

## The Power of Scientific Knowledge

It is often said that knowledge is power, but more often than not relevant knowledge is not used when political decisions are made. This book examines how political decisions relate to scientific knowledge, and what factors determine the success of scientific research in influencing policy. The authors take a comparative and historical perspective and refer to well-known theoretical frameworks, but the focus of the book is on three case studies: the discourse of racism, Keynesianism, and climate change. These cases cover a number of countries, and different time periods. In all three the authors see a close link between “knowledge producers” and political decision-makers, but show that the effectiveness of the policies varies dramatically. This book will be of interest to scientists, decision-makers, and scholars alike.

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# The Power of Scientific Knowledge

*From Research to Public Policy*

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Reiner Grundmann  
and  
Nico Stehr



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## Preface

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Intense discussions of the social function of science in society can be traced to its very origins. Interest in the practical virtues of scientific knowledge has arisen for obvious reasons. From the beginning of the scientific revolution, scholars, philosophers, and laypersons alike have been vigorously engaged in discussions about the nature of the practical impact of knowledge on social, political, technical, and economic matters. Likewise, the social role of the scientist became a topic for debate. After a period of growing resources for scientific endeavors, especially in publicly funded institutions such as universities, science today is faced with funding constraints. This leads to vigorous competition for scarce resources, and to attempts to find measures and rationales for public spending on science. In this context, claims about the practical efficacy and promise of scientific knowledge are not only turned into crucial symbolic capital – but can also be a matter of survival for some fields of inquiry. Where concerns are expressed about the usefulness of science, this can become a serious liability with regard to competition for economic support, attraction of new generations of students, and societal attention.

Dealing with the question of why knowledge sometimes becomes powerful, and sometimes remains unused or is regarded as useless, the traditional answer was to point to the very success of science and technology in transforming our living conditions. Longer, healthier, and better lives due to scientific discoveries and applications are prime examples. Scientific progress in medicine and other applied fields is paraded as incontrovertible evidence of the usefulness and power of knowledge.<sup>1</sup>

In our analysis of the conditions that enable knowledge to become powerful, we are not content with the simple but tautological answer

<sup>1</sup> In a recent study, Sarewitz and Nelson (2008) compare the differing success of vaccination and education programs. They argue that this difference can be explained by the availability of a functioning “technical core” in the first case, which is not available in the second.



that it is the practical success of science and technology. Of course, this has been, and in many quarters still is, the dominant answer. Listen to the British chemist and Nobel Prize laureate Harold Kroto, who says that there are innumerable theories, but only a few that are true. True theories, in his view, are facts that work in practice.

There are countless theories but they can be clearly classified into two groups: Scientific Theories which are considered “true” or “facts” because they have been found experimentally to work and we know why they work, and Un-scientific Theories which have been found wanting when similarly experimentally tested. (Kroto, no date)

Examples of such working and true theories are: Newton’s theory of gravity, Maxwell’s theory of electromagnetism, Einstein’s theory of relativity, Mendeleev’s periodic table, the theory of quantum mechanics, and Darwin’s theory of evolution.<sup>2</sup> This statement could be taken as representative not only for the community of scientists, but for the dominant view about the relation between science, truth, and practical effectiveness.

While we do not doubt the practical success of knowledge, this answer allows at best for an *ex post facto* response to the question of what exactly gives rise to the power of knowledge. In so doing, Kroto and others combine old theories with new technical applications. Newton did not aspire to devise a journey to the moon, and Darwin did not tell us how to treat modern diseases. In a similar vein, one could say – and many indeed do say – that Marx was the mental originator of the Soviet Union, or that Nietzsche was responsible for the Holocaust. Such superficial, anachronistic, and functionalist allegations are ubiquitous. However, their frequent repetition does not make them more plausible.

