Towards a New Kind of Social Science
Social Research in the Context of Science II and RISC-Societies

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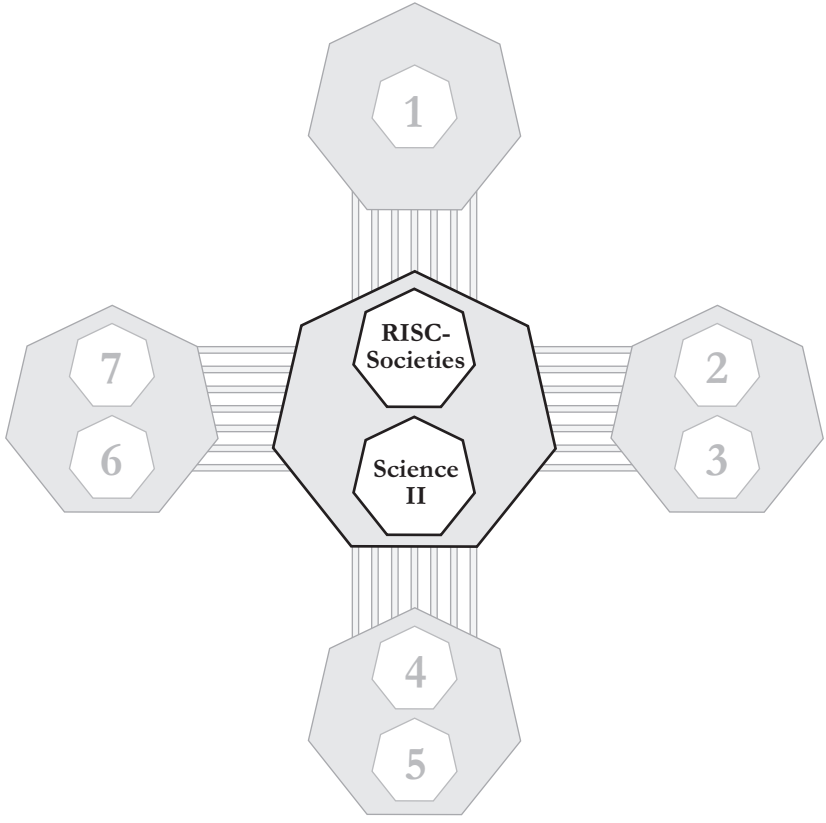
Introduction



This volume is the result of a large research project which runs under the name EECO-LAB (Eastern European Co-operation on Labour), funded by the Federal Ministry of Labour, Social Affairs and Consumer Protection of Austria. EECO-LAB has its main focus on the European Social Survey (ESS) and on generating the Austrian data for the ESS. The present volume compiles a series of jointly produced articles on ESS-data, on survey methodology and on the interpretation of survey data. Three general themes can be specified which lie at the heart of this book.

- The first major theme which provides also the necessary background focuses on an ongoing phase transition in the overall science landscapes from a traditional configuration under the name of Science I to an emergent ensemble under the heading of Science II. This transition from Science I to Science II becomes the central issue of Part I.
- The second major theme discusses the impact of the transition from Science I to Science II for empirical social research, especially for survey research. Traditional empirical survey research was built very much along the line of Science I-assumptions and conditions. The new configuration of Science II poses very serious and significant threats to survey research both with respect to the underlying survey methodology as well as to the organization of surveys and the analysis of survey data. Part II discusses the consequences of Science II for the survey methodology and Part III points to new possibilities in the area of survey constructions and of data analysis.
- The third major theme introduces the notion of RISC-societies (Rare Incidents, Strong Consequences) as a general evolutionary framework for societal analyses. The final grand theme centers on the overall organization of RISC-societies in two different aspects or dimensions. The first issue lies in the specification of basic societal structures for contemporary RISC-societies. Here, the crucial question lies in the structuration of full-time employment in contemporary RISC-societies. Does full-time employment corresponds with a stable core-periphery organization or with a strongly vertical organization where full-time employment is strongly vertically stratified and other forms of employment or even unemployment follow the distinctions within full-time employment. The second aspect or dimension focuses on societal inequality and in its impact on health conditions.

These three major issues seem even at second glance sufficiently interesting, diversified and relevant to be analyzed in a special volume.

