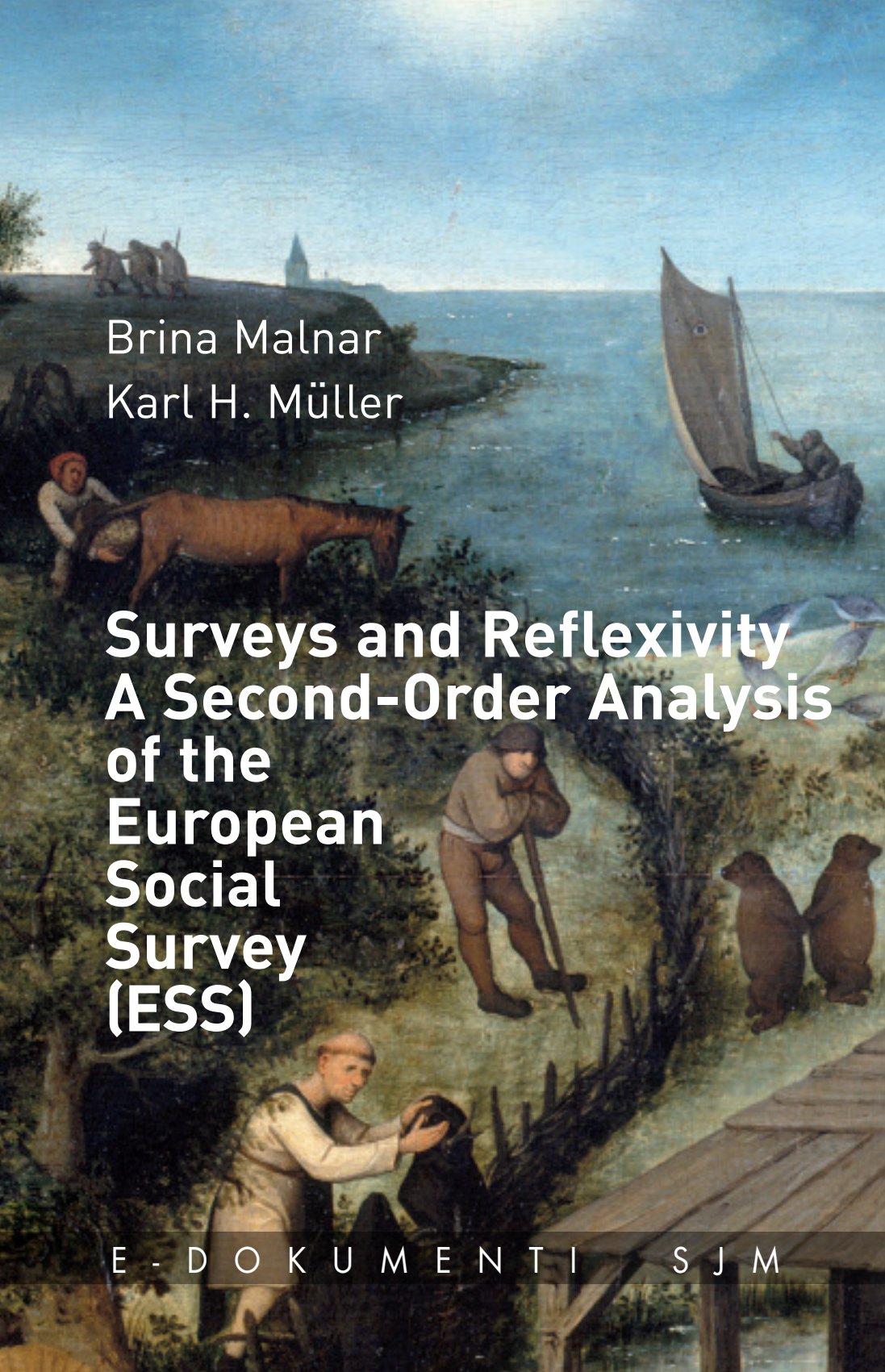

Brina Malnar
Karl H. Müller

Surveys and Reflexivity A Second-Order Analysis of the European Social Survey (ESS)

E-DOKUMENTI SJM

Surveys and Reflexivity
A Second-Order Analysis of the European Social Survey (ESS)

Brina Malnar | Karl H. Müller

With a Foreword by Max Kaase

For Niko Toš,
pioneer of social research in Slovenia,
close friend, mentor, *vir sapiens*,
on the occasion of his 81st birthday

&

for Sir Roger Jowell and Max Kaase,
founding fathers and promoters of the
European Social Survey (ESS)

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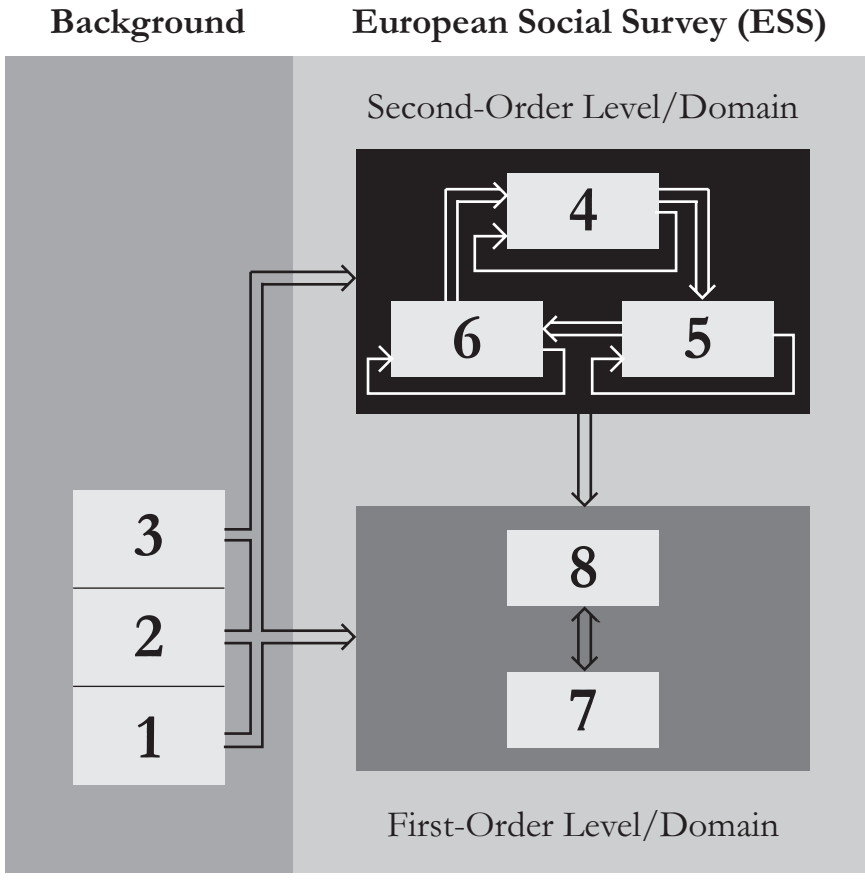

Behind our inventions there is nothing, a void, which
I call a profound ignorance. We do not even build on
sand, but on an emptiness, a lack.

Ranulph Glanville, *The Black B∞x, Volume III*

The present volume is the result of a combination of two unrelated types of research domains which, so far, were not linked in any significant way.

- The first field lies within the well-established world of comparative survey research which over the last two decades saw a massive expansion through the European Social Survey (ESS) which can be characterized as an international best practice example for data production in comparative surveys and as a huge success story in terms of resource mobilization, international participation and scientific productivity of journal articles based on ESS-data.
- The second area is based on recent explorations into second-order science which to a very large extent are the result of big changes and transformations in the overall re-organization of the science system as a whole.

The overall structure of the book which is reproduced in the diagram on the first page of this acknowledgement section shows three major parts, namely an initial background segment, the core section of the book with its emphasis on second-order ESS-analyses and, finally, a third part on the wider implications of the overall results in this volume for the future of the ESS-project and for reflexive research in general.

- Part I as relevant theoretical background presents a short summary of major changes in the evolution of science and science landscapes and on the scope and dimensions of second-order science. Additionally, the first part poses three grand challenges for the European Social Survey (ESS).
- Part II leads into the core of second-order analyses, with an initial section on second-order investigations for surveys, with a central part of empirical results of second-order ESS-analyses and with a final chapter on possible second-order explorations of the ESS.
- Finally, Part III addresses the issue of meeting the grand challenges and of accommodating the results of the second-order ESS-analyses so far as well as the open horizons of reflexive research designs in survey research.

Turning to our acknowledgements for the support of this publication we must refer, initially, to a single outstanding person who enabled the present volume in manifold ways. Over the years and decades Niko Toš became a very close friend

with whom we produced a series of common book-projects on social research in Slovenia, on social science methodology or on societal evolution. At the end of the acknowledgements we provide a list of common book-projects which were completed over the last twenty years and which demonstrate the intensity of our co-operation. The present volume is dedicated as our present to Niko Toš on the occasion of his 81th birthday and we hope that we were able to deliver an innovative and scientifically interesting piece of research, which matches the multiple and sustainable achievements of Niko Toš for the rapid development of the social sciences in Slovenia.

In terms of the production of this book, thanks go, as usual, to Gertrud Hafner who was responsible for the layout of the book, to the late Michael Eigner as graphical designer and to Werner Korn who still is able to cope with our book productions in meanwhile two book series, namely "Complexity, Design, Society" and "Observing Social Sciences", within *edition echoraum*, his publishing company.

Special thanks go to a small group of persons who contributed to this volume in tangible ways and mainly through discussions, dialogues, long talks and numerous glasses of light white wines.

- The authors would like to thank the ESS director Rory Fitzgerald and the entire Core Scientific Team for having recognised the relevance of bibliographic monitoring for the ESS outreach strategy, its quality control and decision making processes. This way, ESS has become a pioneering example for the use of second-order analysis in the field of comparative survey research and its scientific management.
- Ranulph Glanville (1946–2014) makes his impact on this volume through a series of short quotations from Volume III of his collection of articles under the unifying name of "*The Black B∞x*" (Glanville, 2009, 2012, 2014) Ranulph Glanville represented the avantgarde in thinking and living in circular formations which became also the basis for the building of second-order science.
- Stuart A. Umpleby and Michael Lissack from the American Society for Cybernetics (ASC) as well as Alexander Riegler as editor of the journal *Constructivist Foundations* became very close allies in promoting the agenda of second-order science through workshops, lectures, conferences and specisl journal issues (Riegler/Müller, 2014). They are our most important partners with respect to the diffusion support for second-order science.
- Anton Amann made significant contributions on the relevance of second-order investigations in the social sciences and offered a series of stimulating discussions on standards of living and quality of life as second-order concepts.

– Richard Költringer was a very important and close companion in his dual function as head of the national survey organization for the ESS in Austria and as a long-time friend and discussion partner on survey data, survey methodology, survey research and epistemology.
– Finally, Rogers J. and E.J. Hollingsworth were significant critical observers for us who played the role of an *advocatus diaboli* and who helped to sharpen the arguments in favor of second-order science and on the potential of second-order analyses.

Last, and most important, the two authors must acknowledge themselves respectively for bringing together their expertise in two unrelated domains and to recombine them to a hopefully coherent and consistent publication. This volume is to our knowledge the first book on second-order survey analyses and we needed, thus, to navigate through uncharted waters with all the emotions and feelings of pioneers in new science landscapes.
Of course, the reader and not the authors must and will decide whether this recombination of comparative survey research and second-order analyses produces relevant new insights into the scope and the potential of the European Social Survey or new and cognitively fruitful perspectives for similar investigations with other national or international survey data sets.
As usual, we as authors bear full responsibility for all shortcomings and errors in the present volume, but also for all the comparative advantages, based on a second-order approach, and for the novelty which this second-order perspective is able to generate.

Ljubljana and Vienna, August 2015

Brina Malnar
Karl H. Müller

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Foreword

"Surveys and Reflexivity": Some Thoughts

Max Kaase

In writing about the ESS, inevitably my first thought goes to Sir Roger Jowell who surprisingly and much too early passed away on December 25, 2011. With Roger, I personally have lost a colleague and close friend, but institutionally the ESS has lost its *spiritus rector* in the development from the 1999 "Blueprint for the ESS" to the whole process of implementation. In the contemporary rational world the saying goes that there is nobody who cannot be replaced if necessary, but there are reasons to doubt that this is always true. One thing is sure: without Roger Jowell, the ESS would not be where it is today.

Work on developing the ESS started in 1995 with a decision by the Standing Committee for the Social Sciences (SCSS) of the European Science Foundation (ESF) to accept my proposal to set up an "Expert Group" studying the feasibility of the ESS idea. This idea had originated from my experience with the comparative "Beliefs in Government" project which I had directed jointly with Kenneth Newton between 1988 and 1995. Funding of the Expert Group was to come through contributions by interested national research councils, following the then extant à la carte mode of funding research through ESF.

The group produced a written report in 1996 and proposed to the SCSS to vigorously pursue the ESS concept by developing a detailed document (blueprint) for the steps envisaged to bring the ESS to life. The expert group report was accepted by the members of the SCSS who followed its recommendations and particularly emphasized the need for such a blueprint to be first discussed and accepted at a later point in time by the SCSS to be finally presented for approval to the ESF General Assembly. This was effected in 2000 and so set the stage for what over the years has become the ESS. Looking back from the contemporary situation of the ESS after having been transformed, in November 2013, into a European Research Infrastructure Consortium (ERIC) under the auspices of the European Commission, it is hard to believe what all involved in this complicated process have been jointly able to achieve.

But time has gone by, and I now strongly believe that the ESS needs expansion and innovations in order to remain what Roger and I wanted it to be: a top-notch multidimensional infrastructure for the social sciences. In this context I find the book edited by Brina Malnar and Karl H. Müller of particular relevance. Karl H. Müller was involved in the ESS from its early stages, first as a member of the Steering Committee and, later, as the national ESS-coordinator for Austria, as

a member in the ESS Scientific Advisory Board. In 2012, at the ESS conference in Cyprus, he gave a fascinating lecture on three grand challenges for the ESS which is now published in this volume. Brina Malnar, from the University of Ljubljana over the last couple of years has invested a lot of effort in analyzing the annual record of publications using ESS data.. As one would expect, from 2003 on when the measurement started with 18 entries, this number has now substantially increased and for the year 2014 alone 381 publications were found which worked with data sets from the ESS. This achievement is even more remarkable considering that the share of peer-reviewed journal articles has increased from 24,1 % in 2004 to 56,1% in 2012. Publications thus are a benchmark which the ESS ERIC has to observe closely in the future and this, incidentally, provides already a strong argument in favor of continuing to collect the information of which and how many publications are based on ESS data. But the book "Surveys and Reflexivity" adds three important points which go well beyond collecting information on ESS-publications.

- First, survey research and the scientific environment in which it flourishes are in permanent flux and have undergone significant transformations in recent years. These scientific changes and transitions are summarized in Part I of the book which not only deals with three grand challenges for the ESS, but in a more general vein also addresses great transformations for the science system as a whole.
- Second, the results of investigating ESS publications have been placed in a new and wider context of second-order survey research which is presented in a systematic way in Part II of this book. Thus, the collection of ESS-publications, though significant and important, is not the only research task in this domain. Second-order survey studies as a new field offer a multiplicity of innovative perspectives which will be a challenging task in its own right to be pursued in the future.
- Third, this book provides also a blueprint or a strategy to broaden the ESS ERIC substantive and methodological research approach. Part III of the book describes such additional ESS-components which reside on different science levels and which are focused on specific research objectives and tasks. In the final chapter, the overview of reflexive research designs which offer additional options for survey research as well very fittingly concludes the book.

"Surveys and Reflexivity" presents many suggestions which should be discussed not only within the ESS-community, but also within and among European social science research infrastructures and presents even challenges for survey research in general. Obviously, definite answers on the feasibility and on the

potential financial support necessary for installing all the activities which are proposed by Brina Malnar and Karl H. Müller will not easily be come by. But this type of input and new perspectives for advancing the ESS ERIC are needed in order to keep the ESS-ERIC in its leading role as a provider of research infrastructure support as well as of high quality research for the European social science community and beyond.

Abstracts

Part I: Big Changes and Grand Challenges

The Contemporary Great Transformation of the Science System

The first chapter presents several themes which are highly relevant as background knowledge for the subsequent chapters. First, this chapter presents a transition from Science I, the traditional science regime from the 16th century onward to the turn of the 20th century, to Science II, the emerging new epistemic regime since 1900/1950. Strong arguments are provided why the change from Science I to Science II should be considered as a most powerful and comprehensive science drift which qualifies as a complexity revolution of the overall science system.. Finally, the first chapter presents some results from an online survey which was sent out to experts in the field of science studies worldwide. The assumptions of Science II as a complexity revolution could be supported empirically through this online-survey.

A Scientific Revolution in Reflexivity

The transition from Science I to Science II has been described, so far, as a complexity revolution. However, this transition can also be classified as a reflexivity revolution in multiple dimensions and practically across all scientific disciplines. Reflexivity is characterized by a circular configuration between two components x, y like in x causes y and y causes x or between a single building block like in $x \leftrightarrow x$. The current reflexivity revolution manifests itself, above all, in a new form of science, called second-order science, which fulfils vital functions for the overall science system in terms of quality control, of creating robust forms of knowledge and of providing challenging new research problems and large opportunities for innovations.

Three Grand Challenges for the European Social Survey (ESS)

The third chapter neither operates with data from the European Social Survey nor is it focused on the methodology of comparative social research. Rather, this chapter analyzes the ESS as a system of societal self-observation and its future prospects and challenges. More specifically, this chapter is divided into three major parts.

The introductory part summarizes the major achievements reached through the ESS-data production over the last years. A short second part deals with internal challenges to the ESS which result from a rather weak connection between societal changes and the monitoring capacities of the ESS.
The major part of the article turns to three external grand challenges of the ESS. The first grand challenge lies in new sources and in new technologies of societal self-observations by process-generated data. The second grand challenge comes from the cognitive neuro-sciences and their new perspectives and their experimental designs for the study of cognitive processes like remembering, answering questions, understanding, etc. The third grand challenge, the most challenging of all three, enters on scene once the internal and the two grand external challenges re-enforce each other and are integrated into a vicious circle.

Part II: An ESS-Analysis of ESS-Analyses

An Outline of Second-Order Survey-Analyses

The fourth chapter leads into the new and open domain of second-order survey analyses. The chapter builds two main roads for a combination of surveys and reflexivity. The first trajectory uses inputs from surveys like the questionnaire, methods or methodologies and the like and organizes a second-order study on these inputs. The second path which will be chosen also for an in-depth empirical analysis is focused on the outputs of surveys like data patterns, responses or publications. For each of these two main roads to second-order survey investigations a variety of different types of analyses can be specified which are mostly new and open for further studies.

A Second-Order ESS-Study of ESS-Studies: Empirical Results

The fifth chapter becomes the central part of this book because it summarizes the empirical results of a second-order ESS-analysis of ESS-analyses. This chapter provides a detailed description of the second-order methodology, used for this chapter as well as of the data and information base which was constructed for approximately 3000 articles with ESS-data. The two main second-order profiles are focused on European social scientists and their theoretical and thematic preferences on the one hand and on the utilization of the ESS-data set on the other hand. The chapter also contains comparative second-order analyses of the ESS with other large-scale surveys like the European Value Survey or the World Value Survey.

A Deep Search for Second-Order Survey-Analyses

The final chapter in Part II presents an overview of expanding second-order ESS-analyses from its current data and information base. The main focus lies in an expansion with other European surveys and the new possibilities for in-depth second-order comparative investigations. The chapter concludes with a future outlook in the possibilities and options of second-order survey analyses of second-order survey analyses which require a large number of available second-order survey studies.

Part III: Meeting the Grand Challenges

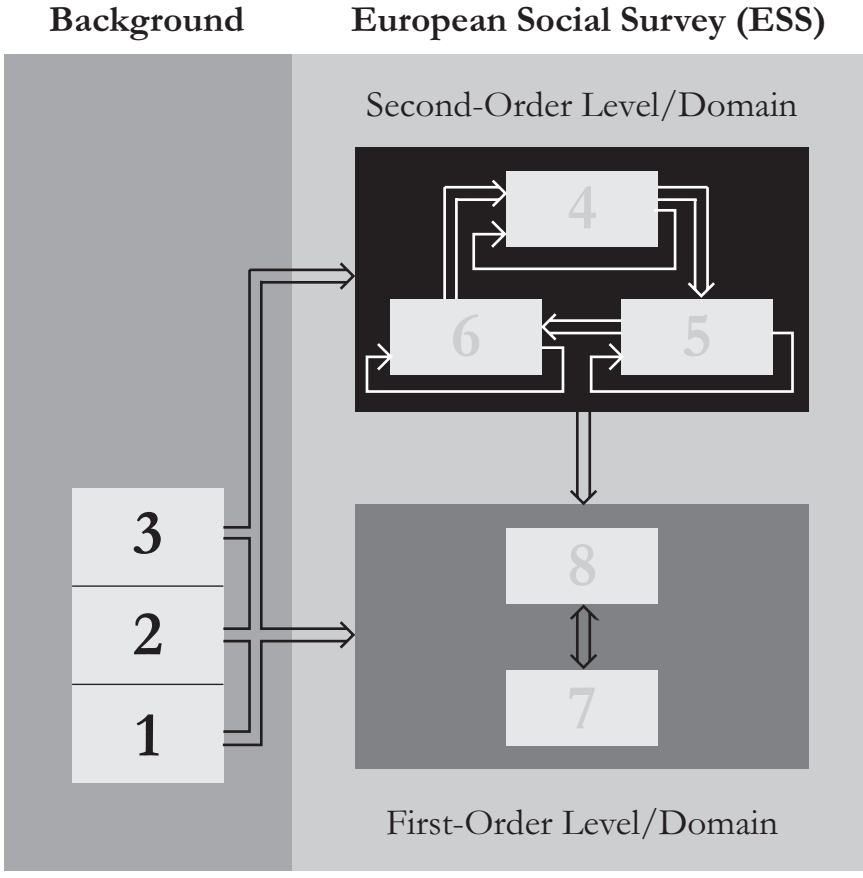
Widening ESS-ERIC across Three Levels

Within the context of a differentiation into three science levels, namely into a zero-order, first-order and a second-order level with three corresponding types of science, Chapter 7 presents an agenda for empowering the organization of the ESS along all three levels. At the zero-order level new clusters of data should be generated which produce relevant new contexts for the interpretation of ESS-data. The first-order level should be used for an ESS-research agenda on embedded cognition. And the second-order level should experience a massive expansion of second-order investigation and the construction of a second-order monitoring system. This empowerment across three levels is intended to be able to meet the three grand challenges for the ESS, outlined in the third chapter.

The Multiple Faces of Reflexive Survey Designs

The final chapter widens the perspectives of reflexive survey research. In sum, reflexive survey research can be grouped into five clusters with circular relations between two elements $x \leftrightarrow x$, namely circular relations between survey researchers, between scientific building blocks like survey inputs or outputs, between systemic levels, between rules and rule systems of surveys or as circular relations or $x \leftrightarrow y$ between these four components.
By far the most important cluster is the second cluster of second-order survey analyses which becomes reflexive through a re-entry operation RE into a survey element x and which establishes its circular formation as x(x). Many of the research problems in these five clusters in reflexive survey research are still unexplored and pose grand challenges for the future.

Part I
Fundamental Changes and Grand Challenges



> It seems that it is hard for us to let go our old views. Pioneers and revolutionaries in many fields can only point the way. They indicate, they strain in the direction they are pointing, but in the end they are too tied to the place that generated the need for the pioneering changes to be able to move themselves. After they have pointed the way, others must make the running.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

Part I of the present volume deals intensively with two typical background phenomena for survey research, namely, on the one hand, with big changes, transformations and drifts in the overall science system and, on the other hand, with grand challenges for the European Social Survey as European research infrastructure for the social sciences. Both background issues become relevant for the future development of the ESS-program and for its further expansion.

However, identifying major drifts or phase transitions in the science system is confronted with a major challenge because a seemingly insurmountable barrier was created by Karl R. Popper which can be qualified as Popper's barrier, on the impossibility of forecasting the future of science.

As an unusual starting point for introducing Popper's barrier, a reference can be made to Donald Rumsfeld, former Secretary of Defense in the Bush-administration, who made an unexpected distinction on three different domains of knowledge and ignorance. In a speech from February 12, 2002 Rumsfeld proposed the following demarcations.

> … 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 have at least one remarkable instance which, not surprisingly, has to do with knowledge itself and, more specifically, with future scientific knowledge.

For Popper, forecasts were reserved for systems and configurations which were characterized by attributes like being closed, stationary or ergodic (Popper, 1965: 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 belong to the unknown unknowns as well.

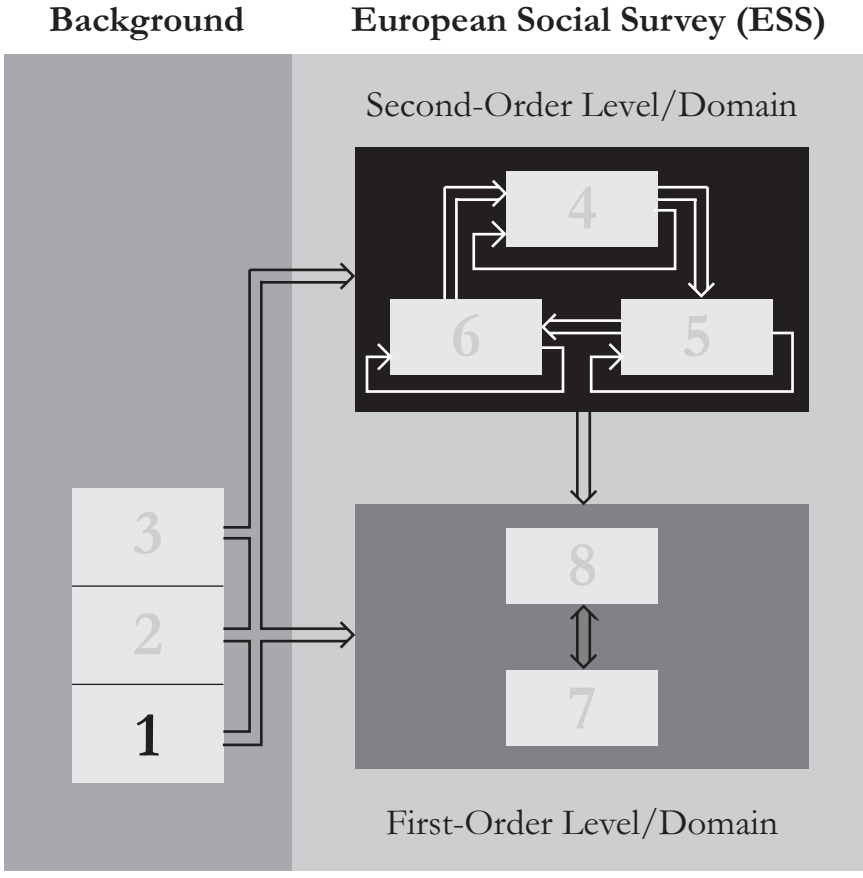
Thus, Popper's barrier looks well-founded and, especially important, insurmountable. Future scientific knowledge, due to its dual qualities of belonging to the class of known unknowns and unknown unknowns lie beyond the domain of possible scientific investigations. Being confronted with Popper's barrier the most natural alternative would be to restrain from the analysis of future knowledge and restrict oneself to the historical aspects of knowledge and science evolution alone. But Popper's barrier does not prevent, however, two groups of analysis of future scientific knowledge.

- The first cluster of studies of science futures 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 analyses on the future evolution of science 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 scientific knowledge, they remove effectively an attitude of *ignoramus, ignorabimus* (du Bois-Reymond, 1912) which Emil du Bois-Reymond cultivated in his talk on the limits to the knowledge of nature, held 1872 in Leipzig. Thus, despite the (un)known unknowns in science a lot more can be said about them aside from being simply (un)known unknowns.