Not all theories have practical applications or are aimed at them. Kroto’s criterion that only proven theories (“facts”) are scientific is mistaken. There are good theories which have no application whatsoever and theories where proof cannot be obtained for practical reasons, or because it is contested. As the history and sociology of science tells us, every research frontier shows uncertainty, experimenter’s regress (Collins 1985), and trials of strength (Latour 1987) between proponents and opponents of such theories. Often these debates have no visible conclusion and a generational shift decides the fate of the theory. As

<sup>2</sup> Kroto lists the following successful practical applications of these theories: the landing on the moon (Newton); electricity, radio and TV (Maxwell); nuclear fission and satellite navigation (Einstein); silicon chips and synthetic pharmaceuticals (Mendeleev); laser and DVDs (quantum mechanics); the fight against life-threatening diseases (Darwin).

Max Planck famously put it, “a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it” (quoted in Kuhn [1962] 1970: 150).

In this book, we therefore aim at a much more precise account of the links between knowledge creation and practical political application.

Pointing to the ways in which knowledge has in fact altered our existential conditions, whether in anticipated or even in surprising ways, does not enable us to tell whether current knowledge may be powerful under future conditions unless we are prepared to assume what must, fortunately or unfortunately, be taken for granted: future conditions are rarely a carbon copy of past circumstances.

Knowledge can become powerful in two different ways, either through technical or through social applications. In the first case, we are looking at scientists and engineers, and the technical artifacts they produce. In the second, we are looking at social scientists and their links to the political, economic, or social world. In the first case the power of knowledge manifests itself in working machines or drugs, in the second in social action, especially effective political interventions into economy and society through laws, regulations, and policies. In this book, we focus mainly on the second aspect of practical knowledge.

Although views differ about the details of this link between knowledge and society, it seems to be common sense that the kind of knowledge that emanates from established science can indeed be quite powerful and beneficial in practice. The most recent thesis in this regard asserts, using the prominent Marxian categories of base and superstructure, that the superstructure becomes the motor of major historical transformations. It follows, of course, that knowledge increasingly displaces those factors and processes that were once held to be the “cause” of history, i.e. the economic base of society, including its property relations. Now the emphasis is much more on the “superstructural” elements which form part of the productive forces.

Despite there being no consensus on how the tight coupling between knowledge and social action works in detail, many would agree that knowledge produced by the sciences can in practice have a major impact. If science becomes so central for the production of societal wealth, the question arises of how we can tap into this productive force and use it optimally. The development of productive forces in the knowledge society means first of all – for us anyway – understanding the process in which knowledge becomes practical.

Running the danger of oversimplifying, we identify two approaches in the literature which analyze the relation between knowledge and power,

using an established distinction between technology push and demand pull. On the one hand, there is the thesis that knowledge flows into society, originating at the source of basic research, continuing through applied research and ending in technical or other practical applications. This linear model makes use of the flow metaphor and implies that for knowledge to become practical, barriers have to be broken down so that knowledge can run freely (“science push”). On the other hand, there is the thesis that knowledge is commissioned from users, which implies that it can be produced on demand and deliver solutions as required (“social pull”). This approach has many variants; we mention only the function that science is said to fulfill as provider of legitimation (Habermas 1970; Salter et al. 1988). The first approach emphasizes the supply side of science producers, the second the demand side of science users. In both cases the unit of analysis is not clear. It is rarely made explicit whether we are dealing with single scientists, groups of scientists, scientific disciplines, or science as an institution. We shall therefore limit our analytical frame to the investigation of the *activities of scientists* who produce practical knowledge and introduce it into contexts of application. What exactly counts as *practical knowledge* is the topic of this book.

Reflections on the power and promise of scientific knowledge preceded systematic considerations about the influence of social conditions on knowledge. Once interest in the social basis of knowledge was firmly established, the concern with the impact of knowledge on society receded as a problematic issue. The matter of the function and the influence of knowledge on society appeared to be solved. Of course, it never disappeared. But the prevailing view was, and perhaps still is, that we should mainly fear a deficit of knowledge.

In exploring in this study both the nature of economic discourse, climate science, and race science, and the features of the practical context within which such bodies of knowledge aspire to gain influence, our study of knowledge production, and of the contribution of knowledge to major societal transformations and historical processes, represents an effort to specify some of the characteristics of knowledge that make knowledge powerful or that appear, for that matter, to substantially reduce the practical efficacy of science. We concentrate on the kinds of attributes that make knowledge powerful in practice, and therefore approach the process of policymaking in modern society from the angle of the role knowledge can play. Heretofore, the answer to the issue of the power of knowledge was found in the philosophy of science. We will try to show that the answers that epistemology offers are not entirely helpful.