Acknowledgements

Working on a complex issue across national boundaries and across different languages requires a coordinated effort by a large number of persons. In our case, this co-operation was funded by a research grant under the name of EECO-LAB (Eastern European Co-operation on Labour), from the Federal Ministry of Labour, Social Affairs and Consumer Protection (BMASK). Thus, special thanks go to

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- Christian Bischof with whom we explored the potentials inherent in new forms of secondary data analyses in article 3.2
- Michael Eigner who was mainly responsible for the design and the redesign of the diagrams, figures and graphs in the book
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- a remarkably good spirit of stable cooperation and friendship between the editors which has overcome many obstacles and barriers and which will continue to last well-beyond the publication of this book.

It should be emphasized that the present book in its final design fits very well into the overall context of the WISDOM-book series with its emphasis on complexity research or on new research designs, new methodologies or, as an essential element, on new information designs. It is hoped that the rather unconventional ways for survey research will meet the interest of social scientists across Europe who search for novel ways and methods in survey research and analysis. It is worthwhile to contemplate an old quotation from enlightenment times, namely from Denis Diderot.

> There are things I can't force. I must adjust. There are times when the greatest change needed is a change in my viewpoint. [Denis Diderot]

We sincerely hope that the articles presented in this volume exhibit some of the changes we have taken over the last years. Moreover, we wish that the cognitive changes indicated in this volume enable researchers in their fields to widen their current tool-box significantly and to open up new ways for social research with exciting and innovative results.

Vienna and Ljubljana, October 2012
Karl H. Müller | Niko Toš

Abstracts

The Complex Drift towards Science II

The first article presents several themes which are highly relevant as background knowledge for the subsequent chapters. First, this article presents different patterns for the evolution of the science system in general, including the phase transition from Science I to Science II. In a meta-analysis strong theoretical arguments are provided why the change from Science I to Science II should be considered as the most powerful and comprehensive science drift among the currently available candidates for general science drifts. Finally, the article presents the results from an online survey which was sent out to experts in the field of science studies. Surprisingly, a large number of the assumptions for Science II could be supported empirically through this online-survey.

Keywords: Evolution of science, science drifts, Science II, leading disciplines, neuro-cognitive sciences, online surveys

Survey Research in the Age of Science II

This article will focus on the rapidly widening cognitive-science landscapes and their potential impact for fresh perspectives on survey research. More ambitiously, the article wants to explore new foundations for survey research which are based on current advances within the broad domains of the cognitive sciences. In essence, the article wants two establish four major claims. First, over the last decades survey research has reached its point of perfection and, given the quality standards of European data collections like the European Social Survey (ESS), can be improved further only marginally. Second, survey research in its current form is characterized by various forms of incompleteness which, however, cannot be re-solved within the contemporary boundaries of survey research. Third, the expanding field of the cognitive sciences should be considered as the most relevant background knowledge for survey research in all its aspects, starting from the design of questionnaires to the actual fieldwork-procedures and to the analysis of survey data. Fourth, shifting to a cognitive science background should have a highly significant aspect of re-shaping survey research and for alternative paths for survey designs which, so far, have hardly been explored.

Keywords: Long-term dynamics of science; cognitive science; survey research; genetic algorithms; over-learned and under-learned responses

The New Background Knowledge for Survey Research in the Framework of Science II

This article deals with a rapid change which is currently sweeping through the science landscapes and discusses the far-reaching implications of this structural break for the social sciences and for survey research in particular. More specifically, this article will make three central claims. First, the science system as a whole is presently undergoing a significant phase transition which can be summarized as a shift from Science I to Science II. Second, due to these large-scale changes, new cognitive environments are gradually emerging as the background knowledge of survey research which will exert a profound impact on its future practices. Third, these new cognitive environments will lead to new actor-models and to new bridges between survey research and the cognitive neuro-sciences on the one hand and bio-medical research on the other hand.

Keywords: Long-term dynamics of science; cognitive neuro-sciences; background knowledge; survey research; bio-medical research

Visual Survey Research with Pattern Formations and Pattern Recognitions

This article deals with two major issues. First, it stresses the asymmetric forms of interactions inherent in survey field work and discusses the wider implications of these asymmetric interactions especially for respondents and their life worlds. Second, this article introduces new visual forms of pattern generation and pattern recognition which are predominantly produced or controlled by respondents themselves. These visual patterns reflect a complex set or network of relationships which are usually absent both from quantitative and qualitative research. Finally, the article concludes with an outlook into the future and with the potential of visual surveys within virtual environments.