1 The Contemporary Great Transformation of the Science System



Every piece of learning we do, and every bit of knowing
we learn, is ours. We are free to understand, and
we understand as only we understand. We are also
responsible. There is no one to blame.

Ranulph Glanville, *The Black B∞x, Volume III*

This volume on surveys and reflexivity is embedded within several broad contemporary science drifts and great transformations which will become the main topic of this chapter. At the outset however, the special configuration of the period from 1940 to 1960 will be specified as the initial condition for these drifts and transformations and as a phase of a significant reconfiguration of the overall science system.

1.1 The Open Science Horizons 1940–1960

In the long run, the structure of scientific evolution can be characterized, following Nicholas Rescher (1982, 1999), by a cyclical pattern of close and wide distances with respect to a perceived final horizon of knowledge production.[1] Such a cyclical pattern of cognitive completeness seems to be highly interesting and illuminating for the decades from 1940 to 1960. Figures 1.1 exhibits, according to Nicholas Rescher, the basic swing in the 20th century which started as a revolution in physics and was accompanied by a considerable opening in medical science and psychology by the new science of psychoanalysis as well as by a fundamental insight into the necessary incompleteness of logical systems and mathematics.

The most important point in Figure 1.1 lies in the cognitive status of the period between 1940 and 1960. According to Nicholas Rescher, this particular phase shared a unique feature in the history of science, namely a very high value for the level of perceived ignorance and, thus, a minimal value for the ratio Q of the level of cognitive completeness which results from the ratio of the level of perceived knowledge F and the level of perceived ignorance G. Thus,

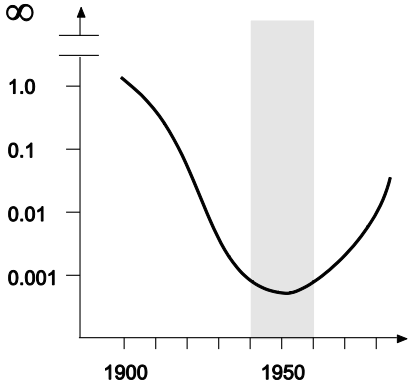
$$\Theta = \Phi/\Gamma \tag{1.1}$$

After an already long-lasting period of scientific evolution, open cognitive horizons or frontiers can only emerge through a complete recombination in

1 On this point, see also Maddox, 1998.

the cognitive foundations and in the scientific as well as in the technological knowledge base by discrediting old paradigms, traditional cognitive networks and the established technological infrastructure.

FIGURE 1.1 **Open Cognitive Horizons 1900–2000**



Θ Level of Cognitive Completeness as the Ratio Φ/Γ

Instead, one can observe the proliferation and diffusion of new paradigms with radically different cognitive network structures and a new technological infrastructure as well. It should be added as an empirical support that during the two decades between 1940 and 1960 the science system was placed on a new inter- and transdisciplinary platform, due to the emergence of –

- a general theory of systems
- a general theory of information
- the transdisciplinary science of cybernetics
- the emergence of the cognitive sciences

as well as on a new science landscape. Since the beginning of the 20th century, the normative sciences – logic, mathematics, ethics, etc. – have been expanded, augmented and, above all, opened by various new frameworks. In mathematics, for instance, one can observe the transition from David Hilbert's vision of a fully self-contained mathematical axiomatics at the turn of the century to a state of necessary incompleteness and to an algorithmic re-definition of effective calculability by Church, Kleene, Gödel, Herbrand, Post, and Turing. This brought about a radical paradigm shift, in which the basic architecture, the potentials, but also the necessary boundaries, *i.e.*, the blind spots and unavoidable limitations of arithmetical or deductive operations could be clearly identified and established. In the field of logic, for example, one finds a multiplication of

logical systems between 1910, when Bertrand Russell and Alfred N. Whitehead's "Principia Mathematica" was first published, and the 1930s, 1940s, and 1950s, where one can find systems of many-valued logic, inductive logic,[2] modal logic, deontic logic, and many others.

The empirical sciences also experienced a gradual shift of gravity and focus within the period of 1940 to 1960, thus successively ending the Golden Age of physics of the preceding four centuries. After a few years of hectically searching for a unifying pattern, the basic structure of the genetic code was decoded in 1953, finally making it possible to translate it into the language of biology and subsequently into bio-technology.[3] Just like the planetary structure of the atom proposed by Ernest Rutherford at the beginning of the 20th century, Francis Crick and James Watson's discovery of the DNA structure was an important starting point, which would turn out to be the beginning of a gradual rise of biology or, more generally, the life sciences as a new leading discipline. Physics, as a key field, maintained its status as an area of large-scale research and a complex of mainly big science. From a technological point of view and in terms of its basic models and mechanisms, however, it slowly started to lose ground to a very extensively structured biological or life science field, which comprised, among other components, large parts of brain research, physiology, and medicine.

Another characteristic feature of the scientific landscapes of that time lies in the new connections between formal and natural sciences, which had likewise been established between 1940 and 1960. In those years, the key empirical disciplines achieved a substantial number of formal syntheses, which eventually led to a re-definition of their basic theoretical foundations. In 1943, for instance, Warren McCulloch and Walter Pitts developed a model of the neuron and the neuronal connections, which was strongly based on Carnap's system of logic.[4] At the end of the 1930s, Claude E. Shannon transformed logic, which was originally expressed by Boolean algebra, into a circuit language (Shannon, 1940). Moreover, the Turing machine constructed in 1936 can clearly be seen as the godfather of the new computer generation that started to evolve about ten years later. The structures and forms of the Bourbaki group became a central point of reference in the formulation of developmental psychology.[5] Finally, John von Neumann

2 See, for example, the rather voluminous edition of Carnap, 1950.

3 For James D. Watson's own account of the story, which is also quite thrilling from a historical point of view, see Watson, 1970.

4 It strikes as rather interesting that this pioneer work by McCulloch and Pitts only contains three references to other publications, all of them dealing with logic, namely to Rudolf Carnap, to Hilbert/Ackermann, and to Russell/Whitehead (cf. McCulloch/Pitts, 1988: 39, orig. 1943)

5 For an overview see Piaget, 1973 and 1983. Piaget defines the common structuralist reference point of the Bourbaki group in terms of isomorphisms to identify the most general structures.

and Oskar Morgenstern used logic and strategic interactions to formalise game theory (von Neumann/Morgenstern, 1944). Logics and linguistics also led Noam Chomsky to develop new syntheses in the field of generative grammars[6] – and this is by far not the end of the list. Compared to thirty, or even sixty or a hundred years ago, the world of science had also considerably changed with regard to its disciplinary foundations and its normative – empirical boundaries. To conclude, these twenty years are characterized by a maximum degree of open frontiers.

1.2 The Great Transformation 1940–2015: The Shift from Science I to Science II

The most dramatic change comes, however, from the next differentiation. From the 1940s and 1950s onwards the science system as a whole has entered a phase of a radical or great transformation from an old regime, called Science I, to a new regime under the name of Science II.[7] Science I was the dominant form of science from the beginning of modern science in the 16th century up to the period of 1900 to 1950. Science II, consequently, emerged over the last decades and will turn out to be the new hegemonic regime, although Science II will not replace Science I completely. In a variety of domains and applications Science I-models and methods will still be used. Table 1.1 lists several key dimensions of this great transformation from Science I to Science II.

In the context of Science II the theoretical, ontological and methodological background knowledge for scientific disciplines undergoes significant changes, too. Clearly, these new building blocks for Science II will exert a considerable cognitive pressure on the theory and research organization from the era of Science I and should lead to new theory structures and research designs for the social sciences or the humanities as well. Table 1.2 summarizes these changes in background knowledge that will become of particular relevance for scientific investigations across disciplines in the future.

6 In this respect, see Chomsky, 1957, 1964, 1965.

7 On this distinction between Science I and Science II, see especially Hollingsworth/Müller, 2008 and on a wider discussion of this separation see Boyer, 2008, Mayntz, 2008, Nowotny, 2008 or Sornette, 2008.

TABLE 1.1 **Changes in the Theoretical, Ontological and Methodological Dimensions of Science I and Science II**

Dimensions	Science I	Science II
Leading Fields of Science	Classical Physics	Evolutionary Biology and the Sciences of Complexity (Cognitive Neuro-Sciences in the Decades ahead)
Theoretical Goals	General, Universal Laws	Pattern Formation and Pattern Recognition
Theoretical Perspectives	Axiomatic, Reductionistic	Nested and Embedded Processes
Leading Metaphors	Clocks	Clouds
Core Philosophers	Rene Descartes (Cogito)	Ludwig Wittgenstein (Cogitamus)
Ontology	Dualism (*res cogitans/ res extensa*)	Monism, Self-Organization Capacities
Generative Mechanisms	Trivial Mechanisms	Non-Trivial Mechanisms
Forecasting Capabilities	High	Low
Complexity	Low	High
Perspectives on Change	Linear, Equilibrium	Non-Linear, far from Equilibrium
Distributions	Emphasis on Mild Distributions	Emphasis on Wild Distributions
Potential for Inter-Disciplinary Research	Low	High
Cognitive Distances between the Social Sciences and the Leading Field of Science	High	Medium/Small

As can be seen from Table 1.2, the main differences between the old and the new background knowledge cover the entire domain of analyses, namely the subjects of investigation, the objects of analysis and, finally, the interaction modes between subject and object of analysis. All three domains differ strongly between Science I and Science II. In short, Science II is organized in a way where the subjects of analysis become an indispensable and inclusive part of an investigation. The objects of analysis turn out to be far more complex than the trivial objects within Science I. Finally, the interactions between subjects and objects are organized in a closed triadic as well as recursive manner.

TABLE 1.2 **Changes in the Background Knowledge of Science I and Science II**

Domains of Back-ground Knowledge	Science I [Theoretical Physics as Leading Discipline (LD)]	Science II [Life Sciences as LD]
Objects of Investigation	Objects Simple Action Schemes	Living Systems Embedded Cognition
	Cognitive Isolationism Single Account Sufficient	Cognitive Holism Requisite Variety Necessary
Subjects of Investigation	Sequential, Linear	Observer-Inclusion
Interactions (between Subjects and Objects)	Equilibrium Dyadic, Asymmetric Forms	Recursive, Non-Linear Triadic, Symmetric Configurations

The methodological and theoretical elements of the new background knowledge emerge from the leading fields of Science II, namely form the cognitive life sciences, broadly conceived whereas the new epistemological components come from a diverse group of frameworks which are particularly focused on the specificities of living systems like the approaches by Robert Rosen (Rosen, 1991) and Walter M. Elsasser (Elsasser, 1998), radical constructivism or, as specially relevant subsets of radical constructivism,[8] second-order cybernetics[9] or the autopoietic approach.[10] These and similar perspectives are especially relevant for shaping the core epistemologies of Science II-research.[11] From both sides, the theoretical-methodological and the epistemological one, the conventional wisdom of research in the social science and humanities-domain is not only questioned in its core aspects and in its central designs,[12] but social science and humanities research is also very much encouraged to change its traditional perspectives in order to become compatible with the new Science II landscapes.

8 On radical constructivism in general, see, as summaries Watzlawick, 1981, Watzlawick/Krieg, 1991, Schmidt, 1987 or Glasersfeld, 1997.

9 For second-order cybernetics, see especially von Foerster, 2003.

10 On the autopoietic approach, see, for example, Maturana, 1985 or Maturana/Varela, 1987.

11 Second-order cybernetics has been developed explicitly by Heinz von Foerster as a science of living systems for living systems. On Heinz von Foerster and his work at the Biological Computer Laboratory, see especially Foerster, 2003, Müller/Müller, 2007 and Müller, 2007.

12 For interesting overviews and approaches, see Palombo, 1999 or Ryckman, 2000,

1.3 Science II and Shifts in Leading Fields

Table 1.3 presents a summary of two and possibly three stages of hegemonic regimes which, despite being part and parcel of the scientific method, are also characterized by significantly different epistemic practices.[13]

TABLE 1.3 **Leading Science Fields in the Evolution of Science, 1650–2150**

Leading Science Field	Characteristics
The Age of Physics (1687–1900/1950)	Rise of Newtonian Physics; Application across a Large Number of Fields; Maximum Level through the system of Maxwell-equations (Unification to an electromagnetic field theory); Tipping Point: Einstein's Special and General Theory of Relativity as well as the Quantum Physics drift towards a GUT (Grand Unified Theory) Electro-Mechanic Technologies
The Age of the Life Sciences (app. 1859–2050)	Pre-phase 1859 – 1950 (Darwin's theory of evolution) Breakthrough into a self-sustained take-off *via* the decoding of the genetic code (Watson and Crick 1951) Evolutionary theories and models for evolutionary dynamics move along a "grammar of becoming" Recombinant Bio-technologies
The Age of the Cognitive Sciences (app. 1948–2150)	Pre-phase 1948–2050 (Pre-phase for the Cognitive Sciences) Breakthrough to a new leading discipline around 2050 Cognitive technologies

According to Table 1.3 these three hegemonic regimes can be classified as

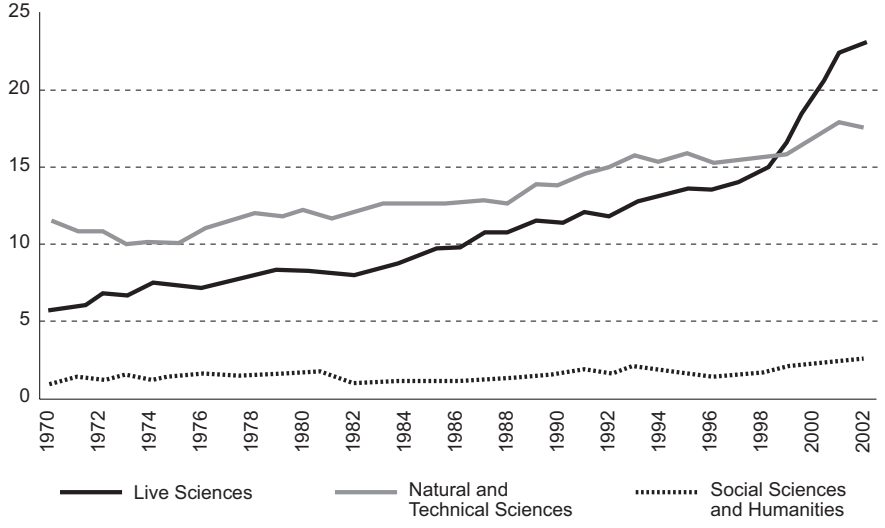
- the age of theoretical physics (1687–1900/1950)
- the age of life sciences (1859 – app. 2030/2050)
- the age of cognitive neural sciences (from 2030/2050 onwards)

More specifically, the succession of theoretical physics to the life sciences implies also a shift in the cognitive routines from, following Karin Knorr-Cetina (1999), theoretically closed forms to open, tinkering, trial and error procedures.
The shifts in basic research in the current scientific hegemon's region, namely in the United States, become obvious from Figure 1.2. Around 1998 an important exchange has occurred. In this year the expenditures on basic research in life

13 For a highly relevant account in this respect, see especially Karin Knorr-Cetina, 1999.

sciences, were surpassing for the first time those for the natural and engineering sciences. In 1970 the expenditures for the natural sciences and engineering had been around the double volume of those for the life sciences, but from 1970 to 1998 one can observe a convergence in spending. Since 1998 the costs of basic research in the life sciences have been rising strongly, whereas the expenditure on natural sciences and engineering increased only lightly.

FIGURE 1.2 **The Shift in the Financing of U.S. Basic Research from 1970 to 2002 to the Life Sciences (in Billion U.S. Dollars at Prices of 2000)**



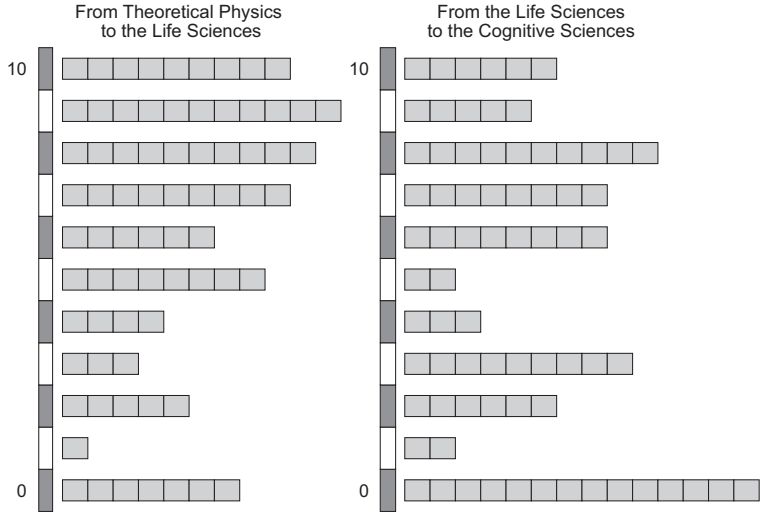
Furthermore, an online survey was created by us which was not designed as an open access-survey, but was based on invitations only. Approximately 150 experts on the long-term evolution of science were contacted worldwide and nearly 50% (N = 73) answered the online survey.[14]

Figure 1.3 shows the responses with respect to changes in leading fields. The mean value of the scale, *viz*. 5, indicates an indifferent position while values larger than 5 show a mild to a strong agreement and values less than 5 indicate small to very strong rejections.

14 For more details on the results of this online survey, see Müller/Toš, 2012: 21–61.

From the left side of Figure 1.3 one can see only 27% in the negative group and approximately 61% in the favorable group. It is impressive to see that the groups with strong approval rates with values 8 to 10 – or with strong rejection rates with values 0 to 2 are very asymmetrically distributed: 41.1% of all respondents agree strongly with the current transition in the leading scientific fields to the life sciences, while only 17.8% of the respondents consider such a shift as highly implausible. In this sense, the results of the questionnaire provide, a rather strong indication that currently an important phase transition from Science I to Science II is well under way which manifests itself, *inter alia*, in an exchange in the leading science fields towards the life sciences.

FIGURE 1.3 **The Changes in the Leading Fields form Theoretical Physics to the Life Sciences (Left Figure) and from the Life Sciences to the Cognitive Sciences (Right Figure)**



The right side of Figure 1.3 provides the assessments for a potential science drift in the future from the life sciences to the cognitive sciences. The assumption of a future change in the leading sciences turns out to be rather risky because only a slight majority of 50.7% thinks of it as at least weakly plausible. A strong skeptic group of 46.6% is found, which, weakly to decisively, rejects a future shift from the life sciences to the cognitive sciences. It is also interesting that a relatively large group of around 20% considers such a transition in the leading sciences to be virtually impossible. Figure 1.4 exhibits the assessments of the long-term future of major scientific fields.

FIGURE 1.4 **Expansion and Contraction of Major Science Fields 2010–2050 (+5: Very Strong Growth, -5: Very Strong Decline)**

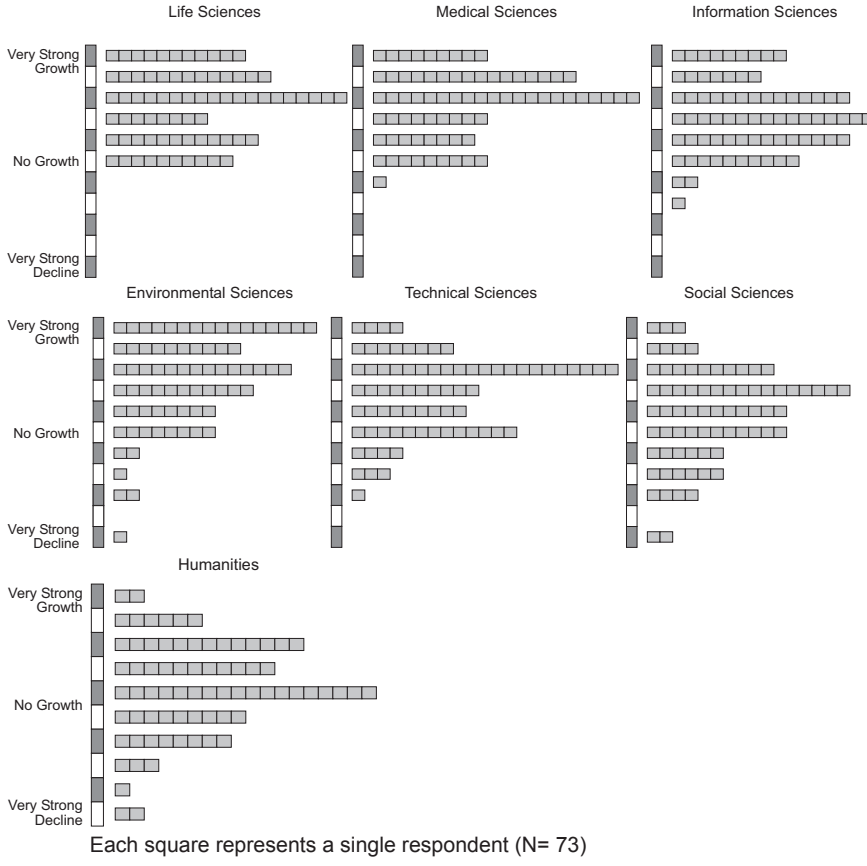


Figure 1.4 makes it very clear that the science drift towards the life sciences is also supported by the assessment on the future development potential of the life sciences. Interestingly, none of the respondents chose even a modest decline as a likely future trajectory. The answers differed only in the growth rates of the future the increase of the life sciences. In addition to the life sciences the medical sciences have, according to the opinions of all respondents, a very strong expansion potential, which is seen as highly similar to that of the life sciences. It is interesting to note that two other large fields associated with the life sciences are classified as strongly expansionary, namely, on the one hand, the information sciences with its strong interface of bioinformatics and, on the other hand, the environmental sciences. Here one may assume a mutually supportive cluster of science fields, which forms the cognitive backbone of the science drift in the coming years and decades.

It is quite telling that the technical sciences are granted a strong potential for expansion, but it is significantly lower than that in the preceding group of science fields. After all, a strong quarter (28.8%) of the respondents assigned values of 0 or lower to the technical sciences. Likewise, only 16.5% see a very strong expansion potential for technological sciences in the future.
The social sciences appear even more restricted in their future expansion because only a weak expansive development was considered to be likely. Almost 40% of the respondents expect a stagnant or even declining future for the social sciences. This finding for the social sciences is only surpassed by the humanities, for which only a stagnant future was specified as a likely option. 56.2% of the respondents chose values of 0 or less in the humanities, hence giving this particular domain, in comparison with other major science fields, the lowest ranking.
To sum up, the respondents provided a ranking of major science fields into four groups. The rank-ordering of scientific fields with respect to their future diffusion was established in the following way:

- Strong Expansion: life sciences, medical sciences, information sciences, environmental sciences
- Medium Expansion: Technical Sciences
- Weak Expansion / Stagnation: Social Sciences
- Stagnation / Decline: Humanities

These results conclude the assessments on the future expansion, stagnation and decline of major disciplinary science clusters.

1.4 Science II as a Complexity Revolution

With respect to the great transformation from Science I to Science II, one must mention Friedrich A. von Hayek who already in 1967 wrote a rather neglected article entitled "The Theory of Complex Phenomena" respectively "Die Theorie komplexer Phänomene" (Hayek, 1967, German edition 1972). In this article, Hayek developed a typology which was based on simple and complex phenomena and processes. Table 1.3 lists the results of these fine distinctions between simple and complex phenomena in several dichotomies which can be related to the primary great transformation from Science I to Science II. The following two equivalences which for obvious reasons cannot be found in Friedrich A. Hayek can be established.

Simple phenomena Ξ Science I
Complex phenomena Ξ Science II

Science II can be equated to complex and Science I to simple phenomena and processes. According to the Table 1.3 the central concepts for complex alias Science II manifest in patterns, in pattern recognition, in pattern forecasts as well as in the pattern production or pattern formation. Accordingly, the analysis of complex phenomena proves to be model based, and is in a striking contrast to the law-based paradigm for simple phenomena and processes.

TABLE 1.4 **Friedrich A. Hayek's Distinctions between Simple (Science I) and Complex Phenomena (Science II)**

Dimensions	Simple Phenomena (Science I)	Complex Phenomena (Science II)
Degree of Complexity	Low	High
Measure of Complexity	Small number of Variables	Large number of Variables
Bond between Variables Specification	Causality	Generative Relations
Schema	Laws	Pattern
Mode of Analysis	Covering Law-Model	Pattern-recognition
Prediction	Law-based	Pattern-based
Leading Science	Classical Physics	Evolutionary Biology and Complexity Sciences

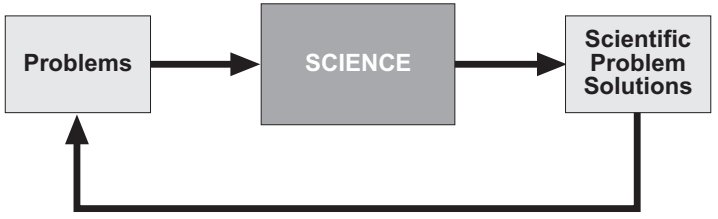
1.5 The Hidden Dimensions of Science II

So far, Science II was characterized as a revolution in complexity which is re-shaping and transforming the architecture of science into its new template of Science II. However, Science II can be characterized, aside from its complexity dimensions, by another principal component which remains largely implicit or hidden.

A first hint on these implicit dimensions can be found in the work of Ulrich Beck (1986, 2000, 2007). In Beck's books on Modernity II and on a new phase in the development of science, one finds a scheme which, according to Beck, should be qualified as reflexive and which, for obvious reasons, will be characterized here as self-infective. Here, science is confronted with its own products and with its own expertise because of new societal problems which are partially based on scientific problem solutions from pervious stages. In the course of their implementation and their diffusion these former scientific problem solutions have become have become a source for contemporary societal problems themselves. Thus, following Beck, science is confronted more and more with unintended consequences of its own expertise in the form of forecasts, scenarios, evaluations, assessments or

consulting and its own scientific-technological problem-solutions in the shape of new or improved technologies or socio-technical systems.
This rather new situation can, thus, be qualified as self-infective and its re-entries occur in the domain of societal problems at time t_k by scientific problem solutions at $t_{<k}$ and their gradual transformation into societal problems. Due to this self-infection the science system is confronted with necessary methodological adaptations and with substantial changes in its traditional designs towards more reflexive forms because science can no longer offer itself as a natural cure if at least parts of the new societal problems are due to an involvement of scientific procedures and outputs in the first place.

FIGURE 1.5 **Past Scientific Problem Solutions as a Source of Contemporary Societal Problems**



Aside from Beck's assumption of a phase transition in science towards a reflexive or self-infective form, we propose another important inversion which leads to a reflexive configuration as well where, generally speaking, inversions can be characterized by an exchange of center and periphery relations.[15] This change can be described as an inversion of novelty and leads to reflexivity in terms of domains of investigation. This inversion assumes a shift in the sources of scientific inventions, innovations and radical breakthroughs[16] from the dominant mode of exploring the world to the reflexive mode of focusing of the already available scientific outputs, resources, publications and the like. Moreover, this inversion of novelty should have significant implications also for science policy and for teaching or curricula developments. Figure 1.6 captures several of the characteristic elements of this novelty inversion with a focus on the social sciences.[17]

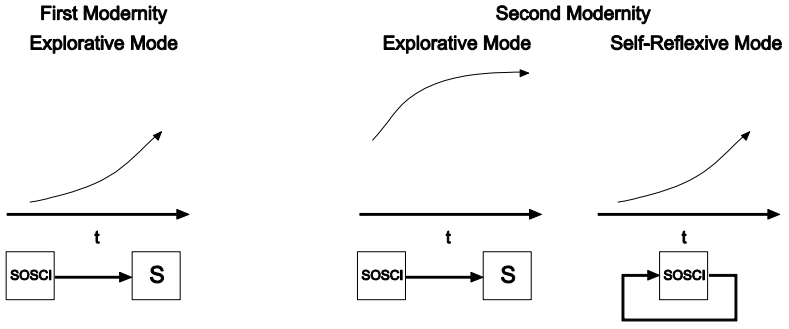
15 Probably the most well-known inversion occurred during the 15th and 16th century in astronomy when the center-periphery relations between earth and sun were exchanged and transformed into a heliocentric configuration.

