



A Political Philosopher of Science

Although Charles Bernard Renouvier is perhaps better known as a political philosopher, he was also a philosopher of science; indeed, these two aspects of his thought were intimately connected. Philosophy of science had implications for the political ideologies of his day that lay claim to scientific status. Also, the sciences themselves had political structures. He saw the sciences as communal activities, each guided by a set of conventions about their legitimate questions of inquiry, basic principles, and concepts. For Renouvier, these conventions belong to a social contract within each science that is never the final word and is always open to renegotiation.¹ It was this very open-ended nature of the sciences that called into question any political ideology that claimed it had the final, scientific answers for how to organize society.

Although the term *political philosophy of science* appears to be relatively recent, it is nevertheless an appropriate term for characterizing Renouvier's thought. The term can mean different things, so we should first try to get clear how we are using it. Philosophers often invoke the term *social* when discussing the wider context in which science is practiced. But *political* philosophy of science suggests something different: a concern with power relationships,

the structure of government, and party politics. Although they do not use the term “political philosophy of science,” it provides an apt description of works by Helen Longino (1990, 2002), Philip Kitcher (2001, 2011), and other recent writers. Perhaps the earliest use of the term was by Joseph Rouse in his book *Knowledge and Power: Toward a Political Philosophy of Science* (1987), which was concerned with how science gives us the power to control the world and the people in it, forcing new patterns of behavior on us in medicine, agriculture, and other aspects of life.

More recently, Thomas Uebel has given the term a different meaning in his paper “Political Philosophy of Science in Logical Empiricism: The Left Vienna Circle.” According to Uebel (2005, 760), the philosophers Otto Neurath, Rudolf Carnap, Hans Hahn, and Philip Frank maintained that political values may play a role within science due to the underdetermination of theories by the evidence for them. That is, the logical positivists recognized that, when the evidence alone did not determine theory choice, scientists may have been influenced by their political values. However, the positivists did not hold that theory choice *should* be made this way. Uebel thus distinguishes a descriptive from a normative sense of the term “political philosophy of science.”² A descriptive political philosophy of science might also say that decisions to pursue a particular methodology or research program are underdetermined by logic and evidence alone and shaped by political values. A *normative* political philosophy of science would be one that advocates favoring one theory over another or pursuing a particular line of research for political reasons. For instance, Janet Kourany (2003, 6–7) finds that some feminist philosophers of science tend to endorse epistemic values such as theoretical novelty, ontological heterogeneity, and complexity of relationship over more traditional values such as consistency with established knowledge, simplicity, and explanatory scope, arguing that the nontraditional values are more in line with egalitarian political goals. And these epistemic values can influence the choice and direction of a methodology.

Ambrosio Velasco Gómez (2004) uses the term “political philosophy of science” in a different sense that does not turn on the underdetermination argument. Instead of concerning itself with the role of political values in theory choice, it looks to the political *consequences* of a philosophy of science. Specifically, Velasco Gómez uses the term for a critical investigation of the political consequences of what Neurath called “pseudorationalism,” the philosophy that denies any such role for political values, maintaining that scientific knowledge

is justified through purely rational methods. Velasco Gómez writes that the philosophers Paul Feyerabend, Hans-Georg Gadamer, and Jürgen Habermas have argued that pseudorationalism, in conjunction with the assumption that such knowledge can justify political decisions and legitimize a political order, leads to antidemocratic, authoritarian outcomes. Together, these assumptions do not leave room for the free participation of citizens in political life, since they lack the scientific expertise necessary for making policy choices. But it is the premise that science can legitimize a political order that is mostly responsible for this undesirable consequence.