Keywords: Long-term dynamics of science; survey research and survey design; universal laws; patterns; pattern recognition; pattern formation

New Forms of Secondary Analyses

This article focuses on the rapidly increasing piles of survey data which are lost for comparative research because they were developed and generated within a specific regional or national context and were not replicated in other regions or nations. Due to the absence of functionally identical datasets in other regions or countries these datasets fell out of the scope of comparative research. In view of the very large quantities of survey data which are currently lost for comparative analyses the present article presents the outlines of a new road for comparative research which

should become of special relevance for these large quantities of unused survey ort panel data. More specifically, the article offers a test with data from the European Social Survey in order to demonstrate the viability and the empirical soundness of the proposed new trajectory for comparative analysis on the basis of data sets which are conventionally.

Keywords: Comparative social research; secondary data analysis; morphology; morphological forms; data formation and data aggregation

Modern Contemporary RISC-Societies and their Basic Organization: Core-Periphery or Vertically Stratified?

The short article attempts to shed new light on the basic organization of contemporary societies. Initially, two models of societal organization are introduced which are classified as core-periphery model and as a homogeneous vertical stratification model. The second section points to a notorious weakness in currently available stratification schemes which are hardly capable to account for the multi-dimensionality of contemporary living conditions. The third part of this article introduces a complex stratification scheme with a multiplicity of different domains and dimensions. As a next step, the two societal stratification models are combined with the complex stratification scheme so that both societal models can be expressed in terms of different stratification patterns. The fifth section produces the results from two parallel surveys in Slovenia and in Austria which were implemented with two groups of 400 fully employed and 400 unemployed persons. The outcomes of the surveys clearly support the homogeneous vertical model and reject, by and large, the center-periphery model. In a final section one of the empirical findings, namely the strong relations between the lower segment of unemployed persons on the one hand and their health conditions on the other hand are further discussed in theoretical terms and new theoretical links are suggested between social inequality research and medical research.

Keywords: Social inequality, comparative research, health research, living conditions

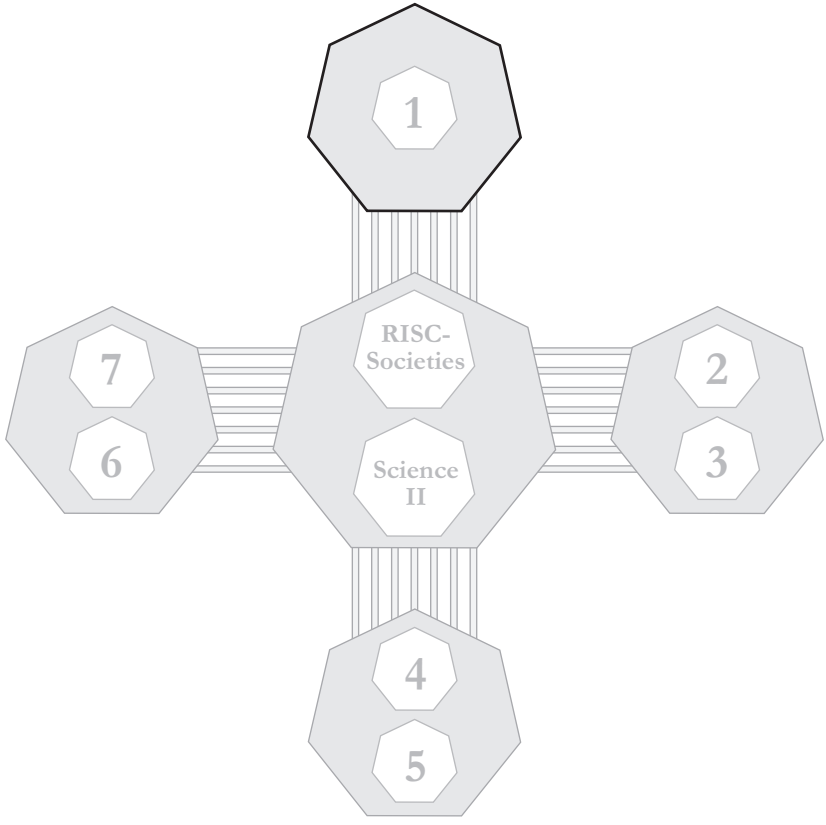
Inequality and Health Conditions in Modern RISC-Societies