16 On radical breakthroughs in science, see especially Hollingsworth/Hollingsworth, 2011.

17 It must be emphasized that the focus on the social sciences does not restrict the inversion of novelty to this science segment alone. The inversion of novelty affects also the humanities, large areas of medical research and, albeit to a lesser degree, selected areas from the natural and the technical sciences.

On the left-hand side of Figure 1.6 one can see the expansion of the social sciences in their explorative mode on the social and societal worlds which is represented by the lower half of an S-shaped curve with high increases in novelty or social science innovations.

FIGURE 1.6 **An Inversion of Novelty in the Social Sciences within Contemporary and Future Science Landscapes**



SOSCI: Social Sciences S: Society Vertical axis: Increases of novelty/innovations

The inversion of novelty comes about in the right-hand part of Figure 1.6 which shows that novelty in the social sciences is based to a diminishing extent on the advances of explorative social sciences, on the exploration of new topics and domains or on the construction of new models or theories. Rather, high levels of novelty and innovation in the social sciences occur in reflexive analyses of already completed social science elements like theoretical concepts, models or publications.

This inversion of novelty can be supported with the help of two examples from different domains, again taken from the social sciences.

First, with respect to theoretical concepts in the social sciences like standards of living or quality of life it becomes more and more difficult, due to a rich variety of already available versions, to produce significant new insights through adding another version for these two already very diversified concepts. However, an investigation on the available versions of these two concepts should produce new insights on the scope and on the main domains of these two theoretical terms, on robust relations between different segments or aspects of standards of living and quality of life or on their mutual dynamics. Additionally, these reflexive investigations can be extended to a study on the scope of living conditions and on quality of life combined which will produce, in all probability, new insights into the differences and similarities between these two concepts. (See also Müller, 2013b)

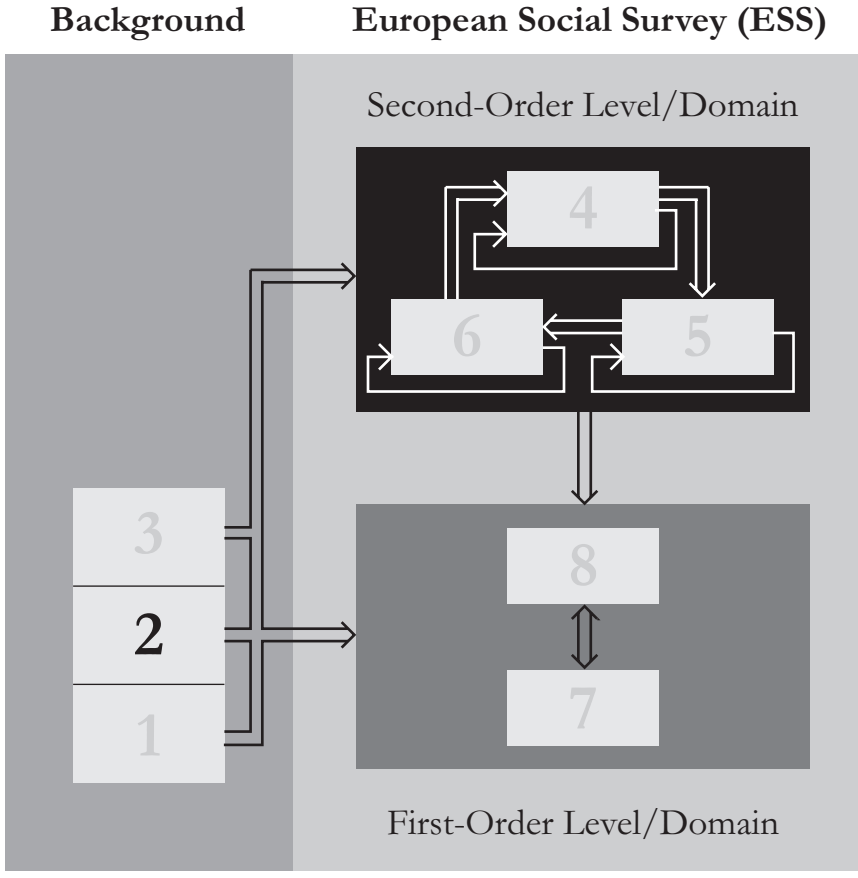
Second, evaluating, for example, a specific ensemble like a university, an academy of science or a national system of innovation for the nth time will produce, in all probability, less innovative content than a reflexive investigation of the n-1 evaluation reports so far and of their relations to the overall societal dynamics, including political changes.[18] Moreover, a rich variety of different reflexive evaluation designs can be implemented, in principle, so that the outputs of these reflexive evaluation studies on already available evaluations are capable of producing significantly higher degrees of novelty than a renewed analysis, given the already available results of previous evaluations.

As time goes by, the accumulation of more and more studies, articles or results should strengthen and intensify the assumption of an inversion of novelty which is not only limited to the social sciences, but to the science system in general. This, in turn, would imply that reflexive research changes, in due course, from a strange and peripheral issue to a sheer necessity for the contemporary or the future global science system as a whole.

The subsequent chapter will explore in more detail whether such a reflexive shift is likely to occur in the years and decades ahead or not.

18 For more details, see Müller, 2013a,b.

2 A Scientific Revolution in Reflexivity



> By interacting with the Black Box, the observer can arrive at a description that accounts for observed changes in behaviour. The observer cannot look inside the Black Box (whiten it) because it is, literally, not there. Attempts to look inside lead to a proliferation of Black Boxes.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

The second chapter continues to be focused on deep contemporary reconfigurations of the global science system which have been classified as a great trans-formation from Science I to Science II. As the previous chapter showed this transformation is largely based on a spectacular increase in complexity (Rescher, 1998) and, thus, qualifies as a complexity revolution. However, one can also detect a hidden dimension within Science II which was not discussed so far and which is concentrated on reflexivity and on circular reflexive relations.

This chapter advances the argument that Science II should be viewed as a recombination of a complexity and a reflexivity revolution. Moreover, due to the fundamental re-organization of the science system in general and an exchange in center-periphery relations across many dimensions of the science system, the present revolution can be classified as an instance of a very rare Copernican revolution which reshapes the science system in most profound ways.

According to the Wikipedia-entry, "reflexivity refers to circular relationships between cause and effect" (Wikipedia, 2015) where x causes y and y causes x or y is a function of x and x a function of y. Due to its circular structure reflexivity was especially strongly promoted in the field of cybernetics where circular processes and feedback mechanisms played a decisive role in the formation and expansion of this field during the 1940s and 1950s.

From the 1970s onwards second-order cyberneticians like Heinz von Foerster (1974, 2003, 2014), Ranulph Glanville (2009, 2012, 2014), Louis H. Kauffman (1987, 2005, 2009, 2009a) Bernard Scott (2011) or Stuart A. Umpleby (1990, 2007) were advocating reflexivity primarily in order to account for the roles and the impact of observers. For example, Heinz von Foerster described first-order cybernetics as the cybernetics of systems observed and second-order cybernetics as the cybernetics of observing systems. Likewise, Humberto R. Maturana and Francisco J. Varela (1987) stressed the principle that everything said is said by an observer. Stuart A. Umpleby advocated a new type of science which is based on the integration of observers (Umpleby, 2014). So it seems that reflexivity is mainly focused on observers and the need to include observers into the methodology of normal science where observers and observer-effects are mostly excluded.

But reflexive designs and analyses go well beyond the inclusion of observers, although observers constitute a significant element in reflexivity research (Widmer/Schippers/West, 2009 or Müller, 2015). These reflexive configurations are not only related to observers, scientific or otherwise, to socio-economic systems or to the social sciences, including economics or science studies, but manifest themselves in very different contexts and across practically all scientific disciplines and sub-disciplines. A majority of reflexive designs and reflexive research is embedded in a new environment and in a new science level which provides the backbone of the ongoing reflexivity revolution.
Since the assertion above looks implausible, even at second sight, it will be advisable to start with major changes outside the scientific revolution in complexity.

2.1 Major Changes in the Science System, 1950–2015

Between the 1950s and today the science system changed in significant ways. From the infant days of survey-research in the 1950s and 2015 several very large-scale shifts occurred within the overall science system which had a profound impact for different forms and levels of scientific practices.
Aside from the long-term growth of the global science system in terms of institutes, personnel or publications as an ongoing secular trend, the information infrastructures for science changed in a fundamental way, too. In the 1950s or 1960s the access to relevant scientific outputs, journals, research-projects and similar domains was very much restricted, being high in a few places with an advanced environment of universities, research institutes and libraries and being notoriously low or non-existent in most parts of the world. Today these restrictions are almost completely abolished and the access to recent scientific outputs, new journal articles, books, research reports and the like is very high even in remote areas of the world, due to the worldwide web and its enormous and still expanding contents. The technological support system for science has led to a considerable information overflow and even to an information anxiety (Wurman, 1989, Wurman *et al*., 2000) and can be expressed by a phrase of Jürgen Habermas as "neue Unübersichtlichkeit" ("new incomprehensibility" or, alternatively, "new intransparency").
The third very large-scale change, aside from the growth of the science system and its vastly expanded information infrastructures, came as a self-organizing attempt by scientists themselves to cope with the growing number of studies, tests, results and the like which used similar or identical designs, approaches or explanatory schemes and which differed only in time, space and in research

groups from one another. This self-organized reaction can be summarized under a single heading, namely as meta-analysis[1] which was first proposed by Gene V. Glass, an educational scientist, in the year 1976. Glass distinguished between primary and secondary data analysis on the one hand and meta-analysis on the other hand where he described a meta-analysis as a collection of all relevant studies on a highly comparable or identical topic and as a systematic analysis of the data pool of these studies. Glass introduced meta-analysis as

> the analysis of analysis and as a statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings. It connotes a rigorous alternative to the casual, narrative discussions of research studies which typify our attempts to make sense of the rapidly expanding research literature. (Glass, 1976: 3)

The table below shows that meta-analyses in psychology, for example, were practically absent during the 1960s and emerged one year after the publication of Gene V. Glass' article, albeit in a minimal version. By the mid-1980s however, meta-analyses turned out to be more frequent and from the 1990s onwards meta-analyses became an established research field within psychology, the social sciences (Wagner/Weiß, 2014), clinical research, economics, business administration, and many other areas. Meanwhile, meta-analyses cover all disciplines and fields across the entire scientific landscape. Meanwhile meta-analyses, due to their large and growing numbers in comparable fields, became objects for meta-meta-analyses and this process can continue, in principle, to even higher levels.

TABLE 2.1 **'Meta-Analysis' as Keyword in Psychological Abstracts**

Year	Number of Counts
1967–1976	0
1977	2
1978	4
1979	6
1980	9
1981	18
1982	32
1983	55
1984	63

Source: Hunter/Schmidt, 1990: 40

1 On the group of early meta-analyses, see, for example, Glass/McGaw/Smith, 1981 Hedges/Olkin, 1985, Hunt, 1999 or Hunter/Schmidt, 1990.

From the 1980s onwards, more and more statistical methods and tools were developed which dealt with biases or spurious effects. The four important characteristics of meta-analyses lie in the following points.

- Meta-analyses are based on a large number of available, directly comparable and mostly quantitative studies.
- Additionally, meta-analyses are performed with partly new statistical methods and tools which were especially designed and developed for pooled data sets.[2]
- Moreover, meta-analyses moved out of their initial domains in psychology, medical research or education science and spread over practically all major science fields and disciplines, including the life sciences or theoretical physics.
- Finally, the prefix "meta" has acquired very different meanings when applied to first-order science domains. In areas like metalogic or metamathematics the prefix "meta" indicates foundational issues both for logic and for mathematics whereas metapsychology or metabiology[3] designate special fields within biology or psychology. It is partly for this reason that the new terms of second-order level and second-order science were chosen instead of the concepts of meta-level and combinations between "meta" and scientific disciplines or fields.

The fourth significant transformation in the overall science system occurred from the 1950s onward in an entirely different domain which was totally unrelated to the rise of meta-analyses. Research infrastructures experienced a significant take off in their institutionalization through the establishment of large-scale operations and organizations. CERN, for example, started its operations with a synchrocyclotron and a proton synchrotron during the 1950s, the nuclear research centre in Jülich in Germany was founded in 1956, etc. But these large-scale facilities were not restricted to disciplines like astronomy or high energy physics. In the 1960s social science data archives appeared on the European science map and observatories moved outside the field of astronomy to the oceans or to the arctic. In 2006, the European Strategy Forum on

2 On the current scope of meta-analysis, see Borenstein/Hedges/Higgins/Rothstein, 2009, Card, 2012, Cooper, H.M., 2009, Cooper/Hedges/Valentine, 2009, Egger/Davey-Smith/Altman, 2001, Higgins/Green, 2008, Hunter/Schmidt, 2014, Kulinskaya/Morgenthaler/Staudte, 2009, Lipsey/Wilson, 2000, Petticrew/Roberts, 2006, Pigott, 2012, Rothstein/Sutton/Borenstein, 2005, Welton/Sutton/ Cooper/Abrams/Ades, 2012 or Whitehead, 2002.

3 Both metabiology and metapsychology remain first-order fields with special exploratory tasks. Metabiology can be considered as a recombination between genetics and algorithmic information theory and metapsychology has a clear focus on a client-centered settings with a strong emphasis on traumatic stress syndroms. On metabiology see, for example, Chaitin, 2009 and on metapsychology, see Gerbode, 2013.

Research Infrastructures (ESFRI) produced its first map of future European research infrastructure facilities (ESFRI, 2006, 2008, 2010) which comprised an ambitious program for new European research infrastructures across all relevant science fields.

2.2 The Current Revolution in Science as a Silent Reflexivity Revolution

The combination of overall scientific growth in outputs, personnel and publications, an enormous expansion of access to scientific research in its inputs and outputs, the rise of meta-analyses and the institutionalized take-off of research infrastructures had significant effects on the basic architecture of science.

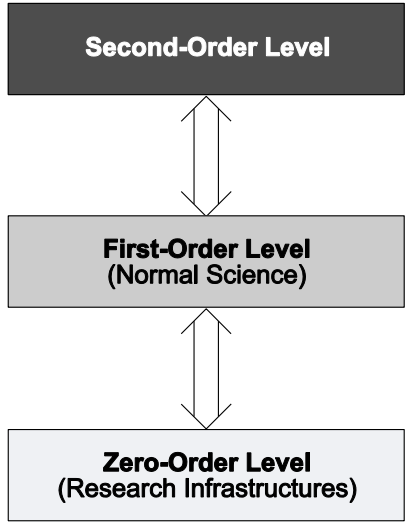
2.2.1 A Differentiation into Three Levels

In terms of levels, the science system underwent a differentiation from a single level ensemble into a three level configuration. According to this new scheme, modern science, after centuries of a single level organization, evolved from the 1950s up to the turn of the millennium to a three-level configuration, with a first-order level of conventional science research, supporting research infrastructures at a zero-order level and an area of reflexive analyses on first-order inputs or outputs at the second-order level. Figure 2.1 summarizes the new three-level configuration for contemporary science landscapes.

The first-order level of research can be characterized in the tradition of Thomas S. Kuhn as a problem-solving operation and is designed for the exploration of the natural and social worlds as well as for the construction of a technological sphere and for the organization of the possible worlds of logic, mathematics and related normative fields. Scientific research at the first-order level or domain can be defined as first-order science and it constitutes the reference area for scientific activities. Investigations on empirical themes across nature and society, on technical or technological systems or on normative issues in logic, mathematics, statistics, ethics or aesthetics fall all under the category of first-order science. Approximately 90% of scientific activities are still undertaken at the first-order level or domain.

Research infrastructures became a special support-level for science over the last decades only. This zero-order level constitutes the expanding kingdom of research infrastructures which perform vital catalytic functions of enabling or of accelerating first-order research. The different catalytic functions of research infrastructures are accomplished in at least three different forms.

FIGURE 2.1 **A New Architecture of Contemporary Science Landscapes: Three Principal Levels of Scientific Operations**



- The first type is based on large-scale observation, measurement and experimental facilities and their production of a rich data variety which contains relevant observations, measurements and experimental data for first-order research.
- The second form builds and utilizes a rich coded information base which is composed of bibliometric and scientometric documentations.
- Finally, the third type operates with the documentation and the archiving of relevant research data or documents and through the institutionalization of permanent data or document archives.

All three forms combined constitute the zero-order level of science landscapes and constitute the area of zero-order science which, moreover, should increase in relevance during the next decades. In terms of disciplines research infrastructures are operative for clusters of scientific disciplines, not for a single discipline or field. For example, the ESFRI-roadmap 2010 distinguished between research infrastructures for six broad disciplinary clusters, namely for the social sciences and humanities, biological and medical sciences, the environmental sciences, materials and analytical facilities, energy sciences, and physical sciences and engineering.

Research at the second-order level goes far beyond meta-analyses and operates generally on various building blocks from first order science like experimental results, tests, studies, evaluations, models, methods, theories and the like with scientific means. These building blocks can be on the input side of first order

research like theories, models, methods, designs or methodologies or on the output side like tests, patterns, causal relations, hypotheses and hypotheses-groups, functions, correlations, model results, scenarios, articles and the like. Research at the second-order level can be organized in a multiplicity of contexts and offers important functions for the overall science system in its current stage (see also Müller/Riegler, 2014, 2014a). In the next section second-order science will be presented in its major characteristics and functions.

2.2.2 Four Examples of Second-Order Science

The overview of second-order science starts with four examples from very different scientific disciplines, namely from sociology, from theoretical physics, from a cluster of disciplines like economics, earth sciences or linguistics, and, finally, from innovation studies. Moreover, the four examples of second-order science are focused on different building blocks, namely on theoretical concepts, on models, on generative mechanisms, and, finally, on explanation sketches. Additionally, these four examples require different tools and methods of analysis in order to accomplish a conceptual second-order study, a second-order model-investigation, an analysis of second-order generative mechanisms and, finally, a second-order explanation sketch. These four examples should make it clear that second-order science transcends the boundaries of meta-analyses and is capable of moving into many *terrae incognitae*.

Second-order conceptual analysis: a quality of life analysis of quality of life-analyses

For the first instance one has to select a theoretical concept from first-order science and collect a number of first-order studies for this theoretic concept. Taking quality of life as concrete example from the social sciences, questionnaires and operationalization for quality of life exceed the two digit domain and have become very numerous.[4] One of the possibilities for a second-order conceptual study lies in the specification of a general quality of life scheme which, due to its new categorizations, is capable of integrating the numerous versions of quality of life into a consistent format. Such a general second-order frame will most probably find robust and evolutionary stable classifications (Müller, 2013a) which are capable of accounting for the large diversity of available variables and dimensions at the first-order level.

4 On the variety of approaches to quality of life, see Amann, 2010, Bowling, 2005, Knecht, 2010, Morris, 2013, Nussbaum, 2011, Nussbaum/Sen, 1993, Phillips, 2006, Rapley, 2008, Sandel, 2009, 2012, Sen, 2012, Skidelsky/Skidelsky, 2012, Stiglitz/Sen/Fitoussi, 2010 or Stiglitz, 2012.

Second-order modeling: a model of models

From the 1970s onwards theoretical physicists at the University of Stuttgart developed highly general non-linear and complex models which were based on meanfield-theories or master-equations which could be applied to a large number of very different domains like laser research, migration processes or long-term economic cycles (Haag, 1989, Haken 1977, 1983 or Weidlich, 2000). Moreover, the master equation approach was found to be able to serve as the foundation of other types of models (Helbing, 1993) and as a basic model for other model groups. Research tasks in the area of models of models are numerous and divers. Recently, Michael Lissack proposed variations with *ceteris paribus* assumptions in models as fruitful second-order modeling designs (Lissack, 2015).

Second-order generative mechanisms: a generative mechanism of generative mechanisms

One of the fascinating aspects of studies in self-organization lies in the wide diffusion of power-law distributions across many different domains like ecological systems, earthquakes, migration processes, scientific citations, etc. Complex networks[5] were recognized as one of the important mechanisms for this type of distribution. But other forms of generative mechanisms like self-organized criticality (Bak, 1996, Jensen, 1998) were identified as well. A second-order investigation (Kajfež-Bogataj/Müller/Svetlik/Toš, 2010) searches for a more general format of a generative mechanism which is capable of generating different generative mechanisms.

Second-order studies with a common topic: An innovation sketch of innovation sketches

The fourth example uses studies on success factors of innovations as its reference point. After the compilation of a large number of innovation studies the next analytical step consists of an ordering of these studies in a comprehensive explanation sketch. The final step of this type of second-order analysis lies in a presentation of a highly general explanation sketch which can be tested and analyzed by first-order innovation research with respect to its robustness and to its further empirical implications. (See, for example, Damanpour, 1991, Rosenbusch/ Brinckmann/Bausch, 2011 or Evanschitzky/Eisend/ Calantone/Yuanyuan, 2012)

5 See Barabasi, 2002, 2010, Newman/Barabasi/Watts, 2006, Sornette, 2003, 2006 or Watts, 1999, 2003.

2.3 Scope of Second-Order Science

Like zero- or first-order science, second-order science is bound to a specific level within the stratified science landscapes Second-order science as the sum total of research activities that are carried out at the second-order level can be described, on the one hand, with respect to its topics and issues and, on the other hand, in an institutional way with respect to its potential disciplines.

The choice of research topics in the second-order domain is based on a single operation, *i.e.*, the operation of re-entries, which was originally suggested by George Spencer Brown (1969). The operation of re-entry occurs whenever elements or building blocks from the first-order level are applied to themselves in the form of

> computation of computation, cybernetics of cybernetics, geometry of geometry, linguistics of linguistics, logic of logic, magic of magic, mathematics of mathematics, pattern of pattern, teaching of teaching, will of will. (Kauffman, 2005: 129)

Similarly, Heinz von Foerster (2003) referred to processes like "understanding understanding," or "learning learning" and to topics like "communication of communication," "goals of goals," "control of control," etc. These self-applications of first-order science building blocks accomplish a dual reference because these elements are not only applied in various space-time settings, but also to themselves. In a more formal way a first-order science building block X with a re-entry operation RE produces X[X]:

$$X \rightarrow RE \rightarrow X[X]$$

Potential topics for second-order science can be generated in practically infinite numbers. Moreover, each second-order topic can be analysed with different research designs and methods and is not restricted to a single path of analysis. Finally, second-order analyses should be particularly useful for complex societal topics and problems which can be characterized as so-called wicked problems. (Alrøe/Noe, 2014)

With respect to second-order disciplines and fields one can construct a very large number of new fields or disciplines for the second-order level because these re-entries can be undertaken within all scientific disciplines, sub-disciplines, discipline groups or hybrid fields of the first-order level. A first-order field F can be transformed, *via* re-entry RE, to a second-order field F [F]

$$F \rightarrow RE \rightarrow F[F]$$

In general, second-order domains or fields are distributed across the same range of scientific disciplines and sub-disciplines which are used for the first-order level. One can put forward a *correspondence principle* stating that each institutionalized field at the first-order level has, in principle, a corresponding counterpart at the second-order level that could be organized as a new research and teaching program in the

future. The correspondence principle can be extended from scientific disciplines hybrid fields and to discipline clusters and groups as well which are used in the classification of first order science. The following five examples are based on this correspondence principle between first- and second-order disciplines.

The first type produces re-entries in well-established scientific disciplines like political science, chemistry, sociology, historiography, management science or engineering and leads to new disciplines like second-order political science, second-order chemistry, second-order sociology, etc. Second-order sociology, for example, is based on the work of first-order sociology and strives for higher levels of robustness in sociological knowledge, deeper foundations for sociological models and mechanisms or more general theories. Second-order management science produces second-order schemes for theoretical concepts in management science and focuses on robust relations and functions on various management issues or problems. Usually, these re-entries into first-order disciplinary domains lead to new second-order disciplines which at the present time are only marginally explored.

The second type focuses on hybrid first-order fields like socio-economics, situated cognition, health care or systems engineering and creates the corresponding hybrid disciplines of second-order socio-economics or second-order situated cognition. Evidently, hybrid fields must be well-established over several decades. Socio-economics, for example, is organized in the "Association for Socio-Economics" which dates back to the year 1941 or the "Society for the Advancement of Socio-Economics" (SASE) which was founded by Amitai Etzioni in the year 1989. Both societies have developed a dense network of socio-economic topics, operate on a global scale, use a large amount of theoretical and modeling approaches and support several journals like the "Review of Social Economy", "The Forum for Social Economics" or the "Socio-Economic Review" and qualify, thus, as a potential second-order field.

The third type starts with large clusters of disciplines like the social sciences, the natural sciences or the humanities and uses re-entries to construct the new disciplinary clusters of second-order social sciences, second-order humanities or second-order natural sciences. Second-order social sciences can be focused, for example, on the inputs of different social science disciplines and on potential deep conceptual or model structures.

The fourth type focuses either on a first-order normative discipline like mathematics, logic, law or philosophy of science or on the normative sciences altogether. Second-order mathematics could have its focus on foundational issues like algebras of algebras, geometry of geometries or arithmetic of arithmetics. Second-order normative sciences could be concentrated on a methodology of methodologies, research designs of research designs, rule-systems of rule sys-

tems, laws of laws, etc. Usually, these second-order normative studies should lead to normative approaches with higher generality, directed towards new foundations of normative sciences.

Finally, the fifth type of re-entries falls outside the four previous examples which are based on well-established first-order disciplines or discipline groups. The fifth type can be focused on a special theme which can be found across many first-order disciplines. For example, a focus on the routines or practices of observers can generate a new second-order discipline on scientific observers. Such a focus brings a reflexive shift towards a more general understanding of researchers, their recurrent research operations and their changing work environments which are based on first-order studies of observers across various disciplines. Obviously, researchers of radical constructivism or second-order cybernetics and their operations would be a part of such a second-order discipline, too.

These five types of re-entries for different disciplinary fields of first-order science are just a small and tiny fraction of possible re-entries. In general, re-entries can be used to establish new academic fields with a second-order research program and curriculum. These research and teaching programs can be built, due to the correspondence principle, in practically all institutionalized fields and disciplines of first-order science. Research and teaching programs in second-order sociology, in second-order formal sciences, in second-order clinical and health research, in second-order anthropology and in many more fields and disciplines can and should be established in the years and decades ahead as the institutional basis of second-order science.

2.4 A General Methodology of Second-Order Science

The general methodology of second-order science can be presented with the help of a typical second-order analysis within the social sciences. In recent decades a variety of approaches was built for the theoretical concept of living conditions ("Lebenslagen").

In recent publications (Müller, 2013a,b), investigations were undertaken on a more general and integrative concept of living conditions where the first-order approaches to living conditions $\{X_i\}$ led to a second-order concept X[X]. The goals for this analysis were specified as the construction of a highly general conceptualization of living conditions which includes all available approaches. New categories were developed for the second-order form of living conditions which were able to include all the dimensions or variables from first-order schemes. In the end the new and more general second-order scheme of living conditions allowed for new statistical explorations on patterns and relations between these new domains.

One can generalize this example to a general methodology for second-order science investigations which should include the subsequent steps for any particular building block X from first-order science like a concept, relation, theory, model, test, generative mechanism, scientific field, etc. Table 2.3 demonstrates the necessary methodological steps for an analysis of X[X]. On the left side of Table 2.3 one finds the necessary or optional steps for a general methodology of second-order science in terms of basic recombination operators, the second column presents a short description of these specific operations.