Historical evidence that supports their argument can be found beginning in the nineteenth century, especially in the philosophy of Auguste Comte. He thought that the only way to restore order and ensure progress in France, which had been politically unstable ever since the French Revolution, was to first establish a new system of thought grounded in the sciences that would replace Christianity. Social harmony, he thought, depended upon intellectual harmony: “The world is governed and overturned by ideas” (Comte 1830–42, 1:38; trans. 1988, 28).³ Thus his *Cours de philosophie positive* (1830–42) drew on what he understood to be the methods of the natural sciences in order to establish the methods of the new science of sociology, which would then provide the basis for a positive polity. Although Comte held that ordinary people should defer to scientists’ authority on epistemic matters, he also defended society’s right to supervise science in order to ensure that research is directed at yielding knowledge that is of benefit to everyone. However, Comte did not want to bring science under the direct control of popular democracy, either. Rather, he saw the need for some competent authority to organize science around human needs. He thus argued for putting the direction of science in the hands of an elite thoroughly educated in the history, philosophy, and sociology of science. Unfortunately, Comte did not explain how these social engineers are to be kept in check or how to make sure that they are indeed directing science to benefit everyone. Although Comte saw the need for the general public to be enlightened about science, he did not provide a mechanism for this enlightened public to be heard.

Renouvier rejected Comte’s social philosophy as undemocratic and authoritarian in character. He opposed Comte’s notion that scientific methods could be used to legitimate a political and social order. Where Comte saw a social need for a shared ideology based on the sciences, Renouvier defended a philosophy in which one may be allowed to hold nonscientific beliefs in such things

as religion and the freedom of the will (e.g., Renouvier 1889b). John Stuart Mill, of course, also famously broke with Comte over the latter's social thought. However, in *A System of Logic* (1843), Mill drew on the philosophy of science of Comte, along with that of John Herschel, in order to articulate the methods of a new social science that could provide a basis for such liberal causes as defending the rights of women and other disadvantaged groups. He continued to express much respect and admiration for Comte's philosophy of science in his *Auguste Comte and Positivism* (1865). Renouvier, on the other hand, subjected Comte's philosophy of science to a thoroughgoing critique over the course of his career. Both Comte and Renouvier could be said to have been engaged in political philosophy of science, but whereas Comte pursued philosophy of science to *create* a political ideology, Renouvier used it to *critique* a political ideology.

To defeat the positivist program, Renouvier undertook a critical examination of Comte's philosophy of science as well as his political philosophy. In Renouvier's earliest writing on science, in the first of his monumental *Essais de critique générale*, published in 1854, he defended the Comtean positivist position that the sciences should consist only of laws governing phenomena and eschew causal entities, restricting the use of hypotheses to the anticipation of laws. But even in this work, he criticized Comte's social philosophy as dogmatic and illiberal for its denial of individual rights (1854, 11; 1912a, 1:xvi).⁴ In later works, Renouvier explained that the only right that Comte appears to have recognized is the right to do one's duty, a duty that derives from one's function in society (1896, 122; 1897, 239). Beginning with his second *Essai*, published in 1859, Renouvier found positivism wanting as both a descriptive and a normative account of science. With regard to Comte's descriptive claims, Renouvier argued that positive methods do not yield the certain knowledge Comte thought they did, and adduced historical evidence against Comte's three-state law, according to which mathematics, astronomy, physics, chemistry, biology, and now sociology were all supposed to progress from the theological through the metaphysical to the positive stage. He also maintained that Comte never actually provided a definition and a philosophical defense of what he meant by progress. With regard to Comte's prescriptions, Renouvier questioned whether Comte had given good advice in proscribing particular kinds of explanatory hypotheses and defended a more liberal attitude toward hypotheses that postulate unobservable entities and processes. He went on to argue that, from an epistemological point of view, all of empirical science is tentative and hypothetical.