The final article attempts to shed new light on the deep relations between stratification, social inequality and health-relevant dimensions. For this purpose a new relational metric will be introduced which transforms a multiplicity of living conditions into a [-1, 0, +1] metric of socio-economic risks and life chances and, subsequently, into a social inequality scale and a vertical stratification scheme with groups of multiple life chances at the upper end and multiple risk groups at the lower

end. With two international survey data sets it can be shown that the new relational metric leads to significantly deeper relations between stratification, inequality and health than in the traditional accounts.

Keywords: Social inequality, comparative research, health research, living conditions

Part I
From Science I to Science II



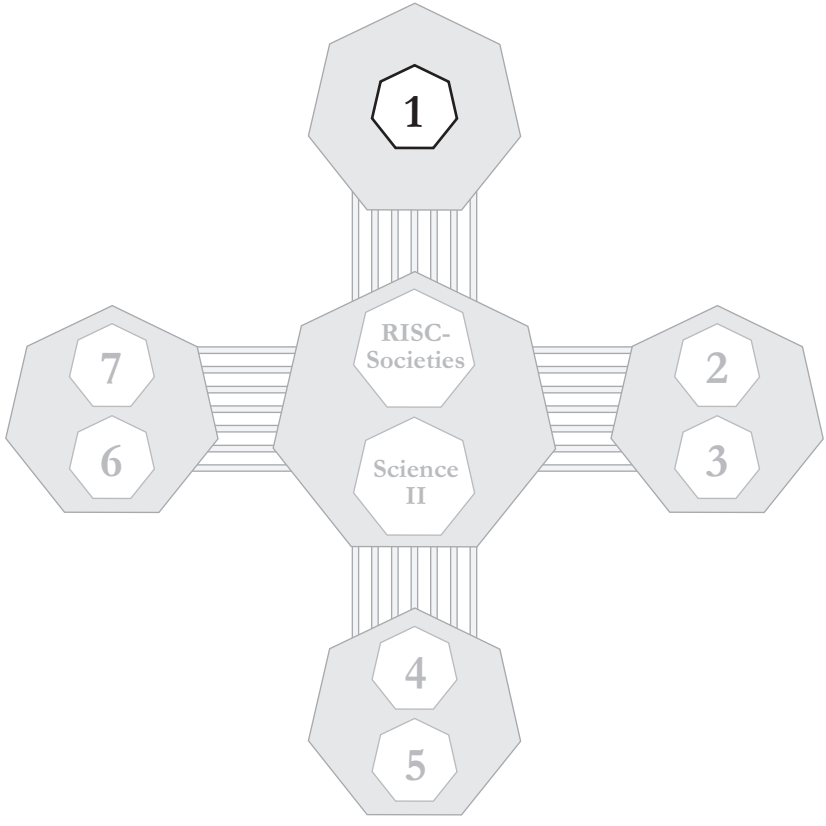
Introduction to Part I

The first part of the book consists of a single article which covers important aspects in the transition from Science I – the period between the emergence of modern science in the 16th century up to the decades around 1900/1950 – to Science II. In closer detail, the first article aims to reach three major objectives.

- First, several characteristic drifts in the long-term evolution of science have been specified and are discussed in greater detail. These science drifts become important because one of the overall aims of the new kind of social science is to provide cognitive support and, thus, additional strength to these contemporary and future science drifts.
- Second, an attempt has been made for a dynamic mapping of the overall science landscapes for three different periods, namely for
  - the science system around 1900 to 1950
  - the contemporary science system of the year 2012
  - the future science system for the period 2050–2100
- Finally, the article presents the results from an online survey which was sent out to experts in the field of science studies worldwide. Surprisingly, a large number of the assumptions for Science II like the emergence of the life sciences as a new leading field could be supported empirically through this online-survey.

Through these three stages Part I wants to show the scientific background dynamics which become relevant for the shape and the profile of the new kind of social science.