TABLE 2.2 **Core Steps for a General Methodology of Second-Order Science**

Recombination Operations	Description of the Operations
Selecting X	Consensus on a common first-order theme X
Re-entry X	A re-entry operation in the first-order theme and the creation of a corresponding second-order topic X(X)
Adding Goals [X]	Consensus on the goals of the observer(s)
Widening X [First Order Building] Blocks]	The compilation of a large number of first-order building blocks on the common theme
Ordering X [First-Order Building Blocks]	Applying various methods for a re-arrangement of first-order building blocks like data-bases, new conceptual schemes, etc.
X(X): {Integrating, Deepening, etc. First Order Building Blocks}	The core part of second-order analysis which, in dependence from the goal set, integrates, heightens, deepens first-order building blocks until a final output is reached
Moving X(X) ⟶ X	Vertical moving of X(X) to the first-order level and to X
Adding [Impact X(X) ⟶ X [First-Order Science] (optional)	Assessing the effects of the final second-order outcomes for first-order research on the common theme X
Adding [X(X) ↔ Society/ Environment-Relations & Dynamics (optional)]	An evaluation of the relations between X(X) or X and the wider environment across science and society and their dynamic patterns

2.5 Functions and Goals for Second-Order Science

The rise of second-order science can be viewed as a reflexive turn and as a self-organized reaction within the science system itself to reduce the complexities and negative side-effects of the spectacular growth processes of first-order science.

Table 2.4 exhibits various dimensions of Science II which can be subsumed under the principal component of reflexivity.

TABLE 2.3 **Main Differences between Science I and Science II along the Principal Component of Reflexivity**

	Science I (1600–1900/) 1950	**Science II (from 1900/1950 onwards)**
Second-Order Science	Implicit	Highly Advanced
Zero-order Science	Implicit	Highly Advanced
Distances betw. Social Sciences Natural Sciences	High	Low – Medium
Potential for Interdisciplinary Co-operation	Low	High
Methodological Goals	Objectivity, Accessibility	Intersubjective Reproducibility
Observers	Excluded	Included
Main Design Mode	Exo-Mode	Endo-Mode
Self-Reference	Excluded	Included
Reflexive Designs	Peripheral	Central
Sources of Novelty	Nature, Societies	Nature, Societies | First-Order Science
Core Philosophers	René Descartes	Ludwig Wittgenstein

Although only a single article can be found which combines the concepts of reflexivity and revolution in its title (West, 2000), the rise of second-order science can be seen as the core element in an ongoing reflexivity revolution. Moreover, second-order science fulfils vital functions and goals for the sustainability of the overall science system.

Second-order science becomes necessary for the quality control of the overall science system and for the production of robust knowledge which is based on a rigorous analytical, statistical or model analysis of the inputs and outputs of first-order science.

Second-order science fulfils an important role for the innovation capacity of the overall science system through the heuristic strategies of second-order science like integration, deepening, widening, re-ordering, etc. which provide more general frameworks or a generative deep-structure to first-order theories, models or mechanisms.

Additionally, second-order science advances the robustness of the results of first-order science through the integration of building blocks from first-order science.

Thus, first-order and second-order science will organize themselves in a recursively closed manner where the outputs or inputs of first-order science are transformed into new second-order inputs and the outputs of second-order science become new inputs for first-order science which can lead to new outputs for second-order science, *round and round* ...., until Eigenforms across first- and second-order science emerge.

The leading aphorisms for this reflexivity revolution which combine traditional or first-order science and second-order science can be constructed in the following way:

- First-order science: the science of exploring the world
- Second-order science: the science of reflecting on these explorations.

2.6 The Current Complexity and Reflexivity Revolution as a Copernican Revolution

It has been argued that the current great transformation to Science II is dependent on two principal components, namely on complexity and reflexivity where each of these principal components can be described with a large number of dimensions, as shown in the previous chapter and in Table 2.4. As an additional classification, the current transition in science qualifies also as a Copernican revolution.

The phenomenon of a Copernican revolution constitutes a very rare event in the long-term history of science and can be characterized by a significant number of exchanges in center-periphery relations. Elements in the center of an old epistemic regime move to the periphery and peripheral components shift to a center position within the new regime. In terms of Copernican inversions along the complexity dimensions, these shifts manifest themselves in the transitions from linear to non-linear models, from universal laws to patterns or from trivial to non-trivial machines. With respect to reflexivity dimensions, these shifts can be seen in the exchange from objective to observer-dependent research, from the exclusion of self-reference to its inclusion or from the implicit status of second-order science to its central and highly advanced form.

This contemporary shift from Science I to Science II can and should be classified, due to its profoundness, its multi-dimensionality and its exchange in center-periphery relations as one of the very rare instances of a Copernican revolution. Table 2.5 summarizes the three big Copernican revolutions in the evolution of the global science system. As can be seen from Table 2.5, these three Copernican revolutions are classified chronologically as a rationality revolution in ancient Greece from the Pre-Socratics to Aristotle, as a revolution in methodology,

designs and tools or instruments during the Renaissance period, and, finally, as a revolution in complexity and reflexivity where the part of the reflexivity revolution remains, at least until now, implicit and hidden only.

TABLE 2.4 **Three Copernican Revolutions in the Evolution of Science**

Time-Scale	Copernican Revolutions
800–400 B.C.	Copernican Revolution I: A Revolution in Rationality and Logical Reasoning about the World by Its Observers
1450/1600	Copernican Revolution II: A Revolution in Methodology, Designs and Tools Exploring the World (from Without) with Observations, Instruments, Experiments and Support from Previous Results Inverting a Geocentric System with a Heliocentric System
1950 2050	Copernican Revolution III: A Revolution in Complexity and Reflexivity Reflecting on the Explorations from First-Order Science (from Within) at the Second-Order Level

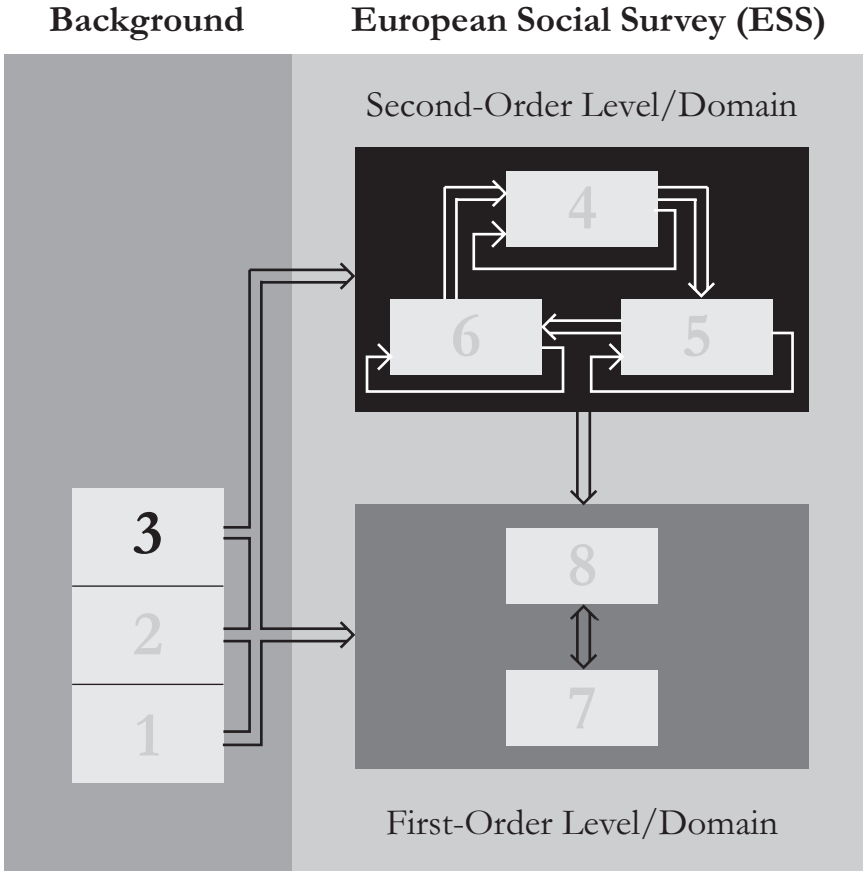
The first Copernican revolution was a revolution in thinking and styles of thought, the second one a revolution in exploring the world and the third one a revolution in complex explorations and in reflecting on these complex explorations.

2.7 Outlooks

It remains, of course, for the reader to decide whether this chapter succeeded in promoting the perspective of a Copernican revolution in science and of the emergence of second-order science as the most significant element in reflexive research designs or whether this grand narrative of a revolution in reflexivity is still as obscure or unconvincing as before.

This book will make an attempt to select the field of survey research which, so far, played almost exclusively at the first-order level or within first-order science and to empower first-order survey research with the new field of second-order investigations. The next chapter will be focused on the European Social Survey (ESS) and its current grand challenges. Part II of the book will show the methodological and empirical results of second-order investigations with the ESS and will demonstrate the very large scope of future analyses at this second-order level.

3 Three Grand Challenges for the European Social Survey (ESS)



> The attribution of the quality (*i.e*, intelligence) is not in the object but is in the description (of the object). Since the quality is not in the object, it cannot be (inherently) a property of the object.
>
> Ranulph Glanville, T*he Black B∞x, Volume III*

This chapter does not aim at a comparative analysis of ESS-based data or on methodological considerations of comparative survey research. Rather, this chapter wants to discuss the ESS as an advanced system of societal self-observations in a very general manner, albeit not at a second-order level. From this perspective the chapter wants to point to three grand challenges which lie ahead for the European Social Survey in the years and decades to come. These grand challenges are situated, on the one hand, in emerging new systems of societal self-observations with process-generated data and data infrastructures and, on the other hand, in advances within the cognitive neuro-sciences and their new perspectives of cognitive faculties like remembering or communicative interactions.
The starting point, however, is focused on the ESS as a science-driven success story for societal self-observations.

3.1 The European Social Survey as a Science-Driven Success Story

For the moment it seems that survey based research has become the most frequently used observation mode for modern societies across the social sciences. The following table, compiled by Willem E. Saris and Irmtraud N. Gallhofer,[1] shows a remarkable increase of survey-based publications across wide segments of the social sciences, including social psychology and economics as well.

TABLE 3.1 **The Rise of Survey Research from 1950 to 1995 in %**

	Economics	Sociology	Political Science	Social Psychology	Public Opinion
1949/50	5.7	24.1	2.6	22.0	43.0
1964/65	32.9	54.8	19.4	14.6	55.7
1979/80	28.7	55.8	35.4	21.0	90.6
1994/95	42.3	69.7	41.9	49.9	90.3

1 See the summaries by Saris and Gallhofer, 2007: 2p.

Table 3.1 suggests that survey research is on a continuous victory march. The European Social Survey adds an important component to the predominance of surveys as the main mode of societal self-observations. Through the ESS, the potential as well as the quality of comparative research has been improved significantly.

Since it was formally launched in 2002, the European Social Survey (http://www.europeansocialsurvey.org/) has been one of the key data sources for measuring and understanding long-term changes in public attitudes across Europe. The ESS was explicitly envisaged as a time series, as a tool to monitor and explain the long-term change in Europe's underlying attitudinal make-up. Politicians, policymakers and academics all need to keep abreast of and understand such changes if they are to obtain a nuanced picture of their society.

Other declared goals of the ESS are to achieve and spread improved standards of rigour in cross-national social measurement, raise the threshold standards of national surveys, introduce and encourage the use of soundly-based attitudinal indicators of national progress, undertake and facilitate the training of European researchers in comparative quantitative measurement and analysis (Jowell *et al*., 2007). ESS methods and procedures are acknowledged as being cutting-edge. Its innovative methodology has been highly praised, and not only by the award of the prestigious Descartes Prize in 2005 "for excellence in collaborative scientific research" (the first social science project ever to have even been shortlisted).

The ESS follows a policy of transparency with respect not only to its data but also its documents, methods and protocols (see Mohler, 2007). Since 2002, the ESS has fielded seven rounds in 34 European countries and a formidable body of data and metadata has been stored in the ESS Data Archive and available to all, a fact demonstrating that considerable investments have been made in the ESS over the years by more than 30 European academic funding bodies. By imposing mechanisms of self-observation, some of which are detailed in this chapter, the ESS seeks to achieve maximal returns from these 'investments', *i.e.* to maximise the actual and potential benefits for knowledge transfer, theory building, social analysis and methodological progress.

Academically, the ESS is led by seven academic institutions responsible for the central design and coordination of the ESS infrastructure, as well as the links between those institutions and the ESS' other active stakeholders, including its funders and users, national teams in 34 countries and a distinguished network of advisers. Questionnaire design teams are selected in each round to help formulate the rotating elements of the questionnaire. Two of the proposals are then selected by the Scientific Advisory Board. This structure based on thematic experts is expected to guarantee the relevance of the ESS questionnaire content. In order to maximise the survey's academic impact, the ESS Core Scientific Team

is engaged in a variety of outreach activities aimed at promoting academics' use of secondary analysis of ESS data and providing supporting materials for public and policy communities. As stated in its work programme, the ESS seeks to make its science communication strategy targeted, specific, wide-reaching and proactive. These goals were the main motivation behind the launch of a series of bibliographic studies whose aims were to inform ESS bodies and guide their outreach strategy. The information gathered proved significant to the point that by now the ESS has established a continuous programme of bibliographic monitoring to assure a continuous flow of feedback on its academic impact and policy relevance. By providing general and specific information on the strengths and weaknesses of the ESS questionnaire and its parts, as well as its methodological qualities and the relevance of its online resources, bibliographic monitoring has now become an established self-observation tool for the ESS governing bodies.

In this way, the ESS can be seen as a European success-story in at least three important dimensions.

- First, the ESS has become a success-story for the methodology of comparative surveys. Starting with the ESS-blueprint prior to the first round of the ESS a rich stream of methodological advances has been achieved in domains like sampling, translations, data documentation, data diffusion, etc. which have established themselves as best practice-examples for comparative data production on societal changes.
- Second, the ESS can be seen as a success-story with respect to European participation. Meanwhile, approximately thirty countries participate in each round of the ESS. Thus, the ESS has very much become a project whose relevance and importance is acknowledged throughout Europe.
- Third, the ESS has also become a success-story within the context of the diffusion of a new wave of European research infrastructures. Fueled by the ESFRI-Process (European Strategy Forum on Research Infrastructures), the ESS appeared already in the first ESFRI-Roadmap in the year 2006. From there the ESS moved rapidly through the stage of a feasibility study and will be established very soon as a new European Research Infrastructure Consortium (ERIC).

In a study under the title "Google Scholar Study of ESS-based Publications" (Malnar, 2012) it was shown that the diffusion of ESS-data and ESS-publications has led to a stream of approximately 450 ESS-based publications annually, most of them in English (82.6 %). Roughly half of the substantative topics (N = 2.116) fall under the categories of immigration, politics, social capital, family, work, well-being and citizenship (N = 1.111) and nearly all of these topics were

discussed in a comparative context, involving at least two different countries. Thus, it seems that the new configuration of ESS-ERIC is rapidly moving to the state of cognitive perfection of the ESS as a system of European societal self-observation.

3.2 Peaks of Perfection and Their Potential Threats

The chapter could stop at this place and could elaborate more closely on ESS-achievements reached so far. But there is an interesting lesson from innovation theory which emphasizes that a technological or scientific position near the peak of perfection is, more often than not, unstable and can lead, even by evolutionary necessity, to a subsequent decline and to a complete substitution by a new technological regime or a new scientific paradigm.[2]

Heinz von Foerster once made the remark that, contrary to Thomas S. Kuhn, old scientific paradigms are not abolished due to an increasing number of anomalies, but, paradoxically enough, due to their success and their state of perfection. Von Foerster points to instances

> in which not the emergent defectiveness of the dominant paradigm but its very flawlessness is the cause for its rejection. One of these instances was Copernicus' novel vision of a heliocentric planetary system which he perceived at a time when the Ptolemaeic geocentric system was at its height as to accuracy of its predictions. (von Foerster, 2003: 284)

As a corollary, James M. Utterback showed several examples in the evolutionary history of technological systems which were replaced or substituted at or near their peaks of perfection.[3]

One of the revealing case studies by James M. Utterback was focused on America's ice industry up to the 1880s which operated with an advanced technology of ice-harvesting, storage and distribution across the northern and the southern parts of the United States and beyond.

> The American ice industry thrived in nineteenth century New England. The 'Ice King,' Frederic Tudor of Boston, sent his first shipment of ice from the port of Charlestown, Massachusetts, to Martinique in the West Indies in 1806. Fifty years later, his company was shipping thousands of tons of ice per year to several U.S. ports,

2 On this point, see, for example, Anderson/Tushman, 1990, Arthur, 2009, Nelson, 1996 or Nelson/Winter, 1982.

3 On Utterbacks approach on evolutionary technological change see, for example, Abernathy/Utterback, 1978, Christensen/Suárez/Utterback, 1998, Pistorius/Utterback, 1997, Utterback, 1994 and 2003 or Utterback/Kim, 1986.

> the Caribbean islands, Rio de Janeiro, Bombay, Hong Kong, and sites in between. (Utterback, 2003: 81)

The technology was based on the invention of an ice plow and more than fifty other inventions for harvesting natural ice from local ponds and storing it. By the late 1870s one finds at least fourteen firms in the Boston area alone, harvesting almost 700.000 tons of ice each year and subsequent innovations led to more homogeneous products and to significantly lower production costs.

> The ice business became an important part of the U.S. economy and continued to expand as households became regular consumers of harvested ice. City dwellers had begun purchasing ice boxes in growing numbers after 1850, and these soon became a modern necessity. (Utterback, 2003: 82)

By the 1880s the American ice industry approached its peak of perfection, producing a total of 25 million tons of ice in the year 1886.
But already in the 1860s and 1870s, during the successful diffusion phase of the American ice industry, one can observe attempts and inventions towards a mechanical or chemical production of ice. These attempts were initially not very successful and the successful inventions produced ice at very high production costs. But the price for ice differed widely between the northern parts of the US with $6 to $8 per ton and the southern parts with prices around $ 100.

> In 1868, New Orleans got its first ice-making plant, which began manufacturing and selling ice for around $35 per ton—substantially less than the price of natural ice. Some 20 years later, by 1889, there were well over 200 ice plants, mostly in the South. New England ice was finding itself effectively driven out of the Southern markets. (Utterback, 2003: 83)

Subsequently, inventions along the new technological regime of ice production led to further reduction in production costs, culminating in the invention of electric refrigerators after World War I which put an end to the traditional American ice industry altogether. Utterback makes the highly interesting observation that the key actors of a dominant technological system near the peak of perfection

> often not only resist innovative threats, but also resist efforts to understand them, preferring instead to further deepen their commitment to their older products. Failing firms tend to be remarkably creative in defending their entrenched technologies, which often reach unimagined heights of elegance in design and technical performance only when their demise is clearly predictable. (Utterback, 2003: 83)

These replacements and substitutions at the height of perfection can be found, following Utterback, in numerous other examples like the transition from the mechanical typewriter to electric typewriters or from the discontinuous change from dedicated word processers to personal computers, etc.

According to Heinz von Foerster and James M. Utterback, these instances of scientific or technological substitutions or replacements follow a more general pattern.

- First, scientific paradigms or technological regimes close to their peak of perfection have little or almost no room for further improvements simply because they have reached or entered this particular region.
- Second, scientific or technological systems close to their peak of perfection start to decline rapidly once new and significantly different alternatives become available at an early stage of their life cycle.
- Third, the challenges usually occur outside the control and design domain for the old systems and normally start in the periphery or in external domains of the old systems.
- Fourth, the old scientific or technological regime, due to its position near the peak of perfection, offers no possibilities for adequate responses, due to its lock-in position near the peak of perfection.
- Fifth, due to these lock-ins and path-dependencies the old technological or scientific system is unable to move to the domains of its emerging competitors.
- Sixth, despite the frequent discontinuities in technological or scientific regimes the number of users and the functionalities of new paradigms or technologies are constantly growing over time.

Thus, this chapter poses a critical question. Can one observe serious challenges ahead for the ESS as a comprehensive system of societal self-observation which lie outside the control and design domains of the ESS and which could lead to a new observation and data regime for empirical social research?

3.3 An Internal ESS-Challenge: Societal Changes and ESS-Monitoring Capabilities

Before moving to external grand challenges a smaller internal challenge, not a grand one, must be mentioned. This challenge is a purely internal one and results from the discrepancies between the actual usage of ESS-data by the European scientific community and the scope and dimension of societal problems and societal changes. In short, ESS-data can be linked to societal changes only to a weak or medium degree.

Societal problems of the last decade could be specified in a more orderly manner, but here I simply use a personal enumeration of widely discussed topics in the last years which include climate change, the ICT-Revolution (Information and Communication Technologies), increasing financial instabilities, rising

inequalities, the intensification of labor processes, rising unemployment, elderly care, natural disasters or nuclear accidents.
This enumeration could be more refined and generated more in an evidence-based manner. Nevertheless, this enumeration should be sufficient to capture the focus of various urgent societal problems at the national or the European level.
It becomes interesting, to compare this enumeration of societal problems with the most intensively published ESS-topics which is shown in Table 3.2.

TABLE 3.2 **Major Societal Challenges and Major Publication Topics with ESS-Data**

Societal Problems	Topics of ESS-Based Publications
Climate Change	Immigration
ICT-Revolution	Politics
Increasing Financial Instabilities	Social capital
Rising Inequality	Family
Intensification of Labor Processes	Work
Rising Unemployment	Well-being
Elderly Care	Citizenship
Natural Disasters	Age Groups
Nuclear Accidents	Culture

Form Table 3.2 one can detect a certain degree of mismatch between these two areas which leads to the initial assessment of only weak and medium links between ESS-data and urgent societal problems. Moreover, problems with respect to the status or future of the institutional arrangement of the European Union become more and more difficult to handle within the ESS-context, due to the different forms of EU-memberships (Euro-zone, Schengen-zone, non-members like Norway, Switzerland, Israel, Russia, etc.).
The internal challenge may intensify in the years ahead since the organizational setting of the ESS changed into an ERIC which is no longer controlled by scientific bodies but by a political body, namely the new general assembly from ESS-funding organizations. Over the long run, this partial mismatch between the ESS as a success-story for European comparative research and the capabilities for the analysis of urgent societal issues could become a potential threat with respect to the societal and political relevance of ESS-data.

3.4 The First Grand ESS-Challenge: ICT- Changes and New Data Infrastructures

So far, only an internal challenge has been discussed which by itself cannot be classified as a very serious or as a grand challenge. The next two challenges, however, are external ones which lie outside the control and design domain of survey research and which can be qualified as grand challenges.

The first grand challenge is related to the current revolution in information and communication technologies, to a basically new type of society and to new forms of societal self-observations which are based on process-generated data. Contemporary societies have been described, *inter alia*, as Turing societies[4] which are based on a new code-system, namely the machine code, on Turing creatures as embedded systems, mainframe computers, PCs, notebooks, mobiles, on a global and highly linked network between these Turing creatures and on new data-infrastructures which record actions, interactions and transactions in a continuous and instant fashion.

Thus, contemporary Turing-societies are just in time producers of huge amounts of process-generated data on information search, consumption patterns, social networks, political participation, societal issues of major concerns, etc. Currently, strong barriers like the protection of privacy or commercial interests prevent a direct access to process-generated data. However, a growing stock of new methods on data mining, web-mining, mining the social web, etc. become available which could handle even very large amounts of data and transform them into suitable static or dynamic patterns.

Finally, process-generated data exhibit a number of significant comparative advantages to the usual survey data.

- First, process-generated data record actual socio-economic actions, interactions and transactions in an instant manner and are not subject to the old problem of the relationship between communicative survey interactions, underlying attitudes and actual practices and routines.
- Second, process-generated data are available for different actors like individuals, households, enterprises or organizations and are not restricted to specific survey populations.
- Third, process-generated data provide a permanent recording of these socio-economic actions, interactions and transactions at very low costs and are not restricted to the wave structure of replicative surveys with time intervals of one, two or even more years.

4 On characteristic features of Turing societies, see especially Müller, 2012 or in a historical perspective Dyson, 2012.

- Fourth, process-generated data can be easily linked, in principle, across different domains like social interactions, consumption patterns, political involvements or social networks.
- Fifth, process-generated data are highly sensitive to the emergence of new concerns, issues and interactions since these data are able to record new developments as they are unfolding.
- Sixth, the rapid ICT-diffusion leads to a rapid decline in persons and households outside the new ICT-environment. Process-generated data comprise more and more segments of an overall population.
- Seventh, process-generated data can be used for cross-sectional and longitudinal analyses at the same time and are not dependent on the usual separation between survey and panel data.

Moreover, new techniques and methods emerge very rapidly for handling vast amounts of data or texts.[5] These new approaches allow a quick detection of significant patterns in data or texts.[6]

As already mentioned there are strong barriers which restrict the access to process-generated data. At the same time, the methods and techniques for dealing with these data is increasing rapidly and we may find ourselves well in the position of the 1870s when the new substitution technologies for the American ice industry were already under way, but were suffering still from barriers like high production costs, access to markets or distribution problems.

3.5 The Second Grand ESS-Challenge: Science II and the Cognitive Neuro-Sciences

The second grand challenge comes from a silent revolution within science itself which has been labeled in the preceding chapters as a great transformation from Science I to Science II and changes in the leading fields of science.

- First, the leading scientific field changes from theoretical physics to the life sciences. Moreover, it is likely that in the decades ahead a new shift will occur from the life sciences to the cognitive neuro-sciences.[7] Thus, the

5 On relatively early approaches on data and text mining, see, for example, Feldman/Sanger, 2006, Liu, 2007, Theodoridis/Koutroumbas, 2008 or Ye, 2003.

6 On the variety of approaches to data and text mining, see, *inter alia*, Han/Kamber/Pei, 2011, Inselberg, 2009, Janert, 2010, Nisbet/Elder/Miner, 2009, Russell, 2011or Witten/Frank/Hall, 2011.

7 On current summaries of the neuro-cognitive architectures of these different faculties, see Gazzaniga, Bizzi and Black, 2004 or Calvert, Spence and Stein, 2004. Within the cognitive

cognitive distances between the social sciences in general and survey research in particular and the leading fields of science will diminish dramatically in the decades ahead, especially when compared to the old regime of Science I. Additionally, the availability of complex models and theoretical frameworks from the leading fields of science for the social sciences in general and for survey research in particular will increase significantly. Already at the present stage self-organization models, complex network theory or evolutionary population dynamics, to name only three, have become normal components for explanatory and simulation accounts in the social sciences. Moreover, again at the present time new and extremely large scale projects emerge which combine complex models and a rich societal data-infrastructure and which are aiming at a strong reconfiguration of the social sciences as we knew them.[8]

– Second, the science drift towards the life sciences and the cognitive neurosciences opens up, in all probability, a new and deeper level of social science analysis, namely the neural or, alternatively, the nano-level, which will be used together with the current micro-, meso- and macro-levels. Such an addition of levels usually is accompanied by a confirmation shift as well because the processes at a deepest level normally acquire a special epistemic quality as reference level to which processes at higher levels have to be related.[9]

Especially the addition of a new and deeper neural or nano-level should be seen as a grand challenge to survey research in general and to the ESS in particular. Why? So far, survey research was free to assume that, on the one hand, explanatory concepts like values, attitudes, beliefs, etc. can be linked to cognitive faculties like introspection, long-term memory on the one hand and to observable routines or practices on the other hand. For example, Jon A. Krosnick, Charles M. Judd and Bernd Wittenbrink, among many others, are able to adhere presently to a storehouse or file drawer image of attitudes and to see a

---

neuro-science arena, one finds meanwhile numerous sub-fields and disciplinary niches specializing on a particular senso-motoric, emotional or cognitive faculty. For a diverse set of literature over the last decades, see Calvin, 1996, Calvin and Bickerton, 2000, Campbell, 1984, Damasio, 1994, 2003, 2012, Deacon, 1997, Edelman, 1987, 1990, 1992 or 2007, Hofstadter, 1982, 1985, 1995, 1997, 2007, Hofstadter/Dennett, 1982, Hofstadter/Fluid Analogies Research Group, 1995, Holland, 1995, 2012, Kahnemann, 2011, Lakoff and Nunez, 2000, Lehrer, 2012, Minsky, 1990, Norretanders, 1997, Pinker, 1997, Plotkin, 1997, Pollock, 1989, Ratey, 2001, Roth, 1999, Sporn, 2012 or Sternberg and Wagner, 1994.