Although the distinction between statements of what is and statements about what ought to be can be found as early as David Hume's *A Treatise of Human Nature* (1739, bk 3, part 1, §1), it was not always clearly drawn by philosophers, especially when one turns from moral to other parts of philosophy. For instance, the distinction is only implicit in Mill's criticism that Comte had provided only a logic of discovery and not one of justification: "The philosophy of Science consists of two principal parts; the methods of investigation, and the requisites of proof. . . . The former if complete would be an Organon of Discovery, the latter of Proof. It is to the first of these that M. Comte principally confines himself. . . . We are taught the right way of searching for results, but when a result has been reached, how shall we know that it is true? . . . On this question M. Comte throws no light" (Mill 1865, 291–92.). But of course a logic of discovery concerning "the right way of searching for results" has just as much normative content as rules for proving the truth of these results. We expect a logic of discovery to provide guidance in making rational decisions about how to pursue our research. How did Mill know that Comte had indeed taught us the right methods of investigation? Renouvier, for one, did not agree that Comte had.

For Renouvier, progress is a normative concept. Progress must be measured against a goal or ideal. For Comte to have defended such an ideal, he would have had to have embraced moral concepts that were not grounded in empirical science and that he had relegated to the metaphysical or theological stages (Renouvier 1867, 42, 46; 1875b, 65–66; 1881b, 343; 1881c, 1, 3). Ideals cannot be defended through empirical methods alone, as they are not about what is but about what ought to be (1873b, 330). Renouvier thus contended that the sciences, even if they could achieve certainty, which he doubted, were not an adequate basis for social policy. Empirical knowledge about people and society may be relevant to formulating and implementing social policies, but such knowledge alone cannot tell us what our goals should be. Society's goals are a matter for normative inquiry. Renouvier insisted that normative questions could not be answered through empirical research alone. On the contrary, Renouvier thought that what we take to be empirical knowledge depends on normative judgments. For Renouvier as for many philosophers, the concept of knowledge entails that of justification. But justification is an evaluative concept. Whether some empirical proposition is justified is as much a normative judgment as any ethical decision and thus depends on the same conditions.

Renouvier understood that for Kant, the possibility of making ethical judg-

ments rests on the postulate of liberty or freedom of the will. If we are completely determined in our judgments and actions, the very idea of moral responsibility evaporates. Renouvier argued that knowledge as well as morality rests on the possibility of making free choices and that Kant's theoretical reason is actually a kind of practical reason. He maintained that people should settle all normative questions, whether in social policy or in science, in the same way; that is, through free deliberation. Yet far from guaranteeing free discussion among diverse points of view, the political philosophies of Comte and Saint-Simon sought homogeneity of thought.

Comte, on the other hand, maintained that a belief in freedom of the will belonged to the metaphysical stage of thought; people were determined in their actions, making political liberties pointless. He read the history of science as the march of the positivist notion of deterministic law through each of the sciences in turn, finally coming to rest in the social sciences. Thus Comte had run together not only methodological with metaphysical determinism but the question of free will with that of civil liberties. For Renouvier, science did not entail the denial of free will and thus undermine our civil liberties in the way that Comte had claimed it did. As we shall see, Renouvier argued that for Comte to base the denial of free will and civil liberties on the presence of deterministic laws in the physical sciences was for him to make an illegitimate inductive inference from what supposedly holds in these sciences to what must hold in the sciences of human behavior. On the other hand, Renouvier agreed with Comte regarding the metaphysical implications of the notion of free will, and criticized Kant's relegating the will to the noumenal realm as reintroducing the very substantialist ontology that had been questioned by the British empiricists. For this reason, Renouvier preferred to speak of the liberty of our choices in the phenomenal realm, which he defended by an appeal to our experiences of feeling in control.

