

However, there is a big problem with this picture. The evaluation of claims for social policies is more confused and inconclusive than evaluation of theories in natural science. And as a result, people's views of social policy are more confused and disparate than is the case with scientists viewing theories in natural science. Popper attempted to solve this problem with a theory of testing in the social sciences. However, his theory is weak, and at times contradictory, so that it ends up being of no help. It is possible to have a stronger theory of testing in social science, and this stronger theory, if adopted by social scientists, might lead to the kind of rational feedback that Popper aspired to. Let us first look at Popper's account and its problems, then an improved view of testing in the social sciences.

As Popper has noted, in natural science there has been a high level of agreement over what should count as natural laws—even with some lingering disputes, such as over the role of

probability. And the purported natural laws have been testable by basic statements on which there is consensus. In social science, in contrast, how to formulate social theories has not been clear, and how to test the theories is also often unclear—as I explained in 'Testability in the Social Sciences.' (Berkson, 1989.) As a result, even among experts there are great differences of opinion on the status of social policies. And among the voters there is equal or greater disagreement over what events mean on the benefits of policies. Thus, in politics, evidence and rational debate has only a weak influence in resolving conflicts between policies, candidates, and parties. As a result, the influence of rationality in politics is much more tenuous and variable than in natural science.

Popper observed that some pioneering theories in social science, such as Marx's, have been testable—and actually refuted. Once refuted, though, adherents have generally not produced new and improved, testable versions, but simply made *ad hoc* modifications, such as lists of exceptions—and often accused the other side of bad faith. In Marx's case, for example, his prediction that workers would seize the means of production first in the most developed countries turned out to be false; the less developed Russia was the first to become Communist. And Marxists have dismissed critics, claiming "false consciousness," rather than addressing the arguments.

Popper does mention a few testable, universal social laws, such as Plato's "law of political revolutions, according to which all revolutions presuppose a disunited ruling class." (Popper, 1966, Vol 1, 38.) However, he generally (and contradictorily) views such laws as not possible, especially rejecting both laws about social wholes ('holism'), and reduction of social wholes to the psychology of individual actors ('psychologism'). Instead, inspired by classical economics and Max Weber, Popper prescribes what he calls "situational logic" or "methodological individualism," to produce testable social theories.

Popper's situational analysis attempts to avoid psychology, by specifying only the person's goals, their beliefs about their situation, and their objective situation. As Popper puts it, "The man with certain wishes therefore becomes a man whose situation may be characterized by the fact that he pursues certain objective *aims*; and a man with certain memories or associations becomes a man whose situation can be characterized by the fact that he is equipped objectively with certain theories or with certain information" (Popper, 1976, 102-103). This model of individual goals and beliefs is then 'animated' by individual motivations, but by what Popper calls *the rationality principle:* "'Agents always act in a manner appropriate to the situation in which they find themselves.'" (Miller, 1983, 361). The idea is that, using both the rationality principle and our model of the individual person's situation, we can predict how the person will act: in a manner that will serve their goals, given their beliefs.

Now Popper recognizes that the rationality principle is often not true. He says, "One has only to observe a flustered driver, desperately trying to park his car when there is no space to be found, in order to see that we do not always act in accordance with the rationality principle. …Tests of a model…are not easily obtainable and usually not clear cut …[This] roughness entails a comparatively low degree of testability." (Miller, ibid.) Popper acknowledges that such a method faces many difficulties, but claims they can be overcome—without, however, showing how. If we

have two explanations, one of whose consequences are right 20% of the time, and another 30%, what are we to do? Here Popper is silent, and so does not really engage the problem of testability as we actually encounter it.

To make situational models actually testable, we need to include psychological theories, both of individual differences and of general human qualities. Let us look at another example of flustered drivers. Suppose that traffic authorities put a sign on a limited-access highway that reads 'Last Exit to City,' and 'Next Exit 30 Miles'. Further, suppose the sign is placed so that it is seen only seconds before the exit. Following the work of psychologist Irving Janis (1989) on decision making under stress, we can predict, that a certain percentage of people will panic, attempt to swerve from the far lane heedless of the danger, and smash into other cars or side rails. Furthermore, we can predict that improved signage, properly placed, will reduce the frequency of crashes.

If we followed Popper's advice, we would keep trying to produce models which assume that the crashing drivers are acting rationally. But these will not work, because these drivers are not in fact acting rationally—they are panicking. Why does Popper ban such subjective, irrational factors? In one place he attacks psychological hypotheses as "hardly ever criticizable by rational arguments" (Popper, 1976, 103). However, in the very same essay he, contrarily, characterizes psychology as a "social science" (op. cit., 101). Furthermore, he at times emphasized the importance of "psychological studies and discoveries… for the social scientist" (Popper, 1966, vol. II, 97). And Popper himself is author of an important psychological theory of how we learn from error! (For more on Popper's contradictory attitudes toward psychology, see Berkson and Wettersten, 1984.) Popper's views on testing in social science thus lead into a morass of contradictions about the role of psychology, and are not viable.