8 See especially the FuturICT-project under the Future and Emerging Technology Program of the EU which has become one of seven flagship proposals which were selected for a feasibility study. See, for example, Helbing, 2012.

9 Over the last decades one finds, for example, different versions of a methodological individualism and arguments that the micro-level should become the reference level for the social sciences. On this point, see, for example, Coleman, 1990 or Esser, 2002a,b,c.

> great theoretical and practical value... to hypothesize that a single attitude exists in a person's mind: the net evaluation associated with the object. (Krosnick/Judd/Wittenbrink, 2005: 26)

Adding a new and deeper neuro- or nano-level will put an enormous pressure on the current explanatory repertoire in survey research with its emphasis on values, attitudes or beliefs on the one hand and with its strong links between survey responses and actual practices and routines on the other hand. More generally, the new neuro- or nano-level could mean an end to the usual description devices for human behavior which were labeled by Patricia S. Churchland and many others already more than twenty-five years ago as folk psychology.

> By folk psychology I mean that rough-hewn set of concepts, generalizations, and rules of thumb we all standardly use in explaining and predicting human behavior ... as the outcome of beliefs, desires, perceptions, expectations, goals, sensations, and so forth. ... Once it is recognized that folk psychology is not immune to scientific improvement, this reveals the possibility that what will eventually reduce to neuroscience are generalizations of scientific psychology that have evolved a long way from the home 'truths' of extant folk psychology. Moreover, ... these generalizations will likely be the product of a long coevolution with neurobiology. What may eventually transpire, therefore, is a reduction of the evolved psychological theory, and this evolved theory may end up looking radically different from folk psychology - different even in its categorial profile. (Churchland, 1986: 299–312 (*passim*))

So far, survey research is based very much on a "rough-hewn set of concepts, generalizations, and rules of thumb" for the analysis of routines and practices which appear as the result of beliefs, perceptions, attitudes, intentions, values, expectations, goals, preferences, utilities, and so forth. Usually, these folk psychological notions were recombined to generative mechanisms like the value-mechanism which apparently are capable to explain human behavior altogether. Once these folk psychological description devices and generative mechanisms become part of a special field of the cognitive neuro-sciences, namely of embedded or situated cognition,[10] the analysis shifts from the micro-level of verbal responses or routines to the neural or the nano-level and to embedded contexts and situations. These level shifts usually lead to a substitution, to a crowding out or to a profound reconfiguration of the conceptual frameworks at the higher level. In the end, the new generative neuro-mechanisms "may end up looking radically different ... – different even in (their) categorial profile".

For survey research and for the ESS, the second grand challenge results from the fact that communicative interactions between interviewers and respondents

10 On embedded or situated cognition, see, for example, Adams/Aizawa, 2008, Bodenhausen/Lambert, 2003, Gibbs, 2005, Noe, 2009 or Robbins/Aydede, 2008.

become a typical and a very well-defined problem domain for embedded or situated cognition research. Thus, in the years and in the decades ahead, different types or clusters of neural patterns in survey responses will become available and it might well be that such a level shift might put an end to the traditional explanatory and descriptive repertoire of survey research. Already at the present time, one finds numerous descriptions like the user illusion (Tor Nørretranders), the self-illusion (Bruce Hood), two selves (Daniel Kahnemann) or the fictional self (Michael S. Gazzaniga) for the descriptions of the I of actors, basic deconstructions of concepts like free will[11] or strong limitations for traditional concepts like consciousness which becomes the tip of an iceberg at best and a failed folk psychological concept at worst.[12] Thus, conscious experience and its relation to internal neural processes appear more and more like the relation between the text of a daily tabloid to the sum of global and national events during 24 hours.

A deep or neural understanding of communicative survey interactions poses, quite naturally, enormous challenges for the interpretative side of survey data as well. Once the currently assumed links from survey responses to the explanatory side of survey research and to the side of practices or routines are broken or deleted, it will become a major challenge to interpret the available survey data in their current forms.

It must be emphasized at this point that the issue of a growing dependence on the cognitive neural sciences has been framed as a grand challenge. In the best of all possible survey worlds this new combination might lead eventually to a strengthening of surveys and, thus of the ESS as well. But in view of similar scientific level shifts in the past such an outcome appears rather unlikely. Thus, it can be assumed that survey research in general and the ESS in particular is faced with a second grand challenge for the years and decades ahead.

3.6 The Third Grand ESS-Challenge: The Combination of Internal and External Challenges

The third grand challenge is by far the biggest one, because it assumes that the internal challenge and the two grand challenges, presented so far, are no longer isolated from each other, but become inter-linked and re-enforce each other. A possible re-enforcing scenario could take the following form:

A new wave of process-generated data becomes available for the analysis of societal changes across different time scales (very short run (days), short run

11 See, for example, Ainslie, 2001, Dennett, 2004 or Wegner, 2002.

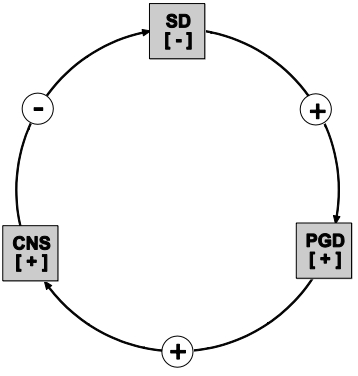
12 On this point, see the classic text by Dennett, 1991.

(months), medium run (single year), and longer runs (more than one year). These process-generated data are used, due to their comparative advantages, more and more by the scientific community. Additionally, this shift to process-generated data is accompanied by a growing recognition that survey data like the ESS exhibit considerable difficulties in coping with societal changes and urgent societal problems. Moreover, results from the neuro-cognitive sciences lead to a radical new perspective on the neural dimensions of survey interactions and on the cognitive faculties involved in standardized survey interactions. This provides new incentives to move to process generated data which moreover become available in larger quantities and domains ...

The third grand challenge is clearly dependent on the assumption that the internal challenge and the two grand challenges take the directions which have been suggested in this article. A strengthening of the current folk-psychology in survey research through advances in the cognitive neuro-sciences would prevent the third grand challenge in the same way as only partial successes in the diffusion of process-generated data or a rapid recognition of the limited monitoring capabilities of process-generated data for the analysis of societal changes. Only under the assumption that the internal and the two grand challenges follow their specified trajectories, the potential for a *circulus vitiosus* and for a negative self-enforcing mechanism towards a shift to a new regime of societal self-observation and to cognitive neuro-science analyses of human behavior can emerge.

Figure 3.1 summarizes a potential combination of the internal and of the two grand external ESS-challenges.

FIGURE 3.1 **A Combination of ESS-Challenges to a Vicious Circle**



SD: Survey Data Relative Decline [-]

PGD: Process Generated Data Relative Expansion [+]

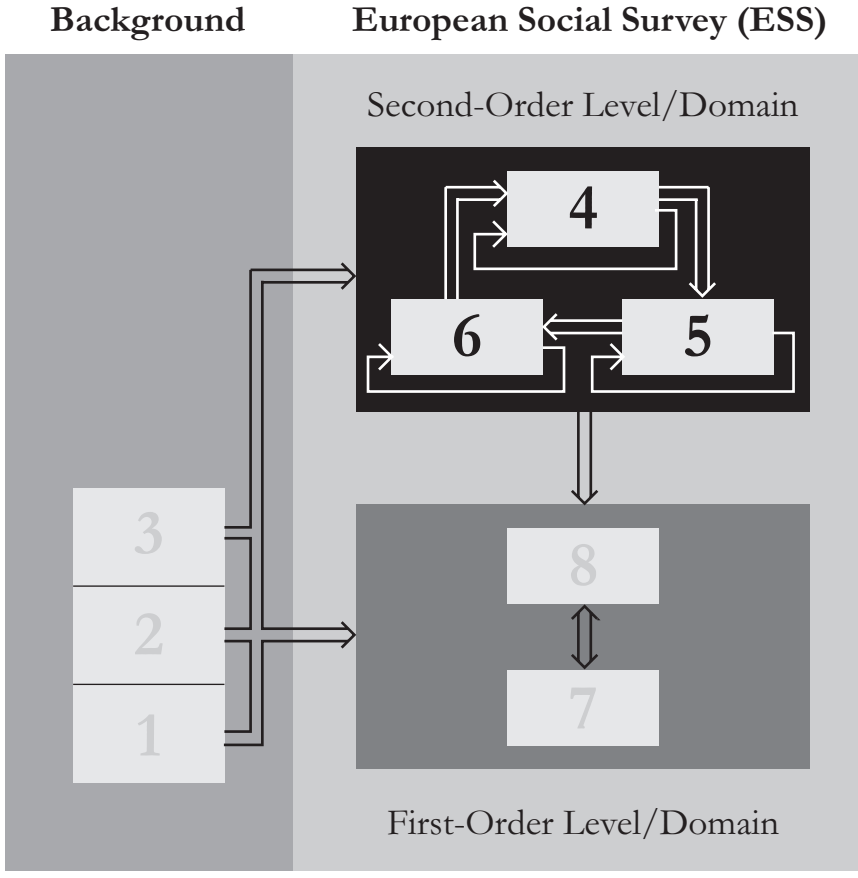
CNS: Cognitive Neuro Sciences Relative Expansion: [+]

3.7 Outlooks

The chapter will stop here and will not discuss possible remedies or adequate responses to these three grand challenges by the ESS-group. While shifts in old technological or scientific regimes towards their successor regimes were and are possible in principle, the history of innovations in science and technology is full of examples of failed adaptions and of unsuccessful restructurations which usually came too late, were focused on inadequate means and instruments and turned out to be inefficient altogether. None of the old ice harvesting enterprises, for example, moved into the new domain of electric appliances, the traditional firms for mechanic typewriters were not to be found among the producers of electric typewriters, etc. To use a Piaget term, accommodation is extremely hard to come by in the face of grand external challenges.

At the end, a slightly more hopeful expectation can be expressed, however, in the following way. Contrary to the technological examples with ice harvesting or mechanical typewriters, a new scientific regime with respect to societal self-observations and even the phase transition from Science I to Science II will not replace the old regime fully or lead to a crowding out of the traditional system. Even the worst case scenario leaves room for traditional scientific regimes. Science I will still claim its peripheral status throughout the next decades. Likewise, survey research in general and the ESS in particular cannot possibly be substituted completely by process-generated data, but could shift in the long run from their current core-position to a peripheral status. Chapter 7, however, will outline three broad strategies for ESS-ERIC to maintain its core position, despite rapidly changing scientific and societal environments.

Part II
An ESS-Analysis of ESS-Analyses



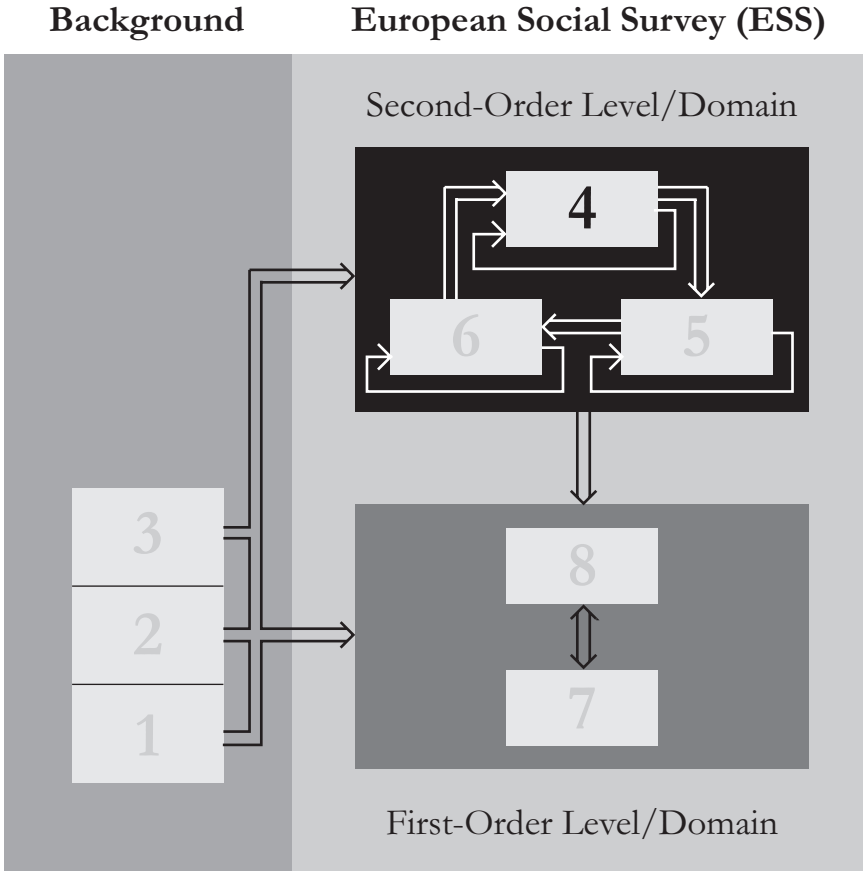
> The observer observes; what is observed changes; a new observation is made. Observation is circular, and circularity is the necessary form for interaction.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

Part II can be considered as the core of the entire volume because it entails a detailed and very long section – Chapter 5 – of a typically reflexive study, namely a detailed second-order ESS-analysis of first-order-ESS-analyses.

- The second part of this book starts with a general introduction into second-order survey analysis as a new form of investigation which is not part of the traditional scope of survey analyses.
- The subsequent chapter is focused on a second-order study of ESS-publications which offers in-depth profiles of European social researchers and their theoretical and methodological interests on the one hand and of the utilization profiles of the large-scale data set of the ESS on the other hand.
- Finally, Chapter 6 presents a roadmap for a deep search for additional second-order survey analyses beyond the results and perspectives of the ESS-investigation in the previous chapter.

The roadmap for a deep search of further second-order survey-investigations for the ESS as well as for other European or global surveys should make it clear that second-order survey analyses, like second-order science in general, can be qualified as a vast and largely unexplored science frontier.
Again, it remains for the reader to decide whether our general assessment can be sufficiently supported with the results and strategies of a single second-order ESS-analysis of ESS-analyses and whether our inductive generalization of a very large-scale and mostly unexplored second-order frontier for survey research can be maintained.

4 An Outline of Second-Order Survey Analyses



We create our patterns and by doing so, knowledge
(or, as I prefer to call it, knowing). This knowing is not
founded in fact, but in construction.

Ranulph Glanville, *The Black B∞x, Volume III*

The present chapter leads to a largely unexplored domain of survey research, namely to second-order survey or panel analyses. So far, survey or panel[1] research played almost exclusively at the level of first-order science and of exploring the world with the help of primary or secondary data analyses. However, as Part I of the book indicated, behind, above or aside from the level of first-order science lies a level of second-order science which constitutes a vast and largely unexplored science frontier. This chapter will present an outline of the two major roads of combining surveys and survey research with second-order research in particular and with reflexivity in general as well as various types of analyses along these two main paths of second-order survey studies.

4.1 Two Roads to Second-Order Survey Analyses

Large comparative surveys are designed to provide relevant and reliable data on social, economic or political processes to a wide range of academic audiences, as well as to answer the needs of policy-makers for taking informed decisions and identifying emerging societal trends.

So far, survey analyses were concentrated on the first-order level. The data production for small and regional surveys can be situated at the first-order level, too, as long as such a survey is not made fully available on a permanent basis for other researchers or transferred to a national social science data archive which operates at the zero-order level of research infrastructures. Large international surveys usually become research infrastructures at the zero-order level. In the case of the ESS and of SHARE (Survey of Health, Ageing and Retirement in Europe) both surveys are currently organized as European research infrastructure consortia (ERICs). Thus, the ESS as one of the components of European research infrastructures must be situated at the zero-order level, although the ESS contains a significant segment of first-order research especially in the field of survey methodology. Until now,

1 The strategies and methodological considerations in this chapter can be applied to panel data and panel analyses alike. Due to its focus on the ESS, the subsequent remarks will be concentrated on survey-data and survey research exclusively.

the second-order level or second-order science were not part of traditional survey research.

For the present context it becomes necessary to differentiate surveys into two broad segments, namely into survey inputs and survey outputs. Both survey inputs and survey outputs must be available in an encoded format, usually as text-documents in order to reach the requisite variety at the first-order level and to be able to perform a re-entry operation for a second-order topic. Thus, other survey ingredients like survey researchers, the cognitive-emotional state of interviewers or the ICT-support for conducting a survey, while necessary for any successful survey work, cannot become instances for potential second-order survey analyses.[2]

Here, the following separation for two groups of second-order survey studies will be proposed.

- Survey inputs comprise elements like questionnaires, survey methods and methodologies or statistical models and social science theories like Ronald Inglehart's theory of modernization and postmodernity (1977, 1990, 1997, Abramson/Inglehart, 1995).
- Survey outputs include answers from respondents, data patterns, survey documentations, publications based on surveys as well as other components like the protocols by interviewers.

From this distinction we want to outline two broad paths how survey research and second-order investigations can be recombined in a successful manner.

- The first path is focused on the inputs of surveys and produces second-order analyses like a second-order questionnaire study or a second-order analysis of survey methods.
- The second road is concentrated on the outputs of surveys and leads, for example, to second-order analyses of survey analyses.

Subsequently, both ways to second-order survey research will be briefly outlined. But before proceeding to these two main trajectories a short section will lead to the general goals of second-order survey analyses.

2 Only empirical studies of survey researchers, of interviewers or of the ICT-survey support can become potential building blocks for second-order studies, not survey researchers or interviewers themselves.

4.2 Goals of Second-Order Survey Analyses

In Chapter 2 the main function of second-order science was summarized as the function of reflecting on building blocks from first-order science. The goal set of second-order science in general comprises three different and independent targets which become central for the domain of survey analyses as well.

- First, second-order survey analyses aim at higher levels of robustness with respect to the results of first-order survey research or, alternatively, of higher levels of quality control.
- Second, second-order survey studies achieve higher levels of generality and integration, due to their basis of a rich variety of first-order survey investigations.
- Third, second-order survey investigations offer new perspectives, are able to produce a high level of novelty and can act as an innovation pump for survey research.

To be more concrete we can offer three examples from survey research for these three different goals.

- Statistical meta-analyses, which in our new terminology become a subset of second-order analyses, aim and achieve the first goal. Statistical meta-analyses of surveys point to the possibility of disconfirming or confirming first-order results and of achieving a higher level of robustness.
- Conceptual studies of significant theoretical terms in survey research like quality of life or social capital are capable of fulfilling the second goal of higher levels of generality or integration.
- In our example of a publication-based ESS-analysis, we will seek to demonstrate the benefits of achieving the third goal of novelty and innovation. This type of second-order analysis is based on information from several bibliographic monitoring exercises undertaken during the earlier stages of the ESS life-cycle. Although the focus lies on publications with ESS-data, a second-order analysis is capable to shed new light on two domains.
  - First, a second-order ESS-analysis of ESS-analyses produces a profile of European survey researchers and their theoretical and methodological preferences or interests and their implicit non-preferences or their disinterestedness with respect to theoretical or methodological issues.
  - Second, a second-order ESS-study of ESS-studies generates a utilization profile for the entire ESS-data set and identifies hot and very frequently variables from cold and hardly or not utilized data.

Thus, the reader can judge the value of this type of second-order analyses by the level of novelty which this form of study brings to her or him, compared to traditional versions of survey analyses.

4.3 Re-Entry Operations into Survey-Inputs

Section 4.1 specified the two main roads to second-order survey analyses. The first path is focused on survey inputs SI

$$SI \rightarrow RE \rightarrow SI[SI]$$

and can lead to various different types of second-order studies.
The first second-order input field is focused on survey questionnaires in general and survey questions in particular.

- First, questionnaires can be separated into a set of question batteries which are not to be confused with larger survey domains. For example, the ESS is grouped usually into a core with several domains or modules and into at least two rotating domains or modules. However, each of these modules or components can be differentiated into several questions and question-batteries. A second-order study of a relatively large number of questionnaires from different surveys searches for similarities and differences between similar domains or modules and their relevant questions and question batteries. This type of second-order investigation can lead to more general survey questionnaires which include different question and question batteries for a specific domain from a variety of surveys.[3]
- Second, first-order questionnaires use different scales from a minimum of two point-scales to five or ten point scales or scales of higher magnitude. A second-order study of scales across a comparatively large number of surveys presents the overall distributions of scales across these surveys. From here, a large number of second-order studies can be conducted on the comparative advantages and disadvantages of specific scales of topics.
- Third, a second-order study can be constructed by focusing on the main first-order domains of a questionnaire and on the relative strengths of these survey areas.

The second wide field for second-order survey input analyses is open for investigations into survey methodology and survey methods. Here a very

3 Such a second-order investigation can be of interest for the management of surveys in case of revisions of the questionnaire and the elimination of existing elements and its replacement with new components.

large class of different types of analyses can be undertaken in the future. Three examples must be sufficient to demonstrate the feasibility of these second-order methodology studies.

- First, a special method like cluster-analysis, factor-analysis or multi-level analysis can be specified as a common focus and multiple applications of this particular method across different surveys must be selected for an in-depth second-order investigation.
- Second, a special survey topic like social capital, living conditions, etc. or a small number of issues must be chosen as a common reference point and various analyses with their specific methods have to be accumulated and studied with respect to their actual methods used for the empirical analyses.
- The third example of methodological survey studies is based on the repertoire of methods used to carry out these survey studies. Here, the same classification procedures must be undertaken like in the case of the ESS-investigation in Chapter 5 and a rich data base must be created on the applications of different methods. In the end one can produce a new perspective on the methodological interests and disinterests of survey researchers which becomes a highly relevant input for survey researchers or for experts in survey and social science methodologies.

In this way large classes of new second-order input studies of surveys have been outlined. However, this input path to second-order survey studies, while highly interesting and relevant in itself, will not be followed by us within this publication.

4.4 Re-Entry Operations into Survey-Outputs

Our path in the next chapter will be concentrated on survey outputs SO

$$SO \rightarrow RE \rightarrow SO[SO]$$

Not surprisingly, several options are open also for the output-side of second-order survey analyses.

4.4.1 Survey Responses

Responses contain several relevant information elements which can be used for a second-order analysis. For example, the ESS provides two different options for not answering a question, namely the category of "Don't know" and in a few instances the option of an answer refusal like in the case of belonging to a religious community. Using a large number of different surveys a second-order

study could try to group survey responses into several large groups or clusters, starting with responses with a minimum degree of non-responses to the group or cluster with a very high degree of non-responses plus a comparative analysis of these different groups or clusters.

4.4.2 Survey Documentations

Surveys provide a large number of documentation materials which can also become elements of a second-order investigation. Again, a large number of different surveys is needed and surveys can be clustered into several groups, ranging from a comparatively full documentation to a survey group which hardly fulfills the minimal standards of documentation. Here, a second-order analysis provides valuable information on the quality of different surveys, based on their available documentations.

4.4.3 Survey Data Patterns

A very large field for second-order survey studies lies in empirical results and in data patterns like clusters, correlations, similarities and the like. These patterns of patterns can be studied in a second-order manner either

- with statistical means with the tools and instruments of statistical meta-analyses or
- visually with the support from visual data analysis (VDA) as will be demonstrated in Chapter 7.

Both roads to second-order pattern investigations should be seen as complementary where second-order visual pattern analysis should be used preferably for the context of discovery and the statistical branch of meta-analyses for the context of justification.

4.4.4 Survey Publications

Finally, survey publications like journal articles, book chapters or research reports can become the main source for a second-order survey analysis. This route will be the one which we will follow in the current book and its details and its potential results and comparative advantages will be described in the next section and especially in Chapter 5.

4.5 A Focus on Publications with ESS-Data: Towards a Second-Order ESS-Analysis of ESS-Analyses

So far we were able to specify two main branches for second-order survey analyses with a focus on the inputs of surveys on the one hand and on and on survey outputs on the other hand.

The next chapter will be crucial for the entire volume because it will demonstrate the scope and the perspectives, inherent in a second-order survey analysis of the ESS which is focused on the publications with ESS-data and, thus, on survey outputs As outlined already, the main goal for this type of investigation lies in new perspectives with respect to European survey researchers on the one hand and on the utilization profile of the ESS data set.

The management of a comparative social survey, entailing activities such as academic impact assessments and the planning of outreach, becomes part and parcel of second-order science and of reflexive survey studies in general. The second chapter specified two motivations of second-order science, *i.e.*, the inclusion of the observer, and self-reflexivity that allows second-order science to operate on the products of normal or first-order science (Müller and Riegler, 2014: 1). It is the latter notion in particular that the subsequent chapter intends to make use of. One of the most relevant points from the perspective of Chapter 5 is the claim that such a change assumes a shift in the sources of scientific novelty and innovation from the dominant mode of exploring the world to the reflexive mode of focusing on the already available scientific outputs, resources and the like. In other words, reflexivity and self-reference are changing from their highly peripheral status in Science I into a core position in Science II (Müller and Riegler, 2014a: 10). The comprehensive, large-scale analysis of bibliographic outputs seems to correspond well to this notion of science analysing its own outputs in order to advance its value, and academic and social agenda.

Once again, this entire publication is based on the premise of reflexivity and its increasing roles and function for the operations of the overall science system. Second-order survey analyses throughout Part II of this book incorporate a feedback information loop provided by bibliographic monitoring studies. The key step is to complement the first-level analysis of 'observing the world' with the second-order approach of observing, interpreting and mapping the large quantity of findings that the first level increasingly generates. This, in the terminology of this book, is called second-order science If first-order science is the science of exploring the world, second-order science is the science of reflecting on these explorations (Müller and Riegler, 2014a: 14), a logic that seems to fit well with the practical needs of survey management. As surveys become larger and more complex, they also become increasingly expensive, as

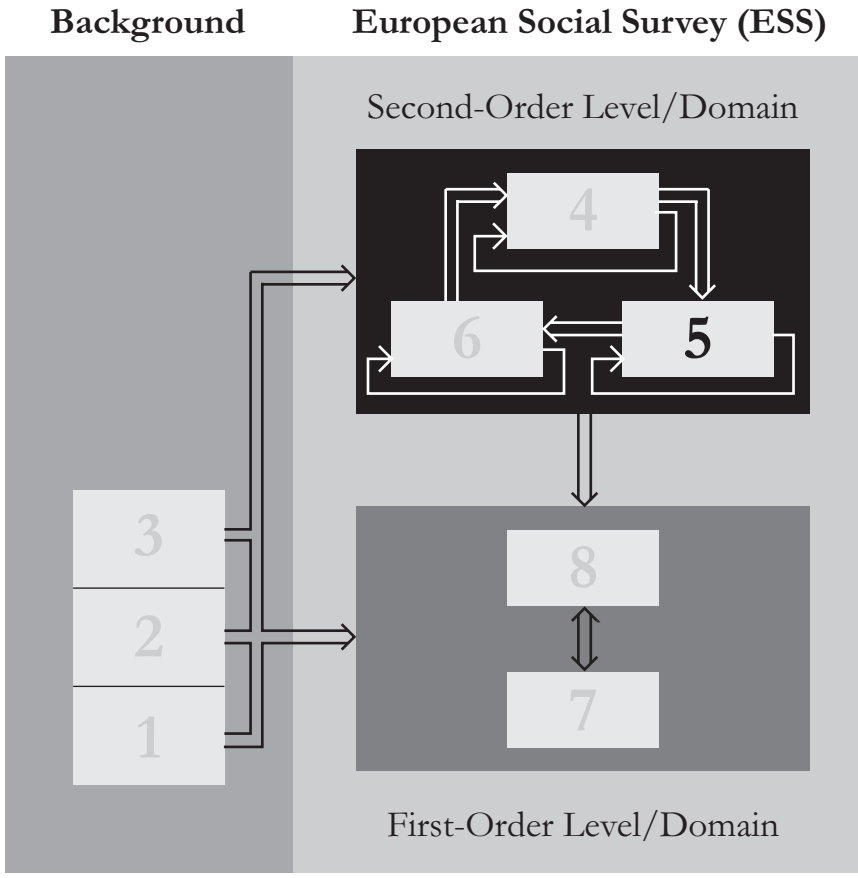
well as more socially relevant in informing academic and policy communities. In order to meet academic and economic expectations, large surveys in particular are faced with an ever more pressing need for self-observation tools which enable them to monitor their impact and functionality. This corresponds relatively directly with one of the second-order investigation domains, namely the domain based on the operation of re-entries. Such an operation occurs whenever elements from the first-order domain/level are applied to themselves (Müller and Riegler, 2014a: 11).