Renouvier drew very different lessons than Comte did from the history of science. For Renouvier, the growth of scientific knowledge depends upon the very civil liberties that Comte's social philosophy had denied. The more Renouvier came to appreciate the hypothetical character of science, the more he understood the constant need for critical discussion as well as empirical testing and thus for liberty of thought and discussion in the sciences. Since certainty or even complete consensus is never possible, scientists must retain the liberty to challenge one another's views. Yet he felt that Comte's political philosophy could not adequately guarantee this freedom of inquiry, but rather tended to-

ward authoritarianism and homogeneity of thought. For Renouvier, the political and civil liberties that Comte denied were even necessary for science itself. In an article characterizing what he called *l'esprit scientifique*, he explained that scientific certainty depends not only on empirical tests and applications but also on “the mutual control that all types of explorers exercise in order to rectify their observations, their judgments, and their reasonings” (1878b, 196). In science, there is nothing that cannot be challenged. For Renouvier, “the scientific spirit, above all, is nothing but a form of liberty and independence of mind” (1878b, 198). But although scientists themselves bear a great deal of responsibility for keeping the spirit of free and open discussion alive, Renouvier also recognized that scientists alone cannot protect themselves from outside encroachments upon their freedom. He found it not difficult to imagine a political and religious future of Europe that would lead to an arrest of the “free creative faculty of the sciences” (198). He worried that movements such as socialism, Saint-Simonism, and Comtean positivism would, in the name of progress, put an end to it, by treating all criticism as scandalous (199). For Renouvier, “the scientific spirit requires liberty of thought and the other liberties that, in the social order, cannot be separated from it” (1895, 57).⁵

These liberties are important for philosophy as well. Renouvier saw epistemology, including philosophy of science, as a normative discipline that depends on philosophical analysis and argument. Renouvier held that free deliberation depends on a social contract that guarantees its citizens freedom of speech, the press, and association, and provides mutually agreed-upon rules for exercising these liberties. These freedoms then make possible social contracts specific to specialized communities within the larger society. In the sciences, these contracts make it possible for scientists to accept certain conventions, such as geometrical postulates or the basic principles of mechanics, that cannot be proven but are needed as starting points in order to proceed with the science. These social contracts also make it possible for scientists to revisit, reexamine, renegotiate, and revise these conventions when they no longer find them suitable. In effect, Renouvier turned the argument of positivists and scientific socialists on its head: where they maintained that their political ideology was scientific and thus certain, Renouvier held that the sciences themselves have no greater certainty than the consent and agreement of the scientists, with each science resting on a social contract among the scientists in that field to accept a particular set of conventions, at least for the time being (1885, 6–7).

Of course, Renouvier is hardly the only philosopher to have argued for the connection between scientific research and civil liberties. As Mill said in *On Liberty*, “If even the Newtonian philosophy were not permitted to be questioned, mankind could not feel as complete assurance of its truth as they now do” (1859, 232). However, Mill did not give the attention that Renouvier did to the ways in which science depends on an interacting community of inquirers. As Kitcher reminds us, although Mill’s arguments in *On Liberty* are usually taken to be a general defense of free inquiry, including scientific inquiry, his central concern was inquiry into the goals or purposes of life (Kitcher 2001, 95). Mill was more immediately interested in the freedom to conduct experiments in living than in the freedom to conduct scientific experiments. Nor is there any defense of liberty of thought or discussion in his philosophy of science in *A System of Logic*. In the section on the logic of the moral sciences in this work, there is an account only of liberty or freedom of the will, in which he attempted to reconcile our feeling of moral freedom with the possibility of the social sciences providing causal explanations of human actions (Mill 1843, bk 6, ch. 2). Read by itself, *A System of Logic* gives the reader the impression that Mill assumed, along with thinkers otherwise as different as René Descartes and Francis Bacon, that scientific knowledge could be achieved by a solitary individual employing the right methods of inquiry, which for Mill appears to have been a synthesis of the ideas of Comte and Herschel.