But it is not only epistemology that has hampered the analysis of knowledge and power. A number of further, interrelated issues have weakened the power of the analysis of the relations between ideas and practical affairs, including politics. Among them is the often taken-for-granted term “knowledge,” and in its wake the relation of knowing, action, and power. A careful genealogy of the concepts of power and knowledge may assist in dissolving the outward appearance of an essential unity of power and knowledge (cf. Foucault 1980). A careful specification and differentiation of these terms should be of help, as would a differentiation of different phases of policymaking in the case of political action. However, the relationship between knowledge and power, and therefore the question of the power of knowledge, remains the core issue of our inquiry.

However, our aim in this book is not primarily a conceptual clarification. At the heart of the book, we present three case studies containing knowledge claims generated within different disciplines, both established and emerging, from social and natural sciences, at different historical times. The actors are oriented to national as well as transnational policy communities. The “operational” or practical knowledge generated in the different scientific communities we are examining emerges in close proximity to social, economic, and political contexts. In each of the three cases, prominent members of the science communities and forceful circumstances contribute to efforts to disseminate knowledge claims widely and assure that they appeal to and resonate with the political agendas of the day. At the same time, agenda-setting efforts are also part of the interests that motivate the knowledge-generating communities.

We do not claim that the selected cases fit some kind of experimental design which would enable us with certainty to factor out processes and dimensions that are crucial for the practical success of knowledge. However, we are convinced that the range and the diversity of cases improve our ability to discern those attributes that allow one to speak about the possibility that knowledge becomes powerful. Our aim is not to produce a general theory of knowledge application but to provide some historical-analytical tools and data for such an endeavor.

Within the context of each of the three case studies, we stress different elements of the knowledge/power constellation. In the case of Keynes, it is perhaps only a slight exaggeration to say that he changed economic policy in Western democracies singlehandedly. While his recommendations were not accepted and implemented during his activity as a government advisor, he laid the theoretical foundation for a new economic policy during these years. It is remarkable that he based his policies on only a few variables. His theory did not reflect the complexity

of economic reality – which in the view of many is the precondition of a theory to become practical.

In the case of climate science, we refer to the role of transnational epistemic communities in placing research topics on the global political agenda. In this case, it is remarkable that there is little practical success visible in climate policies, despite the size of the epistemic community and its scientific consensus.

In our case study of race science as a theoretical and applied science, we emphasize the extent to which scientists take up cultural and political resources of the day in order to generate knowledge claims that resonate closely with the politics of the time. As in the case of climate policy, we see a close relationship between scientific experts and political actors. In contrast to climate policy, race science in Nazi Germany led to practical applications of knowledge claims in the form of race policies, culminating in the Holocaust. This case raises the questions of whether knowledge as such can be “neutral,” and whether the growth of knowledge is always accompanied by societal benefits, or whether it represents a moral value in itself.

We are grateful to Jay Weinstein for allowing us to make use of the case study on race science and the Holocaust in this monograph. The initial chapter entitled “The Power of Knowledge: Race Science, Race Policy and the Holocaust,” authored by Jay Weinstein and Nico Stehr, was first published in *Social Epistemology* (1999). Although enlarged, our case study of the practical power of race science is significantly indebted to the earlier analysis. Permission to reprint the relevant parts has been granted by Taylor and Francis.

The case for and the examination of the socio-economic context in which the influence of Keynesian economic discourse may have considerable historical importance was first made in Nico Stehr’s *Practical Knowledge* (1992). We have enlarged and extended the argument found there, embedding our case in more recent work on John Maynard Keynes, who was after all one of the most important social scientists in history, especially when judged by the practical influence he enjoyed in the immediate postwar era and more recently, in the wake of the financial crisis of the years 2008–10. Permission to reprint the relevant parts has been granted by Sage Publishing.