By making use of the operation of re-entry, the next chapter will seek to address a number of questions relevant to survey outreach, management and quality control on the one hand and new and innovative perspectives on the other hand. From the general managing perspective, the main issue is to end up with a second-order product that is most relevant for user communities as well as the management of these surveys. In other words, the practical use of this type of investigation is to optimise its impact in academic and economic terms and to end up with an instrument with as little dead or unused content as possible. Specifically, the ESS contains a number of thematic and conceptual elements, from individual items to item batteries and rotating modules, for which feedback on the extent of any patterns of their usage is needed in order to fulfil the dimension of reflexivity. Relevant questions are manifold, *e.g.,* whether all of these content elements are being used to a similar extent, or are there perhaps vibrant and dormant elements present? Do elements of content lead a stable usage life, or do they have cycles of high and low usage? What are the shares of vibrant vs. dormant elements? Do dormant elements become vibrant and *vice versa*? What should eventually be done with the dormant elements? Are they a waste of resources, or are they waiting to be 'discovered' at some point? What is the appropriate time span before they can be safely dismissed? Are vital items to be kept irrespective of their internal validity?

To some extent, our second-order analysis will also attempt to determine which factors influence the usage of items, modules etc. Is it their intrinsic value (*e.g.* item quality), or their extrinsic value, *e.g.* analytical and social relevance? Why are some items from the same battery or module used much more than other items? Is it because they tap popular concepts, or because they have better measurement characteristics? Finally, why are some rotating modules used considerably more than others?

These and similar questions will become the main focus for the next chapter which summarizes the empirical results of our second-order ESS-analysis of ESS-analyses.

5 A Second-Order ESS-Study of ESS-Studies: Empirical Results



> We ask Juvenal's question: 'But who will guard the guard?' ...The general answer is, of course, obvious. The controller is controlled, itself, by that which the controller controls (the controlled). Immediately, the relativity of the roles of controller and controlled become apparent: what we have, traditionally, thought of as the controlled can equally be seen as the controller (controlling) – it just depends on where we are looking from.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

This chapter, particularly the part which addresses topics mapping, will seek to demonstrate the benefits of second-order analyses in achieving new perspectives and innovative contents. It summarises and upgrades information from several bibliographic monitoring exercises undertaken during the earlier stages of the ESS life-cycle. This type of second-order investigation should make it possible to highlight the restricted nature of ESS data utilisation, the partial and highly selective amount of actually used time-series data, regions of high and low activities in social research or the very specific interest patterns of European social scientists, with a focus on topics such as social capital or migration and neglecting themes such as intergenerational mobility or religion to a very large extent (Müller and Riegler, 2014: 11).
The introductory section will outline the history and methodology of the ESS bibliographic monitoring, then the discussion will proceed to the results and their relevance in the light of an second-order science approach.

5.1 Background, Definitions, Methods

The first bibliographic study of ESS academic publications based on Google Scholar records was carried out between March and August 2012 and was then repeated annually to add publications for 2012 and 2013. Why was Google Scholar chosen? Launched in 2004, Google Scholar is a freely accessible web search engine that indexes scholarly literature across an array of publishing formats and disciplines and thus attempts to index the totality of the realm of scientifically relevant documents. In contrast to traditional indexing based on an abstract and keywords, Google Scholar searches are based on a full-text index and its relevance ranking takes the full text of each article into account. In a study in 2006 English-language journals had the best coverage/identification percentage wise, with more than an 80% overlap AH, DOAJ, IZ, SCI, SSCI.

Google Scholar allows fast searching with a simple, user-friendly interface (Mayr and Walter, 2007). The STM report on scientific and scholarly journal publishing also mentions the growing use of search engines, particularly Google and Google Scholar, to locate scholarly content and the fact that academic search engines (Google Scholar, Microsoft Academic Search) had in 2012 appeared to have gained ground over general search engines (Ware and Mabe, 2012).

On the down side, Google Scholar only provides the 1.000 most relevant search results for a query, which is why ESS bibliographic analysis is limited to English-language publications whose annual population fits into this frame. To identify relevant items, the key phrase "*European Social Survey*" was searched for anywhere in the text or abstract. In October 2014, the overall or 'gross' number of hits that Google Scholar indexed for the period 2004–2013 was 10.300. However, this number had to be brought down to a level which corresponds to our definition of a 'relevant' hit, *i.e.* an English-language academic publication (journal article, book, chapter, conference or research paper) that is either 1) methodological, or 2) substantive, with at least one ESS item used in the primary analysis. The relevant universe therefore does not include ESS-based publications in other languages, nor does it include substantive publications using the "European Social Survey" key-phrase without primary data usage. In other words, the definition aims to establish a clear and relevant criterion for an 'ESS-based' publication.

To separate relevant publications from non-relevant ones, a qualitative case-by-case review of Google Scholar hits has to be carried out. All articles, chapters, working, discussion and conference papers, and reports which fit the definition of an ESS-based publication and were accessed via formal institutional portals that provided relevant bibliographic information were included. Apart from non-English publications, the largest group of publications that was dropped were publications where a reference to the ESS was made (a keyword present in the text), but where not a single item of ESS data was used in the primary analysis. These include publications that report borrowing ESS items for other surveys (without using actual ESS data), or cite ESS data from other publications (secondary use).[1] In addition, a relatively minor number of hits was dropped because they did not fit the definition of an academic publication (*e.g.* webpages with personal or organisational information that contained the ESS key-phrase,

1 Technically, these publications could also be considered 'ESS-based', but such a wider definition would be less precise and less relevant than the primary analysis criterion. This also means that the number of publications that make non-data references to the ESS or cite secondary ESS data is much larger than 2,300, particularly when non-English publications with either primary analysis or without it are taken into account.

personal CV pages and similar). There were also some outdated links, a group of hits referring to another survey (South European Social Survey), and some publications with no formal attributes.

A separate problem is the category of journal articles where a growing number of units is represented by cross-time duplicates. The number of such duplicates has greatly increased since 2011 when many journals seemed to have adopted the policy to advance-publish electronic versions of articles, sometimes a year or two ahead of the paper version. Frequently, Google Scholar counts the electronic version in one year and the (identical) paper version in another. So far, about 100 duplicates have been detected, in which case the later version was dropped so as to avoid ESS publication numbers being artificially bloated by replicated records. After eliminating irrelevant hits for the period 2003–2013, 2.300or 22.3 units remained and were entered into an SPSS data file. This means that the initial figure generated by Google Scholar is an almost 80% overestimation given our definition of an ESS-based publication. To obtain a valid and realistic number, the annual lists of Google Scholar hits should be combed through 'manually', which makes Google Scholar a comprehensive yet also quite a 'messy' source of bibliographic data. As observed by one bibliographic study that tested the Google Scholar tool, the local contents, including papers in low-impact journals, popular scientific literature, and unpublished reports or teaching supporting materials are clearly overrepresented and the larger coverage it provides in some cases consists of items that are incomparable with those provided by other similar databases (Aguillo, 2012).

Yet, despite its imperfections, the Google Scholar search engine proved to be an efficient and comprehensive tool for monitoring bibliographic outputs of the ESS. It indexes various types of publications and seems to come relatively close to reaching the entire universe of relevant formal units, which in the social sciences also include a large number of books and chapters. Some recent studies argue that Google Scholar might provide a less biased comparison across disciplines than Web of Science and that the use of Google Scholar might redress the traditionally disadvantaged position of the Social Sciences in citation analysis (Harzing, 2013).[2] It may have its weaknesses, but so do international databases

2 As reported by authors, the differences between Google Scholar and Web of Science were fairly dramatic for citations of Economics publications, which was due partly to the far more comprehensive coverage of citations to books, conference and working papers. Google Scholar also has the advantage over Web of Science in terms of timeliness and is, according to the study, 9–12 months ahead of Web of Science in terms of publication and citation coverage (Harzing, 2013). In addition, many publication databases, including WoS, are biased towards the USA, having a much better coverage of US journals while under-representing other literatures (Sundberg and Taylor-Gooby, 2013).

that index journal articles, where a considerable number of newly established international journals as well as national journals are not covered, and neither are books and reports. These limitations apply to a much larger extent to the humanities and the social sciences than for the hard sciences (Kyvik, 2003: 35). If anything, Google Scholar is prone to over-reporting and over-identifying relevant hits but, after a process of case-by-case evaluation, its annual lists of publications can be transformed into a rich data source for bibliographic analysis. They are also a complementary source of publications' information for the ESS Online Bibliography when authors fail to record the publications themselves.
In addition to quantitative analyses, the 1.081 journal articles were also extensively harvested for qualitative feedback about users' thematic preferences and their satisfaction with various aspects of the ESS. In the following section, this information will be used to help interpret some of the quantitative findings.

5.2 The Mapping of ESS Scientific Outputs

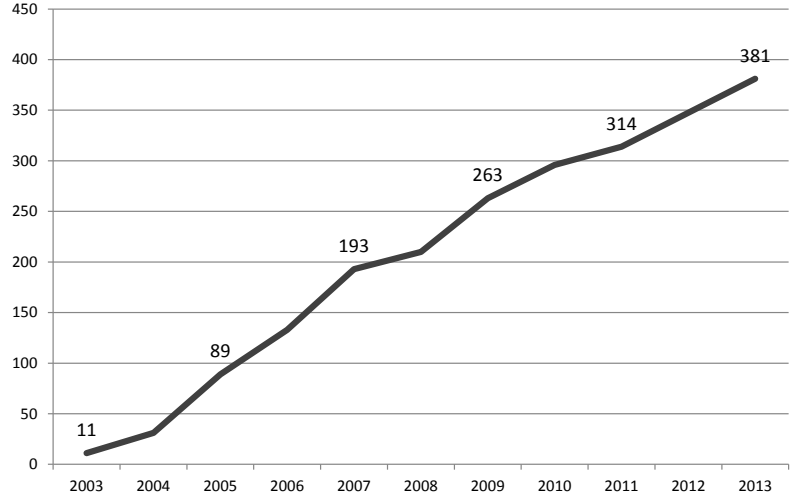
The rest of the chapter is a practical application of the outlined concepts of second-order science, an empirical example that uses qualitative and quantitative ESS bibliographic information as its database. The analysis is organised as a series of sections which deal with specific aspects of bibliographic feedback, sometimes in comparison with other cross-national surveys, and mine for information that corresponds to the concept of survey self-observation and self-reflexivity. Even though most of the analysis is based on ESS-related data only, the findings concerning the role of self-reflexivity in a survey academic and management quality process hold more general appeal.

5.2.1 Overall Publication Trends

The first section examines the most eloquent single indicator of the ESS' academic impact – the overall publication trend. The first round of the ESS was fielded in 2002 and the first cumulative data file was published in 2003. Given the lead time needed for publications to go through the process of writing, reviewing and publishing, it is not too surprising that the ESS 'impact' measured by the number of publications in 2003 was small, but grew quickly afterwards. In later years, there was steady and relatively steep growth in the number of relevant methodological or substantive English-language publications, with 11 of them detected in 2003 and 381 in 2014 (Figure 5.1).
On its own, this trend seems to indicate that the ESS survey is doing well in terms of academic usage, which is constantly on the increase. However, as the

ESS is a relatively young survey, the numbers become much more meaningful when viewed against the benchmark of other similar surveys.

FIGURE 5.1 **Publication Trends: Overall Number of ESS Publications** (*Google Scholar 2003–2013, N=2300*)



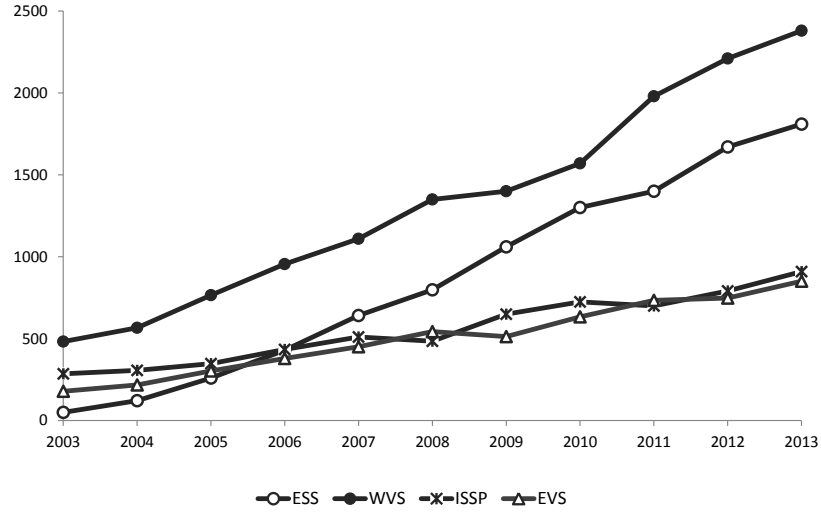
One way to do this is to compare Google Scholar's annual numbers of ESS publications with numbers for three similar cross-national surveys – the WVS, EVS and ISSP (Figure 5.2).[3] Even though the absolute numbers of publications are hugely exaggerated for all four surveys (since these are not 'clean' counts obtained after manual reviewing), the real aim here is a comparison of the proportions.

One immediately obvious fact is that all four surveys have experienced considerable growth in publications in the last 10 years. The main reasons behind this expansion are a rise in the numbers of researchers, pressure to publish by funders and employers, and the expansion of archiving and self-archiving. Many studies report large productivity increases in scientific and scholarly publishing between 1980 and today, reflected in the number of publications rapidly growing (Kyvik, 2003; Engels *et al*., 2012; Guilera *et al*., 2013). Another trend that works in favour of comparative surveys is that authors increasingly want to address an international audience, mostly via English-language international journals (Engels *et al*., 2012). Some even predict that a higher education policy

3 The chart is based on a survey keywords search anywhere in the text: "European Social Survey", "World Values Survey", "European Values Study" (or Survey) and "International Social Survey Program" (or Programme).

shift towards accountability, output orientation, and demand for "international world-class research" will result in a situation where scholars all around the world will publish articles (almost exclusively) in English-language journals, mainly based in the USA and the UK (Paasi, 2005).

FIGURE 5.2 **Publication Trends for 4 Comparative Social Surveys** (*unedited*) (*Google Scholar 2003–2013*)

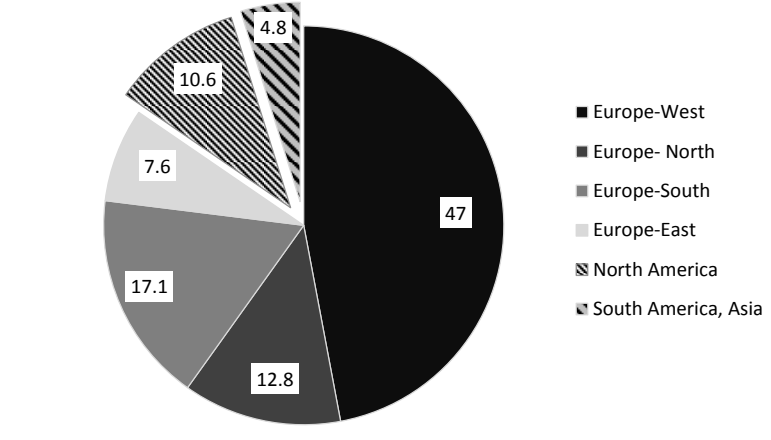


As far as the ESS is concerned, it entered the stage after 2003 and has since shown a fast and steep rise, with its publication count 'overtaking' that of the EVS and ISSP after just a few years of existence. This is not the case with the World Values Survey, whose long time-series and extremely large number of participating countries seem to appeal to an even bigger and more global audience. The overall comparison certainly demonstrates to the ESS governing bodies and financers that the ESS has brought added value to the comparative landscape, having quickly established itself as the leading European-range data source. The reasons for the quick growth of the ESS' publishing presence can partly be explained by the previously outlined context of academic publishing, which makes quality datasets with wide membership and a comparative horizon an ideal source of empirical data for the expanding international academic audience. With its emphasis on survey quality, a relatively dense time series, and the timely publishing of its data sets, open access and extensive Internet tools, the ESS can capitalise particularly well on these trends.

5.2.2 Publication Categories

When self-assessing patterns of academic usage or planning outreach activities, the knowledge about which types of publications are most prevalent and which specific audiences they reach best can be very relevant for a survey management team. In our study, all ESS-based publications were coded into one of the following six categories: journal article, book or chapter, working paper, conference paper, report, and thesis. The most voluminous single category is by far journal articles. According to the 'clean' Google Scholar count, there were 1,081 of them in the 2003–2013 period (Figure 5.3). The dominance of journal articles comes as no surprise and is reported in many other bibliographic studies (*e.g.* Kyvik, 2003). According to a STM report, there were about 28.100 active scholarly peer-reviewed journals in August 2012, collectively publishing about 1.7–1.8 million articles a year (Ware and Mabe, 2012). In a comprehensive UK study, 93.7% of researchers considered peer-reviewed journals a very important form of dissemination in their field, followed by conference papers (34.3%) and monographs (33.6%) (Fry *et al*., 2009). For the time being, the share of other types of publications is still relatively strong, compared to the natural sciences. This indicates that in some humanities disciplines a traditional publishing culture dominated by monographs is still alive, as it is in parts of sociology (Nederhof, 2006: 85).

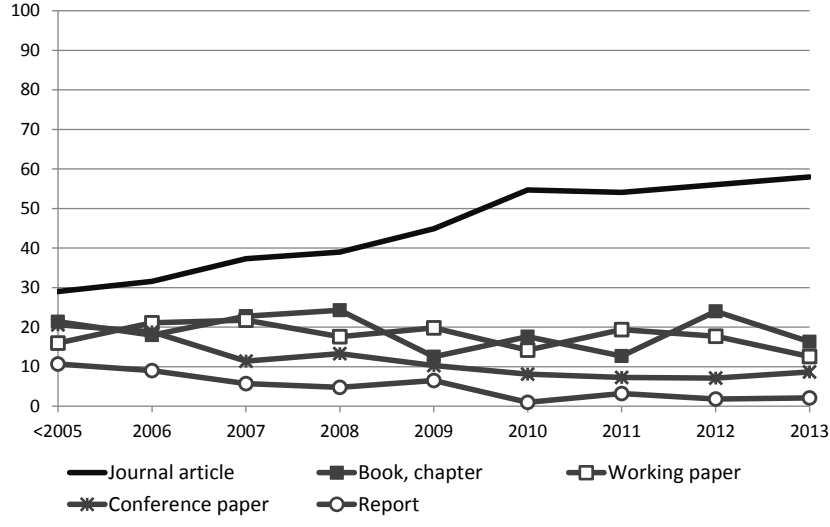
FIGURE 5.3 **ESS Publications by Category**
(*Google Scholar 2003–2013, N=2300*)



(N=2025)

Nevertheless, journal articles are the only category that keeps growing steadily (Figure 5.4) and this trend is expected to continue. Practically all bibliographic studies report increased use of the journal article as a medium of dissemination also in the social sciences and the humanities, although books continue to be highly valued (Engels, 2012; RIN and JISC, 2009). Among ESS-based publications, the second largest group (425) is made up of books and chapters, including proceedings. The collection of working papers (discussion papers, research papers) is similar in size (398). In most cases, working papers are good quality publications that have not (yet) reached the stage of a journal article. They are usually open-source and accessed via formal portals which also list relevant bibliographic information. There are several series of working papers established by academic institutions, with the strong presence of ESS-based publications, *e.g.* ESRC, IZA, CSD and others. The number of conference papers is also significant (236). In addition, Google Scholar detected 92 reports and 63 student theses. The latter number is probably largely underestimated as different universities have varying very policies about putting these works online.
On the other hand, studies detect some elements that work in favour of a variety of publication types, particularly with respect to their target audiences. There seem to be different motivations behind the different types of outputs.

FIGURE 5.4 **Publication Trends by Category**
(*Google Scholar 2003–2011, N=2300*)



In the previously mentioned UK study, career advancement was found to be the most important motivation to publish in peer-reviewed journals, while maxi-

mising the dissemination to the target audience was the most important motivation for researchers' decisions to publish their work in book chapters and conference papers. In the case of reports, research funder requirements had the strongest influence on researchers' decision to use this form to publish research findings (Fry *et al*., 2009). One of the useful implications here for the ESS communication strategy would be to use books and conferences to promote the survey or its specific content to target audiences.

5.2.3 Journal Academic Field

When examining patterns in the journal academic field, the main goal was to acquire a picture on the ranking and spread of intellectual communities that ESS data best support. This angle of information provides feedback on whether parts of the questionnaire, which were designed to appeal to authors from specific fields, have succeeded in reaching them, or not. In the latter case, the question that follows is whether the problem lies in the survey instrument itself, or in the lacking communication actions. Yet, in sum, the spread of journal articles across scientific fields charts, at least roughly, the shares of ESS primary academic audiences. In our bibliographic monitoring model, this indicator is therefore the most direct measure of the variety and scope of ESS academic user communities, as well as the popularity of various ESS parts (modules) among them.

The 1.090 ESS-based journal articles detected for the 2003–2013 period were published in a large number of peer-reviewed journals from a range of academic fields (Figure 5.5).

Sociology prevails quite strongly with 36.6% of journals coming from this field, followed by political science journals (19.1%) and – perhaps somewhat surprisingly – economic journals (10.6%). The spectrum of journals confirms that the ESS is quite strongly present in several other intellectual communities apart from sociology and political science, most notably among economists, medical scholars, psychologists, and demographers. Following on from this pattern, further expansion can be expected as new modules are developed and fielded. For example, ESS presence in criminological journals will likely increase when publications based on the Round 5 module on Criminal Justice will become more numerous, as will the ESS' presence in environmental journals once the R8 Climate Change module data become available for analysis.

The study also identified specific (English-language) academic journals where ESS-based papers are most frequently published by using a criterion of 10 or more publications overall (Table 5.1). The list reiterates that ESS-based articles are typically present in European academic journals which focus on methods or social indicators, sociology or political and policy science.

FIGURE 5.5 **ESS Publications according to Academic Field of Journals** (*Google Scholar 2003–2013, N=1090*)

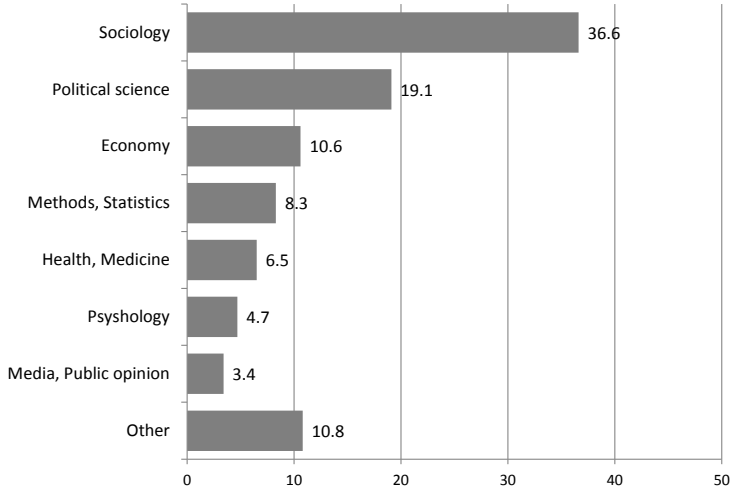


TABLE 5.1 **English-Language Academic Journals with the Most ESS-based Publications** (*Google Scholar 2003–2013, N=1081*)

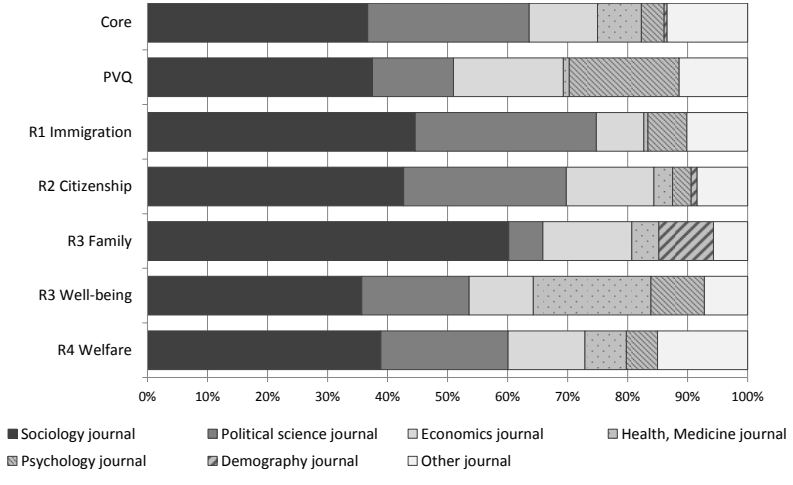
Rank	Journal	Number of publications 2003–2013
1	Social Indicators Research	57
2	European Sociological Review	48
3	European Societies	30
4	International Journal of Public Opinion Research	15
5	International Journal of Sociology	14
6	Journal of European Social Policy	14
7	Survey Research Methods	14
8	International Journal of Comparative Sociology	13
9	Comparative Political Studies	12
10	Journal of Cross-Cultural Psychology	12
11	Portuguese Journal of Social Science	12
12	West European Politics	11

We also counted the total number of journals with ESS-based publications (485). In 33% of journals, more than one ESS-based article was published, while in 67% of them only one article was detected. This 'long tail' seems to reflect

the previously mentioned trend of expansion in academic publishing and the subsequent explosion in the number of academic journals.

These general insights were supplemented by more specific examinations of the connection between an academic journal field and the ESS Core and rotating modules (only for modules with enough publications that allow for reasonable statistical analysis) (Figure 5.6). Judging by the type of journal where its outputs get published, R2 Family and Work is the most 'sociological' of all ESS modules and parts. However, it also has the largest share of publications in demographic journals, owing to question(s) about respondents' birth intentions and personal demographic history. Publications based on the Portrait Values Questionnaire are, unsurprisingly, published relatively strongly in psychological journals, while the R3 Personal well-being module is often the basis for publications in medical journals. This is largely due to the CES-D depression scale and other measures related to respondents' psychological well-being. Generally, sociological journals prevail in all modules, usually followed by political science journals – with the exceptions of PVQ and R3 Personal well-being. Publishing in economic journals is also relatively strong (third place in the case of most modules), particularly in association with the PVQ questionnaire. This confirms that economically oriented authors are keen to explore the 'culture and values' angle of economic attitudes and behaviours. Another module relatively strongly present in economic journals is R3 Family and work, owing to its items on informal work (housework) and labour market involvement.