Nevertheless, more recent philosophers of science, such as Karl Popper and Feyerabend, who have defended the connection between liberty and the pursuit of knowledge, have drawn their premises from Mill. Popper, perceiving the fallible character of scientific knowledge, endorsed epistemic values such as boldness in speculation and the willingness to criticize accepted theory. He then saw that these values in turn call for civil liberties such as freedom of thought and discussion (Popper 1965, 352). But where Renouvier defended a broad role for conventions in the sciences, Popper at least claimed to be opposed to any form of conventionalism in science. To be sure, Popper characterized the process by which scientists reach agreement on what he called “basic statements,” which report experimental results, as analogous to the way in which a jury reaches its decision, which is supposed to be a democratic process guided by rules. But he made clear that this process should hold true for only singular statements of fact and not universal theories or laws (1968, 109). Once a consensus on basic statements is reached, the relationship between statements and theory is one of

logic and cannot be negotiated. In particular, he proscribed the appeal to ad hoc auxiliary hypotheses to protect theories from falsification (82–83). Renouvier, on the other hand, left it up to the scientific community whether to continue work on a theory or to try something else.

Like Mill, Renouvier defended civil liberties against those who sought to deny them on religious, philosophical, or ideological grounds. Also, just as Mill defended the right to express what were generally held to be false views, Renouvier's notion of liberty in science allowed for the pursuit of theories regardless of their truth value. For example, he tolerated the investigation of non-Euclidean geometries in spite of the fact that he found them absurd. One could argue that this means simply that he was more like Feyerabend or Imre Lakatos than like Popper. Feyerabend (1978), for instance, argued that the history of science failed to reveal anything like methodological consensus and defended our right to pursue any line of thought or inquiry we choose. Like Feyerabend, Lakatos, and indeed the Vienna Circle positivists as well, Renouvier did not think that philosophers of science should be in the business of handing down methodological prescriptions to scientists. But neither Lakatos nor Feyerabend articulated and defended a political philosophy. And the noncognitivism of the logical positivists would have prevented them from doing so. For these positivists, a political philosophy is little more than an expression of attitudes and does not consist of statements that are candidates for truth.

Unlike Mill's moral and political philosophy, Renouvier's was grounded in a Kantian concern for individual autonomy rather than in utilitarian considerations. Thus, an analysis of Renouvier's work could provide a different perspective on the relationship between civic values and science from that of Mill and more recent philosophers of science who draw their premises from Mill. One could conceivably argue that for the purposes of an analysis of the methodological norms governing scientific inquiry, a consequentialist approach should suffice. However, Renouvier's social contract alternative may be more appropriate for thinking about the relationships between science and the wider society. For example, Kitcher affirms that our duty to pursue the truth, even into sensitive topics such as gender and racial differences, does not override our duty not to harm those who are less fortunate (2001, 103). But what is the basis of this duty? He does not say. It may not be impossible for a consequentialist to explain duties, but Renouvier's social contract approach could provide a direct answer to this question. For Renouvier, the social contract spells out our duties to one an-

other, and a contract to which one has given one's voluntary consent has moral authority. To say that Renouvier's social contract theory could provide an account of our duties to the less fortunate is not to suggest that Renouvier shared all of our contemporary concerns about race and gender. Nevertheless, it may be useful to consider a broad spectrum of political philosophies of science in addressing our current concerns.

A social contract approach could also deepen our understanding of the norms internal to the sciences. Among contemporary philosophers of science concerned with the politics of science, Renouvier is probably more like Longino, insofar as both thinkers are concerned with the political organization of science itself. One might argue that Kitcher is as well. Kitcher argues for more inclusive deliberations in science policy, with an enlightened general population and not just scientists, politicians, and corporate executives contributing to decisions about where research monies are best spent. But Longino would like to democratize not just science policy but scientific decision making itself, which would permit more different points of view to be expressed. For Longino, in order for critical interaction among divergent points of view to give rise to knowledge, four conditions must be satisfied: (1) there must be public venues for criticism, (2) there should be uptake of such criticism, (3) there must be public standards for critical discourse, and (4) there should be a "tempered equality" of intellectual authority among participants (2002, 129–31; 1990, 76–78). She adds that it is adherence to a set of standards that creates a knowledge-acquiring community out of a group of individuals. These standards may include goals, methods, and criteria for satisfying goals. They can change over time and vary among subcommunities (2002, 145).