1 The Complex Drift Towards Science II



"Towards a New Kind of Social Science" sees itself located and embedded within several broad contemporary and future-oriented science drifts where this new kind of social science and the overall science drifts should support each other mutually. However, identifying major science drifts is obviously confronted with major problems as well. With respect to the past, the special challenge lies in a multiplicity of general patterns of the long-term evolution of scientific knowledge and in their mutual inconsistencies.

1.1 Science Drifts in Four Different Directions – and an Initial Stop Sign

While the multiplicity of patterns for the evolution of science in the past is confronted with the challenge of an under-determinacy of data, one of the most fascinating barriers in a deeper analysis of the scientific evolution of the evolution of science lies in the impossibility, so it seems, to predict future knowledge developments in science. Here, one is confronted with a seemingly insurmountable barrier which can be qualified as Popper's barrier, due to a large number of arguments and proofs by Karl R. Popper on the impossibility of forecasting future knowledge. Nevertheless, this section will attempt to synthesize various patterns of science evolution in the past to a more robust form. This new robust pattern will, then, be tested with the help of an online-survey on the past and the future evolution of scientific knowledge which was accessible only for s small number of specialists in the area of science studies worldwide.[1] Finally, this new robust pattern will become the necessary dynamic environment in which the main themes of the new kind of social science will be placed.

A Halting Problem

But before proceeding to the general patterns of long-term knowledge evolution a special barrier has to be overcome and passed which has been referred to already as Popper's barrier. In fact, Popper's barrier has the potential of preventing any predictive capability with respect to future knowledge domains in science. As an unusual starting point for introducing Popper's barrier, a reference will be made to Donald Rumsfeld, former Secretary of Defense in the Bush-administration, who made an unusual distinction on the three different domains of knowledge and ignorance. In a speech from February 12, 2002 Rumsfeld proposed the following demarcations..

1 For more details, see Müller *et al*., 2010.

> ... as we know, there are known knowns: there are things we know we know. We also know there are known unknowns: that is to say, we know there some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know.

Paradoxically as it seems at first sight, the second and the third domain of known unknowns or unknown unknowns has at least one remarkable instance which, not surprisingly, has to do with knowledge itself and, more specifically, with future knowledge.

For Popper, forecasts were reserved for systems and configurations which were characterized by attributes like being closed, stationary or ergodic [Popper, 1965c:339]. But the universe we observe and operate in is intrinsically open and emergent. In fact, Popper provides a beautiful example that observations, descriptions and explanations of the world add, by necessity, to its genuine openness.

> The incompletability and openness of the universe is perhaps best illustrated by a version of the well-known story of the man who draws a map of his room, including in his map the map which he is drawing. His task defies completion, for he has to take account, within his map, of his latest entry. [Popper, 1982a:129]

In a more advanced form Popper sets out to prove that future knowledge belongs to the domain of known unknowns which, by necessity, cannot be known in advance.

> (1) If complete self-prediction can be shown to be impossible, whatever the complexity of the predictor, then this must also hold for any 'society' of interacting predictors; consequently, no 'society' of interacting predictors can predict its own future states of knowledge;
> (2) The course of human history is strongly influenced by the growth of human knowledge ...
> (3) We cannot, therefore, predict the future course of human history; not, at any rate, those of its aspects which are strongly influenced by the growth of our knowledge [Popper, 1982a:63].

But future knowledge has another highly intriguing property. From a long-term evolutionary knowledge perspective future knowledge was always full of unknown unknowns as well. Time and again, new theories, mechanisms, models or measurements moved the knowledge boundaries into hitherto new domains and dimensions. Both the astronomic and the sub-atomic space-time scales and processes belong to the unknown unknowns for a natural scientist around 1750 or even 1850. Additionally, the effects of the unknown unknowns to the known configuration belongs to the unknown unknowns as well.

Thus, Popper's barrier looks well-founded and, especially important, insurmountable. Future knowledge, due to its dual qualities of belonging to the class of known unknowns and unknown unknowns lies beyond the domain of possible scientific

investigations. Being confronted with Popper's barrier the most natural alternative would be to restrain from the analysis of future knowledge and restrict oneself to the historical aspects of knowledge evolution alone.
Well-founded as Popper's barrier stands it does not prevent, however, two groups of analysis of future scientific knowledge.