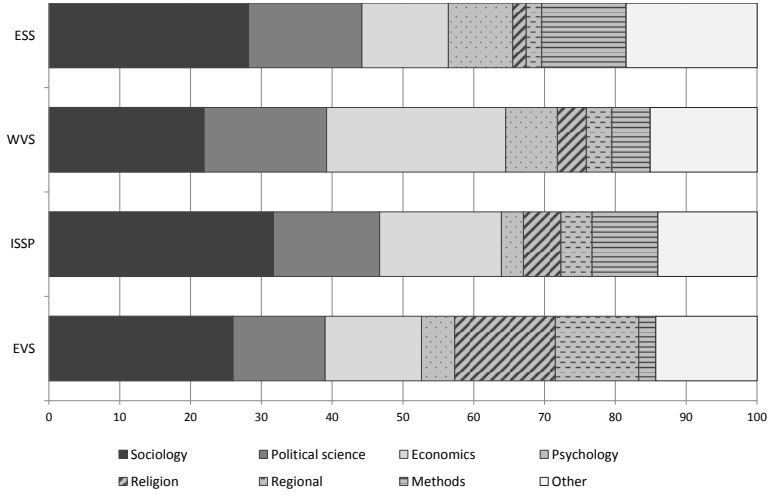
FIGURE 5.6 **Patterns of Connection between Academic Journal Field and ESS Modules** (*Google Scholar 2003–2013, N=733*)



This kind of insight is valuable as it demonstrates, firstly, that at the level of 'large units', such as rotating modules, sociology and political science prevail, which corresponds to the primary ESS academic target groups. Secondly, there are some notable differences in user profiles between the modules, providing knowledge that can guide future ESS outreach actions in a more efficient way. Thirdly, a certain subset of questions, or even individual items – and not necessarily the whole modules – can generate significant attention and usage from a specific group of academic users from another field. This suggests that a relatively moderate 'investment' may be enough to expand survey data usage among new academic communities. It is, however, not straightforward to predict if the desired effect will occur.

Figure 5.7 again puts these findings in a wider perspective. For publications in 2012, it compares ESS journal patterns with those of the three other cross-national surveys and provides an insight into which academic fields each of the four surveys best supports and whether any degree of user specialisation is detectable among the surveys. The results reveal that this is, to some extent, the case. For instance, apart from sociology and political science, the ESS' presence is relatively the strongest in psychological journals owing to Schwartz's human values scale, as well as methods, owing to a large group of methodologists associated with it.

FIGURE 5.7 **Journal Academic Field across 4 Comparative Surveys** (*Google Scholar 2012, N=2025*)



The WVS is the only survey where sociology is not the leading journal discipline, but economics. ISSP is the most sociologically published and also

strong in methods. The EVS has a much stronger presence in religion journals, as well as regional journals. The ESS is also strongest in the "other" category, which includes health and medicine and demography where it also dominates compared to the other three surveys.

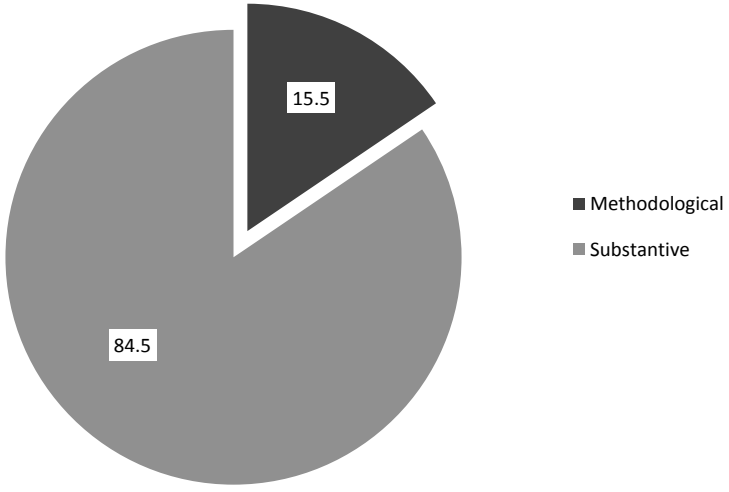
5.2.4 Topics

Mapping the topics addressed by publications is one of the basic self-observation exercises for any survey research team. The picture demonstrates in quite specific ways which issues are being tackled most frequently by academic and policy user groups, and which not. This provides an indirect indication of which questionnaire content is being used the most, and whether some of it is being largely overlooked, suggesting a need for changes. Again, the two additional dimensions of feedback will be a comparison of topic patterns between surveys, and looking for associations between topics and ESS rotating modules; specifically, whether individual modules are being used in the topic areas they were designed for.

Based on the title and abstract, each ESS publication was coded for up to two topics. The first big divide was between methodological (15.5%) and substantive publications (Figure 5.8). As the overall number of publications has increased over time, the share of ESS-based methodological publications has been decreasing, which is hardly surprising since methodological publications are limited to a much narrower group of authors. Only in 2003 did methodological publications surpass substantive ones in number, but with the release of the first ESS cumulative data file the picture changed quickly. Nevertheless, the absolute count for methodological papers is still high (357), reflecting the fact that a large group of methodologists is associated with the ESS research team, doing continuous academic research into various aspects of survey methodology. As already mentioned, methodological excellence is one of the ESS' signature elements for which it was also awarded the Descartes prize in 2005 and can be considered a form of external evaluation.

Among substantive publications, the topics that ESS-based authors explore most frequently are immigration, political participation, welfare, subjective well-being, life-work conflict and social capital (Figure 5.9). These are the six 'big issues' whose investigation the ESS data most strongly support. It is reasonable to assume that the picture partly reflects the structure of the ESS Core questionnaire and modules, and partly the preferences of ESS academic user groups among which sociologists and political scientists prevail. Other topics belong to well-established areas of social research, with an emphasis on current issues such as political protest and radicalism, the economic crisis, the welfare state, and the labour market.

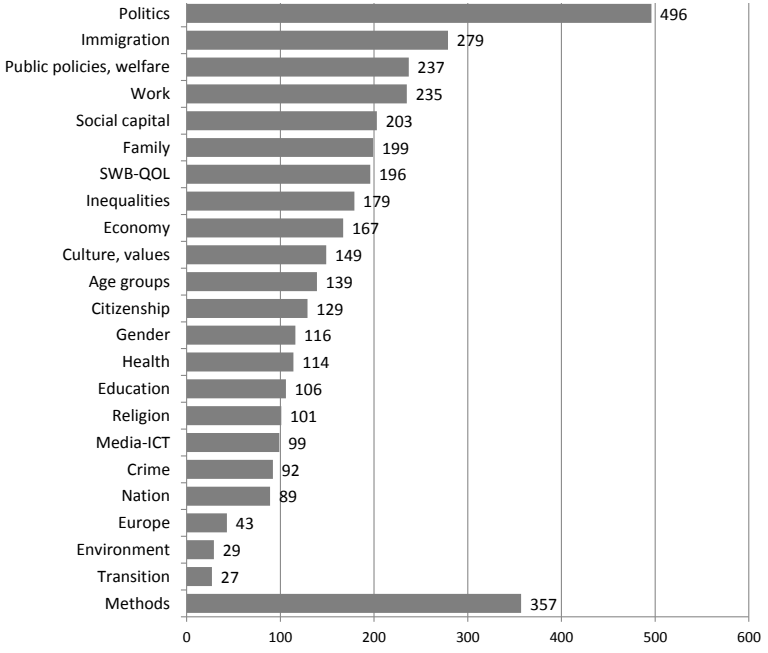
FIGURE 5.8 **ESS Substantive and Methodological Publications**
(*Google Scholar 2003–2013, N=2300*)



Qualitative reviewing of publications' abstracts yielded a map of specific angles from which particular topics were approached. Apart from being interesting in itself, this kind of information can be used as a starting point for designing ESS outreach publications in a way that will reflect the most relevant social and policy debates. Publications on *politics* (496) were mainly concerned with electoral outcomes and their determinants, the issue of radical voting, and the future of democracy in the light of spreading political withdrawal and cynicism (also see Newton and Monero, 2007). Many *immigration* papers (279) examined immigrant populations and sub-populations and explored their integration, experience of discrimination and educational achievements. Others discuss host populations and their reaction to immigrants. The ESS is clearly a very powerful source to investigate these issues, with the 2002 Immigration module and a small battery of core items repeated in each round.

Citizenship was the key topic in 129 publications. Most authors explored the concept of active citizenship and its determinants, such as trust and political knowledge. They also explored its geography and outcomes, in particular for political legitimacy, social inequality and social cohesion. In relation to these topics, publications discussing *media and ICT* (90) were chiefly concerned with media effects in the political sphere, in particular the role of television. The second common theme was implications of the new media and the Internet for political participation and campaigning, and generally the social and political effects of the Internet.

FIGURE 5.9 **ESS Substantive Topics by Order of Popularity**
(*Google Scholar 2003–2013, N=2300*)



The *social capital* publications (203) were very much focused on the trust dimension. Most authors explored the interaction between social trust and various societal outcomes, such as social cohesion, inequality, subjective well-being, health, civic engagement etc. Others examined whether it is possible to build trust and whether it can be done through (welfare) policy measures. Another hugely popular topic was voluntarism, particularly respondents' involvement in the activities of voluntary organisations (also see Norris and Davis, 2007).

Public policy and welfare state was the key theme of 237 publications and also one of the 'big' topics. Most of these publications investigated *welfare state* regimes and their outcomes, welfare and redistribution preferences of the public and the cultural determinants of welfare regimes, *i.e.* why they remain persistently different in different regions of the world. Authors discussing *social inequality* (179 publications) primarily examined new trends in inequality, perceptions of social justice, and political implications of social inequalities, such as class-based political articulation. *Well-being* publications (196), on the other hand, were focused much more on subjective well-being, in particular the happiness and life satisfaction dimension. Most examined the subjective well-being of different social groups, such as age groups, or discussed the question whether subjective

well-being can be promoted by way of policy measures with the goal of 'greater happiness for a greater number'.

The topic of *family and family planning* was discussed in 199 publications. It touched on several pressing policy issues, in particular tensions in the *work*-life balance in the context of growing career demands on one hand, and the attempts to liberalise child care policy on the other. Many papers explored the effects of family policy on the inclusion of women in the labour market, or dealt with family perception and family planning issues in the light of declining demographic trends. A related group of publications on work (235) examined the role of trade unions in employment relations and in the democratic political process in general. Many explored perceptions of employment insecurity in the context of flexicurity trends and the financial crisis, *i.e.* the trade-off between market flexibility and job security, the social consequences of job insecurity and role of policy in managing those consequences. Finally, publications that discussed *gender* issues (116) were primarily concerned with gender segregation and the gender gap in the area of political participation and the labour market, as well as the division of household labour.

Among *health*-related publications (114), the biggest theme by far was health inequalities across social groups and countries, and their micro-macro determinants. A significant number of publications (139) explored various aspects of the two 'critical' *age groups*, the young and the elderly. For the young, the most burning issues seemed to be the problem of low political engagement, the transition to adulthood and their well-being. In the elderly group, the issues most frequently investigated were experiences of loneliness and a lack of social support, the experience of discrimination, as well as the impact of ageing voters on the democratic process.

Culture and values, discussed in 149 publications, relied a lot on Schwartz's human values scale items (Schwartz, 2007). This indicates the existence of a fairly significant sub-group of academics who are particularly drawn to the ESS by these items, most of them exploring the cultural characteristics of different social groups in relation to various outcomes such as innovation activity, political participation, voting preferences, economic development etc. Many explore the geography of values by comparing countries or groups of countries.

A surprisingly large number of publications (167) addressed *economics*-related issues, many of which made use of the measures of culture. While sociologists are intrigued with the question of how to promote well-being, and political scientists with how to promote political trust, economists are mainly intrigued by the issue of promoting the culture of innovation. Many of these papers explored the hard and soft factors that encourage innovation and entrepreneurship. All in all, quantitative and qualitative topic mapping indicates that the ESS provides

analytical opportunities to a fairly wide circle of academics and policy experts in a variety of academic fields. Later on, we will more specifically explore how this potential is sustained through a set of widely-used indicators in the ESS core part (trust, subjective health, happiness etc.), as well as some very successful rotating modules that addressed key social issues. Another element that widens analytical possibilities is a comprehensive demographic section, enhanced with the Schwartz value battery.

Another angle of self-observation was obtained by comparing ESS topic maps with those for the three other cross-national surveys. All four surveys address a similar audience of social scientists in a number of disciplines,[4] so they present a good framework for revealing where the ESS is a particularly common data source choice and where this is not the case. Our study compared the survey choice of analysts according to the topic they discussed for publications in 2012.

Immigration and age groups were the two topics where the ESS strongly dominated as the data source (Figure 5.10). A comprehensive immigration data set was clearly missing until the ESS immigration module came along. Judging from our qualitative analysis, this is not only because of the R1 Immigration module and the immigration core battery of 6 items which came from it, but also because of the possibility to precisely identify respondents' and parents' country of birth (in other words, first- and second-generation immigrants), which was not possible in other large-scale comparative surveys.[5] In addition, the ESS is most often used to explore

4 **ESS** – An academically-driven social survey designed to chart and explain the interaction between Europe's changing institutions and the attitudes, beliefs and behavioural patterns of its diverse populations. Biennial, first round in 2002. Since 2002, it has included 34 European countries.

ISSP – Continuing annual programme of cross-national collaboration on surveys covering topics important for social science research. It brings together pre-existing social science projects and coordinates research goals, thereby adding a cross-national, cross-cultural perspective to individual national studies. Since 1984, the ISSP has included 53 nations.

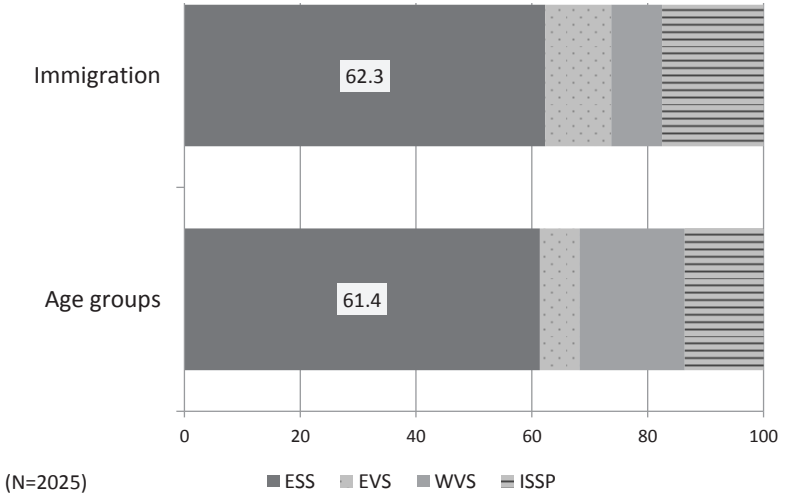
EVS – A large-scale, cross-national, and longitudinal survey research programme focusing on basic human values. It provides insights into the ideas, beliefs, preferences, attitudes, values and opinions of citizens all over Europe. Data are collected every ten years on how Europeans think about life, family, work, religion, politics and society. The fourth wave in 2008 covered 47 European countries and regions.

WVS – Started in 1981 to explore people's values and beliefs, how they change over time and what social and political impact they have. It is carried out in almost 100 countries. Data are collected every five years on support for democracy, tolerance of foreigners and ethnic minorities, support for gender equality, the role of religion and changing levels of religiosity, the impact of globalisation, attitudes to the environment, work, family, politics, national identity, culture, diversity, insecurity and subjective well-being.

5 In its 2012 wave, the World Values Survey included questions on the immigrant status of respondents and parents.

age groups, the young and the elderly, which can be attributed to its Timing of Life and Ageism modules, as well as its larger sample sizes and the inclusion of younger respondents from 15 years of age.

FIGURE 5.10 **The ESS as the Dominant Data Source**
(*Google Scholar 2012, N=2025*)



Frequently two surveys were found to be the dominant source to explore an area of interest. In the case of Work, Role of government, Inequalities, Family and methods, the ESS and the ISSP were the dominant data sources, accounting for 60% to 75% of all such publications (Figure 5.11). These areas largely correspond to ISSP and ESS modules and authors seem to choose them to explore these issues in depth. There is, however, a possibility that different aspects of these wider topics are being explored using different surveys, which the study did not address.

Similarly, in the case of crime, politics, media and health the ESS and WVS account for about 75% of publications (Figure 5.12). Here, the ESS rotating modules cannot be the explanation – the R5 Criminal justice ESS module was still very recent in 2012 and the WVS is not organised into modules at all. This time, individual items – ABC Core items in the ESS case – in combination with a large pool of other items seem to attract users.

Finally, the comparison highlighted three areas where the ESS accounted for a very small share of publications – the environment, globalisation and religion (Figure 5.13). This was not too surprising given that the ESS at that point contained almost no items tapping the dimension of the environment, apart from a lone item in the core part, and another lone item in the PVQ questionnaire.

FIGURE 5.11 **The ESS and the ISSP as Dominant Data Sources in 2012** (*Google Scholar 2012, N=2025*)

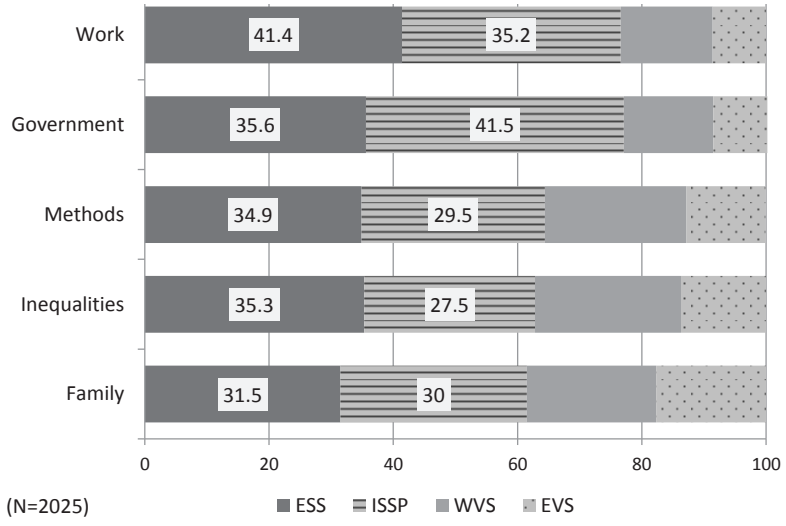
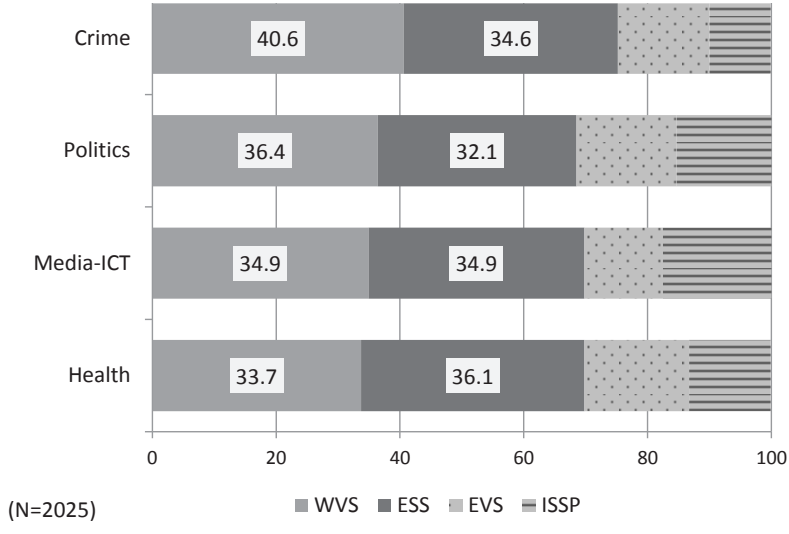


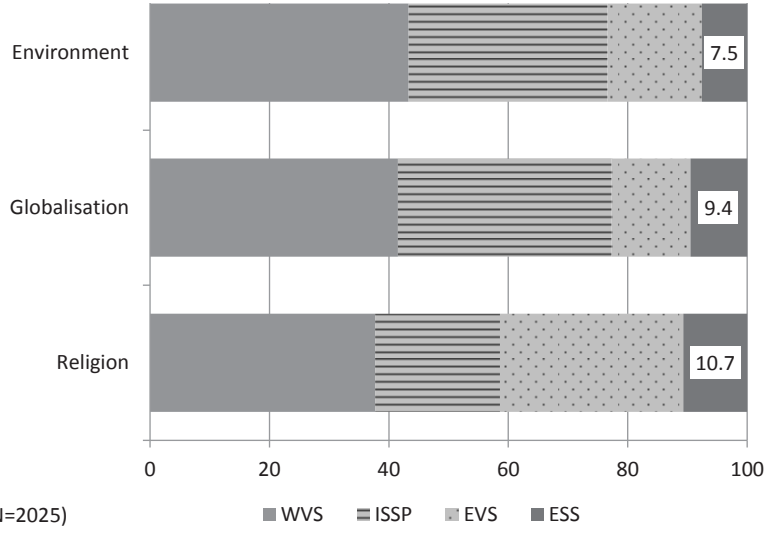
FIGURE 5.12 **The WVS and the ESS as Dominant Data Sources in 2012** (*Google Scholar 2012, N=2025*)



As to religion, the ESS regularly includes a basic battery of religious activity and affiliation items, but the WVS/EVS and the ISSP have a much larger assortment

of items tapping religious attitudes. In the case of globalisation, the decisive factor seems to be the scope of membership as both 'global' surveys are a much more frequent choice when this topic is addressed.

FIGURE 5.13 **Topic areas where the ESS was a marginal data source in 2012** (*Google Scholar 2012, N=2025*)



The comparison confirmed and specified the picture which was already obtained when comparing journal articles' fields. From the perspective of an international general social survey research team, 'topic gaps' can be a problem as they may decrease its academic value and impact. The ESS Scientific Advisory Board, which is the body that decides on rotating modules and is one of the bodies the study informed, selected a Climate Change module for Round 8 partly as a consequence of these insights, thus filling what was probably the most critical gap in the ESS landscape of topics.

In addition to quantitative analysis, our study also used a qualitative approach to explore in more depth why authors choose the ESS survey. The approach consisted of a reading through the 'data and methods' sections of the downloaded publications and searching for relevant parts of the text that related to the choice of a survey. The typical results, presented in Box 5.1, indicate that the content was the most important element for the decision, not just at the level of general topics and rotating modules, but very often at the level of specific items.

Box 5.1 Choosing ESS due to Content (Items, Concepts, Modules)

These data (ESS1) offer the unique possibility to focus on *informal social capital* and to simultaneously take both mediating variables (*i.e.*, ethnic threat perceptions and intergroup contact) into consideration, across a large number of European countries.

We use data from the European Social Survey waves 2, 3 and 4 (2004, 2006 and 2008) for the EU member states. These ESS waves fit our needs in terms of the variables included *(support for EU integration)*, the number and variety of countries covered, and the measurement scale (0–10) of the dependent and key independent variables.

We use the fourth wave of the ESS1 which covers 31 European countries for the years 2008/2009. This data set has been chosen for ... It is one of the few that include a large number of countries and a measure of the *perceived employment security* of individuals... This survey covers the period 2008/2009, which coincides with the recent financial crisis, allowing us to explore its impact on security perceptions.

The European Social Survey is used for the analysis of immigrants' attitudes to European unification here as it is the only cross-national data set that includes detailed information on *immigrants' countries of origin* as well as their *parents' country of birth*.

When studying the occupational status of 'old' and second generation immigrants in old receiving countries, the five waves of the European Social Survey dataset (ESS) are used. This dataset includes much more detailed information than the EU-LFS, in particular information on parental country of birth and on the *individual migration history*, also distinguishing those who have been living in the host country for more than 20 years

This survey (ESS1) is one of the very few cross-national studies that have included *financial support* in their lists of participatory activities, and that treats donations to political parties as a distinct category. Subsequent rounds of the ESS have not repeated this question.

Besides being a high quality, cross-nationally comparable data source, the 2002 edition contains an extended measure of donating to various types of *voluntary associations* and of generalized and institutional trust.

There are two sets of *civic engagement* indicators in the ESS 2002, capturing political participation as well as involvement in voluntary organizations. Both sets of questions are crucial for civic engagement as they represent various forms in which citizens across Europe get involved and by doing so might influence the socio-political landscape of their societies.

This wave contains a *module on welfare attitudes* that is currently the most extensive cross-national dataset for measuring welfare attitudes available. Therefore, these data can be considered a unique opportunity, allowing us to measure most—but unfortunately not all—dimensions of our conceptual framework.

The core module includes an abbreviated 21-item version of the *Portrait of Values Questionnaire*. This instrument is based on the (currently) most influential taxonomy of individual differences in values, namely, Schwartz's (1992) taxonomy.

The 2004 wave contains the in-depth theme, "Family, work and wellbeing," that includes a number of questions that are relevant to this study.

To our knowledge the ESS 2008 is the only internationally comparative dataset containing a measure of *welfare chauvinism*. "Thinking of people coming to live in [country] from other countries, when do you think they should obtain the same rights to social benefits and services as citizens already living here?"

This study investigates to what extent becoming a grandparent affects early retirement in European countries. We use micro-data from the ESS3, with fieldwork carried out late 2006...This round asked respondents both about the *year of retirement* and about the *year when their first grandchildren were born*, if any. This retrospective information allows event history analysis taking the chronology into account, which is better suited for the identification of cause and effect.

Round 5 features a module on "family, work and well-being" ... A specific subsection allows the specific reconstruction of the *flexibilization of contractual relationships* as well as working time arrangements since the financial crisis in 2008.

The second and third important element were survey quality and measurement characteristics (Box 5.2 and 5.3).

Box 5.2 Choosing the ESS due to Survey Quality

The ESS ensures exceptionally high standards regarding the comparability of questionnaires, sampling designs and population coverage, making it an ideal tool to analyse a large number of countries simultaneously.

The ESS is an academically driven, large-scale, repeat cross-sectional social survey, covering over 30 European countries. Its rigorous methodology, relatively large sample size (approximately 2,000 respondents per country per round) and high data quality standards make the ESS a prime source for comparative survey research across European societies.

The European Social Survey provides reliable and up-to date information on trust in political institutions in 23 European countries with a substantial range of variation in proportionality. This dataset is ideally suited for comparative analysis since particular attention has been paid to ensure comparability with regards to the operationalization and cross-cultural validity of concepts in the participating countries.

To these data, we added information about party supporters from the European Social Surveys (round 2), including whether they identify with a party or not. We used the ESS because of its large sample size and the high quality fieldwork.
With large representative samples, carefully conducted translation work, and satisfactory response rates, the ESS provides the nationally comparable estimates required for this study.

Methodical translation procedures were used to ensure that each of these nationally organized translation efforts was informed by best practices and that the different language versions of the source questionnaire were functionally equivalent.

Box 5.3 Choosing the ESS due to Measurement Scales, Units and Group Sizes

For more recent years we only have data from European Social Survey and Eurobarometer for a small number of countries. These surveys use the same question as the World Values Survey, but, unlike the latter, which demands dichotomous yes or no answers, *allow answers on a scale*.

The ESS has the potential to overcome several weaknesses of earlier data sets used for cross-cultural analysis – it provides uniquwe opportunities for the analysis of *differences between regions* within nation states...

Another particularity of ESS data on income is that it is *given in deciles of national income*. ...This national-decile-based reporting of income has a great benefit of being comparable over countries. In particular, this allows me to pool the data on all countries in the dataset without worrying on cross-country differences in income levels.

We have decided to use the ESS4-2008 instead of the 2009 European Parliament Election study because ... the ESS data includes *higher numbers of populist radical right voters* than the 2009 European Election Study (twice as many on average for the countries considered here).

The ESS data are suitable for exploring differences between immigrants and the majority population, as the ESS sample includes a *sufficiently large number of immigrants* to enable analysis.

On the negative side, the content, or lack thereof, was also the main reason for criticism (Boxes 5.4 and 5.5). Authors would often lament missing indicators, whether individual indicators or their sets, either because they were not there at all, or are not being repeated on a regular basis, or were not asked in the whole sample. Mapping such comment allows the ESS team to make minor or more significant adjustments, *e.g.* to identify specific items that are being missed most and consider introducing them or moving them from a rotating module into the core part to respond to the 'demand'.

Box 5.4 ESS Deficiencies due to Missing Items or Concepts

The ESS does not include *individual wages* or earnings, which is the common dependent variable to test sheepskin effects.