How can we, then, make theories in social science, including policy claims more testable, and actually test them? One false trail, which Popper rightly criticized, is simply looking for correlations in data, and avoiding theory, expecting it to arise inductively. What the relationship between correlations and causation is problematic, and, as Popper pointed out, we only learn what data mean when we have clear theories we are testing—and preferably more than one competing, testable theory.

A big cause of problems, I believe, has been the misleading example of Newton's laws of motion. It is model of linear differential equations leading to complete predictions at a particular time and place. Once the 'initial conditions' of a particular situation were identified, then a single solution of Newton's equations could be specified, and it would be possible, at least in principle, to predict events at any desired future time. This model of full prediction of individual events is extremely misleading. Even in physical science, the issues of 'chaos theory' have shown how limited this model is. An example is the snowflake. Because of the strong influence of random factors, every snowflake is different, and the exact configuration of any single snowflake impossible to predict exactly. But the fact is that the *pattern* of a hexagon is shared by almost all the huge variety of snowflakes.

This common pattern of snowflakes I think points to a larger truth, relevant to social events. Social events have myriad inputs from different individuals, with random variations. As a result, detailed predictions of specific future events are usually not possible. But it is still possible to predict patterns, and this is the more promising path for robust development of testable theories of social laws and social policies. We can try to specify what patterns are permitted and barred by a social theory, or what varieties of outcome are likely from a given social policy, and are unlikely.

An example of a 'multiple possible consequence' model is given by Erving Goffman in his book *Stigma*. Goffman describes some of the patterns of discussion used by both stigmatized individuals—who may have disabilities, criminal records, etc.—and those with whom they are conversing. One pattern is to hide the stigma as much as possible, so that it can be ignored. Another approach is to not hide it, but to 'break the ice' by joking about it, showing that the person stigmatized and the other person in the conversation need not worry about provoking embarrassment. We may make Goffman's theory testable by taking it as an exhaustive list, and observing face-to-face conversations (such as by using one-way mirrors) to see whether all techniques of dealing with the stigma fall into one of types in the list. We may also assume that a few random exceptions may happen, but, say, less than one percent of the time. Then the theory of the patterns of interactions involving stigma becomes testable. If, indeed, it is refuted, the refutations will be highly informative as to how the theory should be further modified.

Overall, here are three ways to look for testable social patterns, without fully predicting individual events. First, we can follow the 'chaos' theory approach, using a non-linear mathematical law, and compare the predicted pattern with reality. Second, we can make a 'multiple consequence' model such as Goffman's, where a specified variety of options are allowed. Third, we can look for a conditional prediction of patterns, where the pattern will depend on what prior conditions have evolved. In all of these, psychological theory can give us important clues. And, unlike Popper's situational analysis that is animated by only the rationality principle, all three actually have promise of meaningful, testable explanatory theories of social events and policies.

Bartley and Justifying Arguments

Popper was blocked from exploring how rational inquiries should vary with the goal, and the diversities of resulting beliefs and decisions, because he accepted Bartley's analysis of the heart of Popper's own analysis. Crucially, Bartley had wrongly accepted Popper's assumption that all people will adopt the same beliefs and decisions, given the same prior rational inquiry. Bartley claimed the heart of Popper's message was that the only permissible process for weighing alternative solutions to a problem was winnowing down of options through criticism—justifying arguments should play no role at all. Bartley's analysis had a big impact on Popper's later elaboration of his views, and on the views of Popper's followers. However, the influence was damaging both to the development and the reception of Popperian views.

Bartley's (1962) *The Retreat to Commitment*, based on his PhD dissertation for Popper, was an attempt to generalize Popper's analysis from natural science to rationality generally. Bartley's

background was as a devout Protestant Christian, who wrestled with the debates over justification of belief in Christianity by 'faith' or by 'works.' He had been losing his faith in Christianity, though, and Popper's praise of criticism struck him as a secular revelation that gave him something he could sustain belief in: the power of criticism. (This personal history I learned about in discussions with Bartley, when I was a student in a class of his.) Bartley lighted upon the supposed principle that only negative arguments are helpful. He said: "The rationality of a belief will be relative to its success in weathering serious criticism" (Bartley, 1962, 152). He opposed any attempt to identify the best or truest claims by seeing which are *justified:* derived as best on the basis of principles we already believe to be true. He wrote (op. cit, 147-8): "If all justification—rational as well as irrational—is really abandoned, …[a] position my be held rationally without needing justification at all—*provided that it can be and is held open to criticism and survives severe testing."* (Bartley's italics.)