However, Renouvier had a much richer notion of scientific communities than does Longino. Renouvier was interested in the metanormative question of how scientists should reach consensus on theoretical and conceptual issues. He seems to have recognized that a social contract that first creates a civil society is a precondition for any specific conventions that such a community will adopt as binding, at least for a time. This holds both for civil society at large and for any subcommunity within that society. What constitutes a scientific community for Renouvier is less a set of commitments to explanatory goals, methods, and theories, which are constantly modifiable through free and open debate, than an agreement among a group of individuals to engage in intellectual discourse with one another about the phenomena of the natural world. They also agree to

be bound by the rules they make and to communicate with each other to discuss, interpret, enforce, or change these rules. Longino, on the other hand, simply talks about adherence to public standards by individuals who have “internalized” them (2002, 148). She offers no explanation why scientists would find these standards binding or what gives them their normative force. Although she distinguishes those rules or standards that are genuinely knowledge producing from those that are not, she does so in terms of the successful achievement of practical goals in the physical environment. Thus it may be prudent for scientists to follow such rules, but they would not necessarily feel bound by them. Whether and to what extent scientists do in fact feel bound by rules of method is an empirical question that may best be answered by studying their reactions to violations of these rules.

A study of Renouvier’s philosophy could also provide another perspective on the conventionalist tradition in philosophy of science. In a recent publication on Henri Poincaré’s conventionalism, María de Paz asks how the concept of a convention or agreement among people could apply to the natural sciences. She finds it a relatively clear concept in the social contract tradition of political philosophy, where it entails that the norms that govern society are human products and not given by nature. But how could these concepts apply to the empirical sciences if they are supposed to be about nature? In what sense could our knowledge of nature rest on agreement among human individuals? (de Paz 2014, 48). The examination of Renouvier’s thought may help us to answer de Paz’s question by providing some insight into how a term like *convention* might have been understood by Poincaré and his contemporaries. For Renouvier, conventions are not something that stand in opposition to empirical science, but rather are the agreed-upon starting points among scientists that make empirical research possible in the first place, and yet which scientists retain the liberty to modify or even replace when these basic assumptions no longer prove fruitful. This comparison of Renouvier with Poincaré thus supports David Stump (1989) and Janet Folina’s (2014) argument that Poincaré’s conventionalism was anything but the conservative philosophy standing in the way of progress that it is usually considered to be.

In Renouvier’s conventionalism and social contract philosophy, both knowledge and morality are socially produced but also dependent upon the freely given consent of individuals. Two important thinkers who were significantly influenced by Renouvier, William James and Émile Durkheim, each accepted

only one of these two aspects of his philosophy. James was attracted to Renouvier's defense of free will and initiated a close personal relationship with him that lasted for well over a decade (Schmaus 2010, 2–3). He took from Renouvier the argument that truth or knowledge as well as morality depends on the postulate of free will. However, James's pragmatism, with its emphasis on individual satisfaction, seems to have accepted few if any constraints on what an individual could accept as true. Durkheim, on the other hand, who claimed Renouvier as the master from whom he learned to philosophize (Lukes 1973a, 54; Stedman Jones 2001, 41), understood the normative and communal character of knowledge, but attempted to explain normativity in terms of social constraint. He overlooked the importance of voluntary consent to epistemic as well as moral norms. Durkheim could not distinguish genuine morality or knowledge from doctrines that may be simply imposed on people within a given society. Nor was he able to account for how what is accepted as knowledge can change over time through norm-governed interaction among individuals in a knowledge-seeking community. Renouvier's philosophy, on the other hand, by encompassing both the voluntary and communal aspects of normativity, including epistemic norms, has at least the potential to avoid the shortfalls of both James's pragmatism and Durkheim's sociology of knowledge.