- The first cluster of research problems lies in the area of known unknowns and is centered on the diffusion of contemporary knowledge domains or of scientific disciplines. Like in innovation research it is worthwhile to study diffusion histories of scientific fields or disciplines in detail and to apply the findings from these studies for current innovations in scientific knowledge and their likely trajectories in the future.
- The second cluster of research questions is situated in the domain of unknown unknowns. Here, researchers can be asked repeatedly about their subjective assessments whether fundamental changes in specific knowledge domains are highly likely or unlikely and whether a state of cognitive equilibrium has been reached in these particular areas or not.

These two groups of research issues can be dealt with independently and despite Popper's barrier. While these two clusters of research questions cannot remove Popper's stop sign with respect to the predictability of future knowledge, they remove effectively an attitude of *ignoramus*, *ignorabimus* [du Bois-Raymond, 1885] which Emil du Bois-Raymond cultivated in his talk on the limits to the knowledge of nature, held 1872 in Leipzig. Thus, despite the unknown unknowns a lot more can be said about them aside from being simply unknown unknowns.

1.2 Four Potential Long-Term Science Drifts

After leaving the confinements of Popper's barrier, the next pages will present an overview of those approaches that are focused on the long-term dynamics of science. For this task, various starting points are feasible. John Losee for example, in his "Theories of Scientific Progress" [2003], proposes three theory groups under the headings of incorporation, revolutionary overthrow and descriptive theories. Similarly, Daniel Rothbart, in his "Explaining the Growth of Scientific Knowledge" from 1997,[2] offers a very interesting view on the scientific innovation engine which becomes very productive in the case of a juxtaposition of apparently incongruous cognitive systems which enable the production of a new and

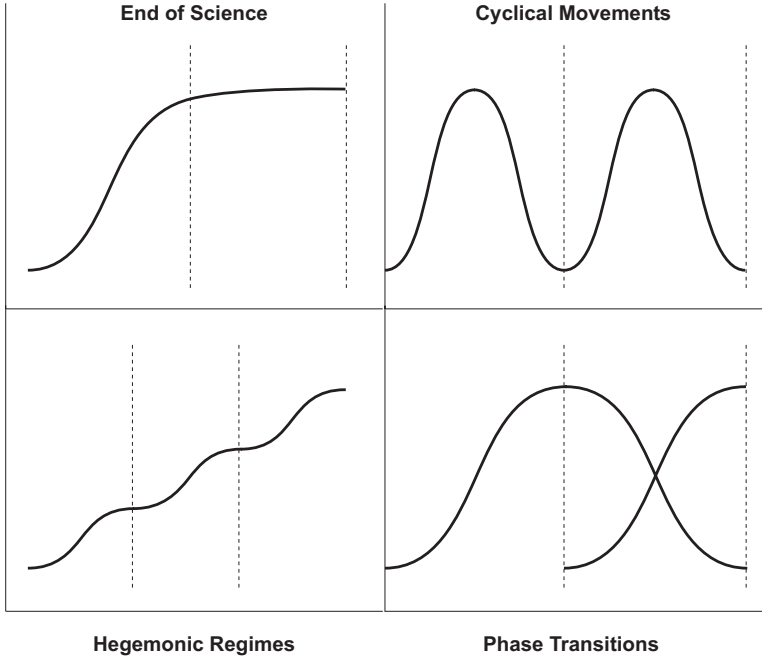
2 See also Rothbart, 2007 with a very illuminating view on the role of instruments and machinery in the production of scientific knowledge.

innovative scientific horizon. Following Rothbart, this chapter could concentrate on periods of intensive scientific growth and the underlying incongruent schemes and building blocks.

While all these and similar approaches[3] would allow a summary on scientific growth, a different approach will be taken in the subsequent pages. Using Humberto R. Maturana's and Francisco J. Varela's term of a drift [Maturana/Varela, 1987], science drifts can be introduced as a generic concept for long-term directions in the evolution of scientific knowledge. In particular, four patterns or theory-groups will be introduced which can be classified according to their characteristic development configuration or, alternatively, science drifts as

Pattern I – End of science
Pattern II – Cyclical development
Pattern III – Hegemonic regimes
Pattern IV – Phase transitions.

FIGURE 1.1 **Four Trajectories for the Long-Term Cognitive Evolution of Science**



3 See, for example, also Kantorovich, 1978, 1979 or 1993.