The problem with Bartley's polar opposition of "non-justificationist criticism" and "justificationism" is that it is a false dichotomy. Not two options are involved, but at least four:

	Conclusive	**Inconclusive**
Positive	'Justificationist' argument	fallible justifying arguments
Negative	conclusive refutation	'non-justificationist criticism'

Bartley put in opposition the two greyed-in options only: conclusive justification vs inconclusive criticism. He thus muddled two different dimensions: the form of argument—positive or negative—and whether the argument is claimed to be conclusive—compels agreement with the conclusion. Positive arguments attempt to derive a claim under question from other statements, accepted as true. Negative arguments attempt to winnow out correct claims from rivals by finding contrary evidence, accepted as true that refutes all rivals. Inconclusive arguments allow people to have diverse views and later revise their views, in contrast to requiring unanimity. To have positive, conclusive arguments thus requires unalterable commitment to the truth of premises; this is the logic behind what Bartley called the 'retreat to commitment.' Negative, conclusive arguments also would call for unalterable commitment to the truth of claims about refuting evidence. However, Popper himself rejected such claims (Popper, 1968, 29).

In muddling the two different dimensions, Bartley ended up condemning the wrong one. Bartley was right in rejecting the search for arguments that are both positive *and* conclusive. But the error isn't in the form of argument—positive or negative—but rather in the demand for conclusiveness—that the argument must have the power to compel agreement.

Positive forms of argument, as well as negative, are perfectly legitimate, and often appropriate. An example of positive argument being beneficial is in the field of law, when judges and lawyers regularly argue over how to apply the law correctly to a particular case. The question is what ruling is justified by the law as written and the facts of the case. Such arguments shouldn't be held out as forever conclusive—for a start, laws may change—but they are positive and also legitimate in this

context. If justificatory arguments on the basis of law were illegitimate, courts couldn't operate. The positive form of argument is also dominant in mathematics, where proofs are derivations from accepted axioms.

The law, ethics, and mathematics are not empirical sciences, but even in the empirical sciences positive arguments play a major role, in *applied science*—the application of foundational theories to more specialized problems. There are least three different areas where such positive arguments are involved in science. First, in applied science. A physical chemist, for example, might write an article proposing new model of a molecule, and give predictions of its behavior, based on physical theory. An editor of a chemistry journal would expect the chemist to justify (derive) the prediction of the behavior of his new model on the basis of an existing best physical theory, and not some new untested physical theory. Second, in the discussion of social norms, such values as all having food security can guide development of policy. Third, predicted social patterns, such as we discussed above, can be used to assess which actions will lead to consequences consistent with our values, the social norms we endorse.

Popper had not focused on applied science, but only on the most fundamental and general physical theories, such as relativity and quantum theory. Popper was blocked from a better analysis of applied science by his acceptance of Bartley's view that only critical arguments are relevant to science, and indeed all rational discourse: "critical rationalism."

Popper's exclusion of positive arguments opened the door to Thomas Kuhn's rival claims. According to Kuhn, scientists normally apply a single existing 'paradigm' in their field without criticizing it. And they only give up basic assumptions with greatest reluctance, when 'anomalies' contradicting basic theory have accumulated, unintentionally, in the course of 'normal,' uncritical science. Kuhn's theory had some credibility, because most scientific researchers work on problems of applied science, which assume the truth of the existing most successful scientific theories. However, contrary to Kuhn, there has been in history of science no rule of lock-step following a single 'paradigm.' In important cases, such as the evolution of electromagnetic theory in the 19th century, there were long-time rival research programs, following rival world views, as I documented in my book (Berkson, 1974, 2014).

Conclusion

In the 1950s and 1960s, Popper and his followers discussed the role of metaphysical research programs, but they failed to note that these are positive, or justifying in their structure. In fact, some researchers look for only theories that assume—are justified by—the truth of a particular metaphysics or world view. This was the case for Faraday and Maxwell, as I describe in *Fields of Force* (Berkson, 1974, 2014). They based their theories and research on the assumption that fields of force existed, and rejected the "particles and action-at-a-distance" view.

The beliefs of scientists do influence what they choose to research, publish, and teach. And these are rationally informed by the tests of existing theories, both refutations and corroborations. They are also informed by positive or justifying reasons, such as whether a better theory might be

consistent with a preferred metaphysical world view. As I argued in my article 'Skeptical Rationalism' (Berkson, 1978), rational inquiry in either case does not dictate choices, but only influences them through logic and evidence. Popper was correct saying that acceptance of experimental results which have been repeated is a social "convention". However, acceptance of a *theory* as corroborated by repeated testing doesn't compel a researcher to accept its truth for the sake of his or her research. The researcher may suspect flaws in the theory, and do research at odds with it, in spite of its being corroborated. This illustrates that the effect of the results of research and reasoning on decisions will, and should, vary with the purpose of the scientist, and his or her judgements. Science is a reasoned enterprise, but its huge diversity and competitiveness is part of the secret of its creativity.

The same openness and pragmatism hold for rationality more generally: rational discussion guides, but does not determine choice, and the best process will vary with the goals and situation of the person or people initiating the inquiry. And in general, for social policies and theories, we will also need to look to predicting patterns, and not individual outcomes.

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