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The next chapter will provide more detail regarding the philosophical and political context in which Renouvier developed his thought. I will discuss the development of his political thought and the role he played in the turbulent politics of the period up until the Second Empire, when he broke off his work on behalf of the socialists to begin writing his *Essais de critique générale*. To be clear, I do not intend to provide a complete intellectual biography of Renouvier in this book. Renouvier had a long philosophical career, writing and publishing prolifically for six decades. In addition to politics, science, and epistemology, he was interested in and wrote about many things, from religion and metaphysics to the novels of Victor Hugo. I will discuss his other concerns only insofar as they are relevant to what I am calling his political philosophy of science.

Chapter 2 will examine Renouvier's relationship to positivism. I will explain how Renouvier found fault with Comte's philosophy of science as well as his social and political philosophy, and in general with Comte's attempt to provide empirical answers to what Renouvier thought were normative questions. In this

chapter, we will see how Renouvier rejected Comte's implicit assumption that all such questions had been settled through his formulation of the three-state law of intellectual development. Renouvier found that this law itself rested on normative assumptions for which Comte was unable to provide good arguments. In fact, Renouvier maintained that Comte in general lacked good arguments for some of the positions he held concerning mathematics and the sciences and offered wrongheaded prescriptions, including recommendations that we not pursue research into stellar astronomy and the mathematical theories of probability and statistics. Renouvier held that only the (Kantian) critical philosophy, and not positivism, had the conceptual resources to address normative questions in philosophy.

One could argue that Renouvier also held very conservative views on the sciences of his day, specifically in mathematics and evolutionary theory, despite the fact that he criticized Comte for having held conservative views in other branches of science and mathematics. Chapters 3 and 4 will evaluate Renouvier's reasons for holding the positions that he did. First, chapter 3 will consider his views on mathematics, specifically number theory and geometry. Renouvier had strong philosophical reservations about the concepts of infinity and infinitesimals, and regarded non-Euclidean geometries as absurd. Chapter 3 will examine the possible roles that Renouvier's conventionalism and Kantianism may have played here, and whether Renouvier was simply stating his own preferences or meant to proscribe these ideas for others. In chapter 4, I will argue that Renouvier's objections to Charles Darwin's theory of evolution through natural selection made sense given what was known at the time and in fact were raised by others in the nineteenth century, including some of Darwin's supporters.

Although Renouvier found the critical philosophy more appropriate than Comtean positivism for addressing normative issues, he regarded Kant's own philosophy as providing only a starting point. In chapter 5, I will explain how he aimed to develop it further, through bringing out the analogy between normative issues in epistemology and in moral philosophy. It will explain his reasons for rejecting Kant's distinction between practical and theoretical reason. For Renouvier, normative judgments about what is true or false as well as good or evil equally depend on a social contract to which everyone has freely consented. This chapter will therefore examine Renouvier's defense of liberty of the will.

Chapter 6 will focus specifically on Renouvier's philosophy of science. I will explain how his views in the first two *Essais* and subsequent publications grad-

ually developed in a direction away from Comte's. In particular, I will show that he came to hold more liberal views on the role of hypotheses allowing for the postulation of unobservable entities and processes that can explain the mode of production of the phenomena. This chapter will include an account of how Renouvier came to regard not only mathematics but also the empirical sciences as resting on conventions, and compare his views on conventions in the sciences to those of Poincaré.

In the conclusion, I present Renouvier as the historical link between Comte and Poincaré, two other well-known *polytechniciens*-turned-philosophers. A study of Renouvier shows how conventionalism grew out of a critique of positivism, despite the similarities of these philosophies. In fact, Renouvier turns out to have been perhaps the more thoroughgoing conventionalist, as he ultimately regarded all the sciences as resting on conventions that gain their legitimacy through social contracts. He also showed us that conventions in mathematics and the sciences include not just arbitrary choices between equally good alternatives but also a consensus arrived at through reason and argument. Renouvier's conventionalism, far from a conservative philosophy holding back scientific progress, is rather a liberal philosophy of science, permitting scientists to engage in cooperative investigations of subjects where there is no guarantee of certainty other than the agreement of those pursuing research.