ESS does not contain information on the relationship between *ethnic identity* and the identity of the 'majority' group where this person lives. For example … 'In many ways I think of myself as British'.

Unfortunately questions concerning *job characteristics* were not recorded for self-employed respondents.

ESS survey does not provide information on the *timing of divorce and on the timing of the second union*, if applicable. As a consequence it is impossible to derive whether a respondent's biological children are born in his or her first marriage (or at least before the second union) or whether they result from the second union.

The number of voluntary associations to which respondents belong, constitutes a super-set of potential voluntary association contacts. However, as has repeatedly been noted in the literature, counting memberships in voluntary association types underestimates the actual number of respondents' memberships because *multiple memberships within one type of voluntary association* are not counted.

European Social Survey lacks measures of *national identity*.

Unfortunately, the ESS data does not contain information on *non-labor income*, but only on monthly household income, capturing both labor and non-labor income.

It would have been ideal to dispose of measures of media preference that capture *variation in the kind of papers, magazines, networks, sites* people use. That information is unfortunately not available in the European Social Survey.

However, as we are quite frequent users of large-scale survey data we must admit that we keep dreaming about much more refined measurement instruments – with much more (gender- and otherwise) sensitive wording – than those that are usually available (*homophobia*).

Box 5.5 ESS Deficiencies due to Non-Repetition of Items or Concepts

One problem with our empirical work is that we are unable to determine whether the observed union membership status reflects an individual's actual preferences or if it is the result of circumstances beyond the respondent's control. For example, information on whether a *union is present at the respondent's workplace*—which was found to be a highly important factor in Schnabel and Wagner (2007b)—is not available in the survey data with which we are working (Round 4).

ESS3 only has information on the current partnership status instead of the *complete partnership history*.

The ESS is one of the first public cross-national surveys to provide information on both *boycotting and 'buycotting'* but unfortunately only in the first wave; the subsequent ESS waves only ask about boycotts.

Although the survey is conducted biennially, some questions forming the base for our indicators are not included in every round. For example, questions regarding *membership in voluntary organisations* can be found only in the first round.

The survey used in this study is the sixth edition of the first round of the ESS (2002/2003). This was the only round of the ESS that included a questionnaire *item on political discussion*.

The 2002 wave of the ESS includes five questions that gauge *political efficacy*... The 2004 and 2006 waves include only three questions gauging internal political efficacy, and the 2008 wave includes only two questions gauging internal political efficacy.

Finally, we should mention another aspect relevant to survey choice, namely ease of access. In the context of the growing publishing demands that academic writers and researchers face, ease of access is one of the circumstances that may influence the decision to pick a specific dataset. The NIS study, for instance, found that for many researchers, especially younger ones, accessibility has a major influence on what they cite (RIS and JISC, 2009). By superficial analogy, this is also true for datasets, within the limits of their general relevance, of course. The ESS maintains a strong online presence, with the Internet being its main dissemination channel (see Kolsrund *et al*. 2007). ESS data, metadata, findings, news and information about the survey are disseminated via its single integrated website launched in September 2013. Users can freely browse through or download the ESS source questionnaires, show cards or other ESS fieldwork documents etc. Also available from the website is the documentation that outlines the ESS methodology and its methodological research programme.

5.2.5 Authorships

As noted, the comparison between the four surveys revealed that the choice of a survey largely reflects the questionnaire content. However, this is not the only determinant. While good topic coverage is certainly the strongest and most logical incentive, geographical coverage is another key factor, in particular when several surveys offer similar concepts. Users who want to explore a particular topic will typically be drawn to a survey which offers the biggest set of relevant indicators and preferably includes their country. It may possibly be the other way around, considering the importance of the domestic audience for academics and policymakers, and the analytical advantages of familiarity with the country context (Stoop, 2007). One of our bibliographic monitoring indicators is therefore the first author's affiliation, which mostly but not always corresponds to the author's nationality.

Based on it, we obtained an overview of countries and regions where most ESS-based academic findings are produced. In total, first authors come from 48 countries, all continents and a few national or international institutions (*e.g.* the OECD). The results show several strong publishing countries, in particular the UK, Germany, the USA and the Netherlands (Figure 5.14). These are countries where the most ESS-based academic capital is produced, and are generally countries with the strongest social science communities.[6]

Figure 5.15 shows the publishing outputs across wider European and other regions. As to the continent, it is no surprise that the vast majority of first authors come from European countries (84.6%), which corresponds to the geographical coverage of the European Social Survey data, while 10.6% come from North America and Australia and about 4.8% from other parts of the world. Within Europe, the strongest publishing region is Western Europe, followed by Southern and Northern Europe. The presence of Eastern European authors is relatively weak given the number of member countries in the ESS, possibly due to the less pressing publishing culture, lower competence in publishing in English-language publications, smaller numbers of scholars in these fields, and other factors. Their share may also be somewhat underestimated as there is a possibility that these authors are more prolific in national languages, preferring to address their national audiences. Another possibility is that they are less likely to be listed as first authors in internationally co-authored publications in which

6 Interestingly, the *ESS data user survey* offers a fairly similar picture, with data users coming from 63 countries. However, the comparison reveals there are some countries (*e.g.* Slovenia or Switzerland) where data usage is very strong while academic outputs are less so, suggesting that in some countries data usage has a different main rationale, such as teaching. (Gatrell and Widdop, 2012)

they are increasingly engaging, according to some studies (Teodorescu and Andrei, 2011).

FIGURE 5.14 **Country of First Author's Affiliation. Countries with more than 20 first authors are included**
(*Google Scholar 2003–2013, N=2300*)

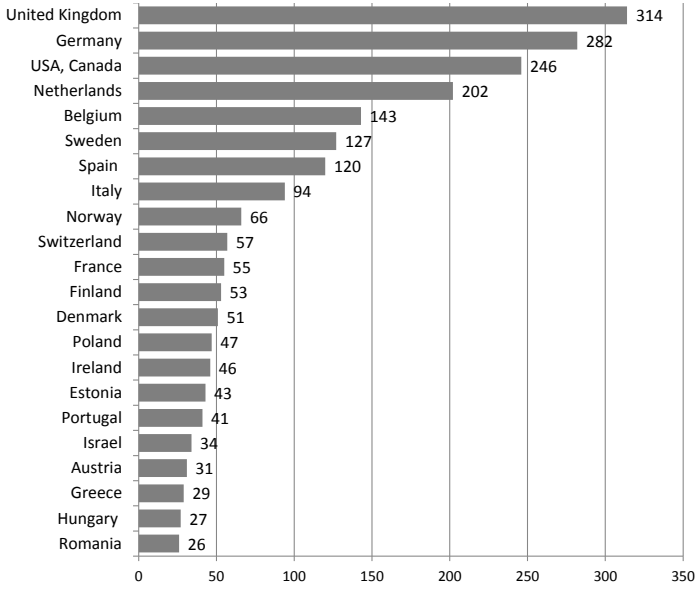
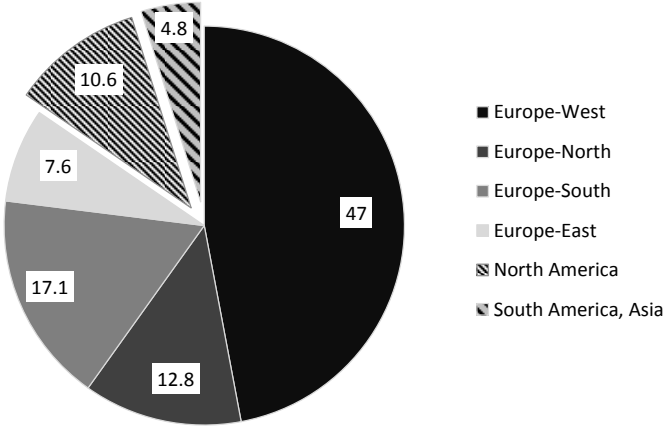


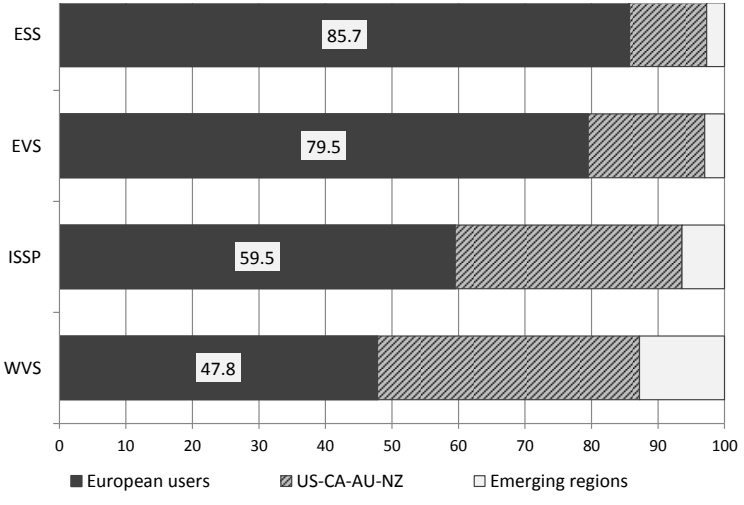
FIGURE 5.15 **ESS Authors by Region and Continent**
(*Google Scholar 2003–2013, N=2300*)



(N=2025)

As revealed later in the chapter, academic writers often combine ESS data with other micro datasets, often ones that include their countries. This explains part of the motivation for using ESS data by authors from non-member countries and regions. In the case of North American authors, an additional factor is that much of the ESS R1 Citizenship module was fielded in the USA under the name Citizenship, Involvement, Democracy in 2005, which enables wide comparisons. Generally, there seems to be a strong connection between the scope of membership and the patterns of authors' origin. Global-membership surveys have the advantage of attracting a wider audience of users, as demonstrated by Figure 5.16. The structure of first authors' affiliations reveals that the two global-reach surveys have a much larger share of non-European authors. The WVS in particular attracts a global authorship owing to its huge membership unmatched by any other comparative social survey. This spread is a likely explanation for the continuous publishing success of the WVS and seems to largely offset its lower level of cross-country equivalence, for instance. This indicates, among other things, that survey quality alone is not necessarily the key element that guides the selection of a dataset. Many academic users are likely to make trade-offs between the level of equivalence and comparative scope, or the level of equivalence and addressing their domestic audience and issues.

FIGURE 5.16 **ESS Authors by Region and Continent**
(*Google Scholar 2012, N=2025*)

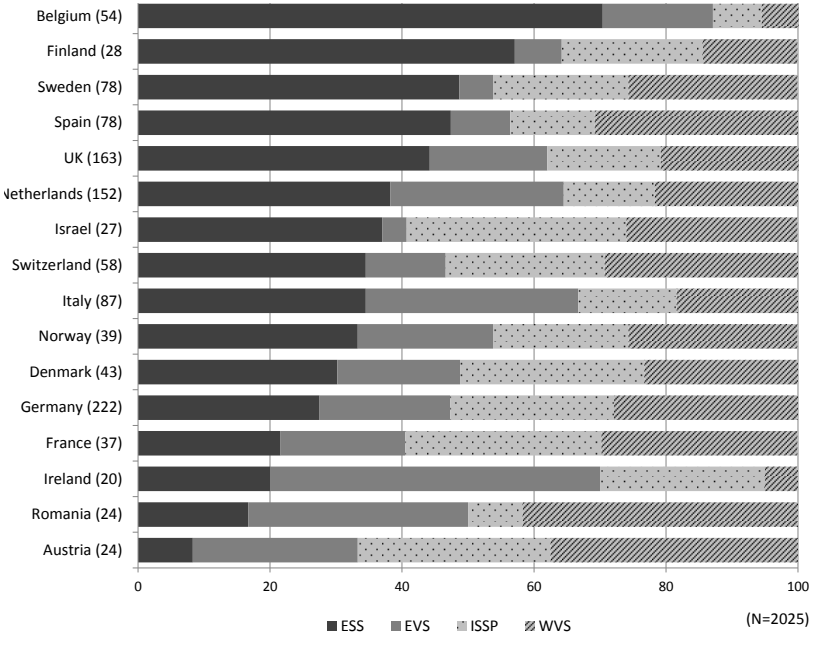


These findings may have sweeping implications for the usage trends of Europe-bound surveys. In the context of global trends in academic publishing and

research, the global-membership advantage is likely to grow. According to Royal Society figures, "the number of global researchers is steadily growing, at about 4–5% per year and the majority of this growth is driven by emerging countries, with 8–12% annual growth in the leading Asian countries (in contrast to around 1% in the USA and the EU). One consequence of this is that China will shortly overtake the USA and the EU in numbers of researchers; similarly, the combined number of researchers from South Korea, Taiwan, China, and Singapore increased from 16% of the global total in 2003 to 31% in 2007" (Royal Society, 2011). The report further states that China has overtaken the UK and publishes the second largest annual number of research papers, with its share now standing at over 10%, and is set to overtake the USA well before 2020. The report mainly refers to publications in the field of the natural sciences (physics, chemistry, maths and engineering), but similar trends can also be projected for the social sciences.

Another aspect we examined was how the ESS was performing in ESS member countries (Figure 5.17).

FIGURE 5.17 **Survey Choices in ESS Member Countries**
(*Google Scholar 2012, N=2025*)



The chart includes ESS countries with at least 20 publications and shows the proportion of authors affiliated in ESS member countries[7] who chose the ESS as their data source in 2012. Countries are sorted from those where the ESS is the most prevalent choice (Belgium, with almost 79% of all lead authors using the ESS), to those where it is the least prevalent (Austria, less than 10%). Generally, in countries that fielded more rounds (*e.g.* Belgium, Finland, Sweden) authors were more likely to choose the ESS, as opposed to countries with an irregular fielding history. This is not the only factor though, as shown by the example of Ireland which fielded every ESS round, yet its authors seem to prefer EVS over other comparative surveys, possibly due to its strong emphasis on the topic of religion which is very popular among Irish scholars. The choice of survey is therefore also a country-specific phenomenon, either in the sense that another comparative survey can offer a longer or more consistent time series than the ESS, or can offer concepts that are closer to a country's academic audiences.

5.2.6 The Use of ESS Rotating Modules

5.2.6.1 ESS Questionnaire Construction and Usage

The construction of the questionnaire is of course one of the key quality issues in a survey cycle. As stated in the ESS ERIC documents, "*The questionnaire in a social survey reflects not just the content of the information being sought, but also the professionalism and conscientiousness of its designers. In the absence of due diligence, the overall cost of poor questions in a large cross-national survey can be dramatic, and may be exacerbated by the thousands of analysts worldwide who may quarry the data it generates without any evaluation of the quality of the questions*". In this manner, the ESS Scientific Advisory Board has recommended that the entire core questionnaire be reviewed every three rounds to ensure that it remains relevant and fit for purpose. The next full review is planned to start in 2018.
In terms of assessing academic and policy impact, information about the usage of various parts of the questionnaire is therefore one of the most important elements of feedback that bibliographic monitoring can generate. The design of the ESS questionnaire consists of three parts – the 'core', which remains relatively constant between rounds, thus ensuring its ability to measure changes in cross-cutting issues over time, two new, or possibly repeat, 'rotating modules' per round and the 'supplementary' questionnaire with methodological experiments and a 21-item version of the Schwartz Portrait Values Questionnaire. Rotating modules are one of the essential elements of the ESS questionnaire. They

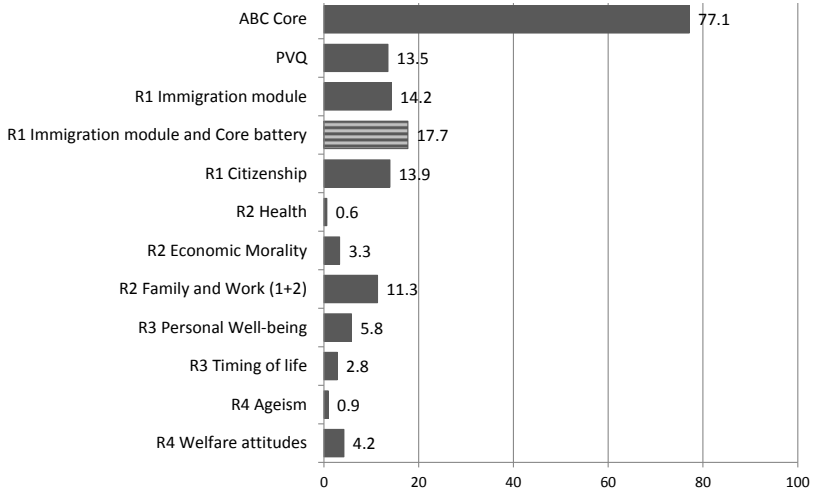
7 Countries with at least 20 publications, *i.e.* at least 20 first authors affiliated in their institutions.

represent the bottom-up approach in constructing the questionnaire and offer specialised international teams an opportunity to compete for space in the questionnaire, free of charge.

While the mapping of topics and journal fields seems to provide relatively specific information about which questionnaire parts are being engaged, these associations are in fact often speculative as it is not really clear which exact questions the publications addressing specific topics are based on. When at some point the ESS was faced with the task to reduce the questionnaire length, topic-level information proved too vague to make informed decisions about cutting or keeping specific questions or question batteries. As it turned out, item-level information was needed for this task. Documenting item usage has since become a standard feature of ESS bibliographic monitoring and is also the basis for assessing the use of rotating modules. A module is counted as being used in a publication if at least one of its items is present in the author's analysis. The module usage statistics were obtained by reviewing 1.190 downloaded substantive publications for the period 2003–2013.

Figure 5.18 presents the overall picture of usage of ESS questionnaire parts: ABC Core, Portrait Values Questionnaire and the rotating modules from Round 1 to Round 4 (the usage of the F core part which mostly consists of demographic items was not documented). It is immediately obvious that the most used individual part of the ESS questionnaire is the longitudinal ABC Core.

FIGURE 5.18 **Shares of ABC Core and Module Usage Based on Item Count** (*Google Scholar 2003–2013, N=1190*)

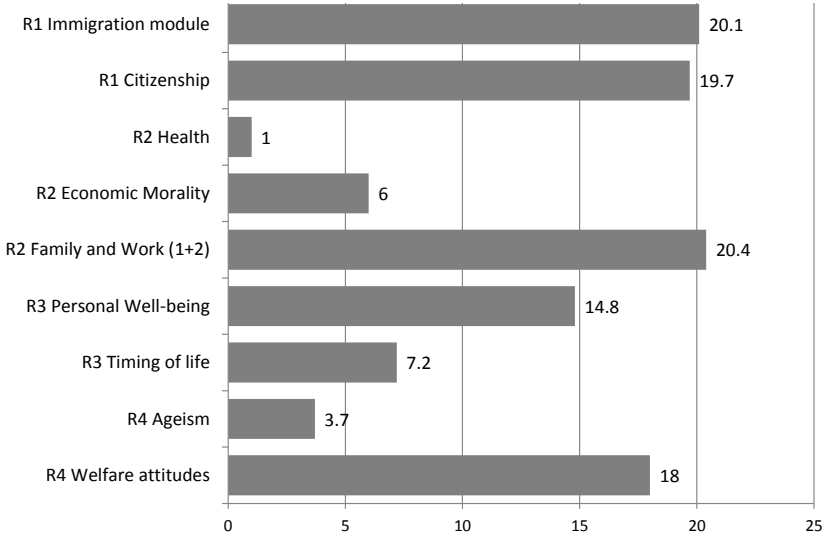


In 77.1% of ESS-based publications at least one item from the ABC core part was used, while in 42.2% of ESS-based publications the ABC Core items were used without any combination with items from rotating modules. PVQ, which is also fielded in every round, was used in 13.5% of publications, while the use of rotating modules varies between 14.2% for R1 Immigration and 0.6% for R2 Health.

The comparison of only rotating modules among themselves reveals that the module most often used in absolute terms is R1 Immigration, whose items appeared in 181 publications that were based on the R1 full immigration module, and in 225 publications when we also take into account the battery of 6 immigration items which became part of ABC Core after round 1. This is the only case where such a compact battery of items migrated from a module to the permanent core and one of the main reasons why the ESS is such a powerful tool to analyse immigration issues. Given the success of this move, the ESS could perhaps consider moving other popular batteries of items from rotating modules into the Core to further enhance their analytical power.

As earlier modules have an obvious time advantage, we present a standardised picture of module usage, in other words, average annual usage (Figure 5.19).[8]

FIGURE 5.19 **Standardised Annual Module Usage Based on Item Count** (*Google Scholar 2003–2013, N=1190*)



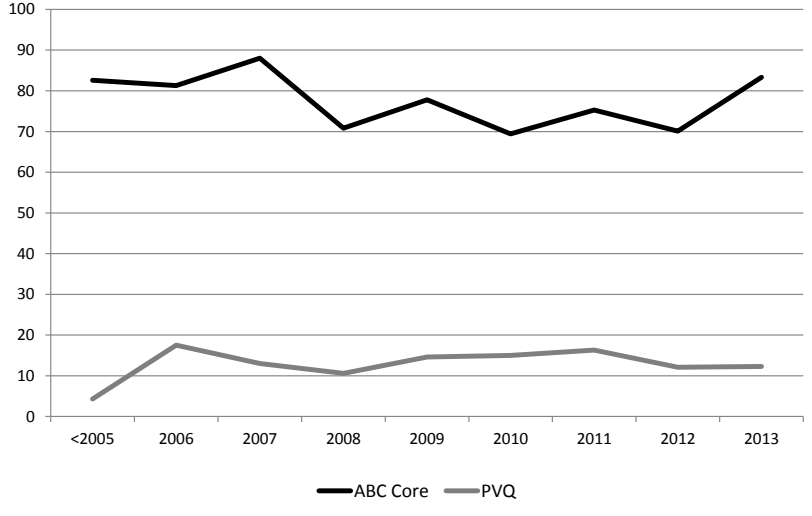
8 The usage was standardised by dividing the count for each module by the number of years that passed from fielding it minus two, as it takes about 2 years for the first module-based publications to appear (*e.g.* 9 years for R1 modules, 7 years for R2 modules etc.).

As revealed by the chart, there are four rotating modules with similarly strong relative usage, *i.e.* with approximately 20 publications annually containing their items. The leader by a slight margin is in fact the R2 Family and Work module, followed by R1 Immigration, R1 Citizenship and R4 Welfare. The R3 Personal Well-being module is also close. R2 Economic morality and R3 Timing of life are used much less (about one-third of the usage of the four strongest modules), while R4 Ageism and particularly R2 Health are used to a relatively marginal extent. Usage patterns seem to indicate that the use of modules with a more general appeal is stronger than the use of a module with a more 'specialised' topic. However, predicting which modules will appeal to a larger academic audience is not necessarily straightforward.

5.2.6.2 Trends in the Usage of the Core and the Modules

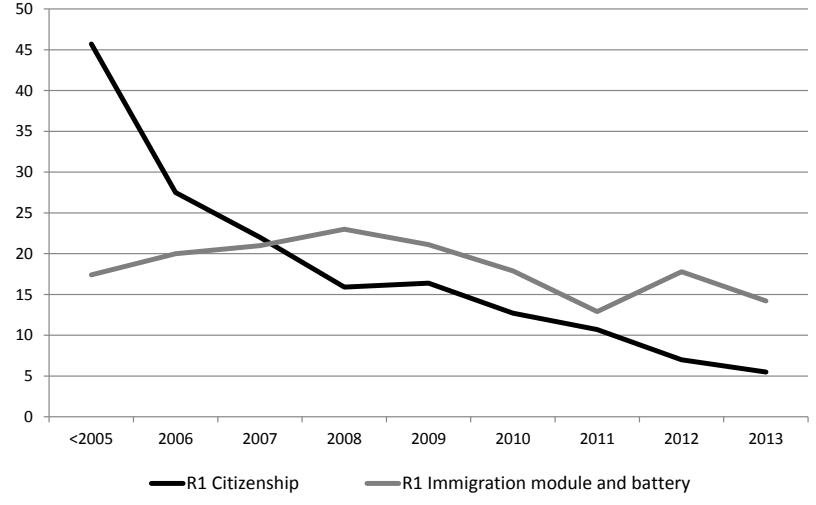
Besides annual usage numbers, another interesting aspect is the picture of usage *trends* of the ESS questionnaire parts. It reveals the typical length of a module's 'usage life', as well as the 'revitalisation' effect brought about by its repetition. While the use of the ABC core and PVQ, which are fielded every round, is fairly constant across time (Figure 5.20), with the core part exhibiting continually strong usage (used in 70% to 90% of publications) and PVQ exhibiting a constant usage share of between 10% and 20%, such steady trends are not typical of most rotating modules.

FIGURE 5.20 **Trend of ABC Core and PVQ Usage Based on Item Count** (*Google Scholar 2003–2013, N=1190*)



Unlike the *ABC Core* whose time-series data are constantly updated, rotating modules are subject to the gradual attrition of usage across time. A relatively dramatic example of the 'data ageing' effect on usage is the *R1 Citizenship module* (Figure 5.21), which was extremely well used up until 2005, reaching more than a 45% share in 2005, while the share of R1 Immigration was below 20% at that point. Then its popularity began to decline and in 2007 the *Immigration module* prevailed. While only about 5% of publications in 2013 still used the R1 Citizenship module, the use of R1 Immigration is still between 15%–20%, owing largely to the battery of 6 items which became part of the ABC core and enables cross-time comparisons, as well as the fact that first- and second-generation immigrants can be identified in each round.[9] This prevented the 'ageing' of the immigration topic, while Citizenship (particularly the extremely popular voluntary organisations battery) was not in a similar favourable situation and its use was subject to a decline over time.

FIGURE 5.21 **Trend of R1 Modules Usage Based on Item Count** (*Google Scholar 2003–2013, N=1190*)



The use of Round 2 modules (Figure 5.22) was quite uneven. Health module usage never really took off despite the general popularity of the health topic. Out of 114 ESS-based publications with the topic of health that were produced between 2003 and 2013, only 7 were based on the *R2 Health module*, while the

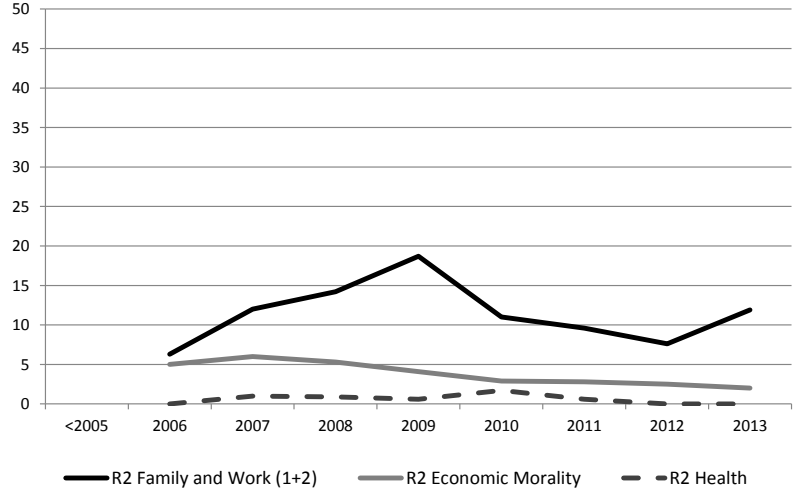
9 With the exception of the 1st round where the identification of second-generation immigrants was impossible because there were no questions about a respondent's parents' country of birth

vast majority relied on the ABC Core and the R3 Personal well-being module. The reasons the R2 Health module had such weak appeal to academic audiences are hard to pin down, but judging by the strong use of health items in the ABC Core its main 'deficiency' seems to be the absence of the health inequalities angle. In other words, this module seems to demonstrate the importance of a specific conceptualisation that can significantly narrow or widen the scope of its target audience. The R2 Health module focused on medications and the doctor-patient relationship, which seems to appeal to a relatively limited pool of academic users.

A somewhat similar case is the *R2 Economic morality module*, whose use was strongest between 2006 and 2009 when its items were present in about 5% of publications. Later, its data began to age and now the module continues to be used sporadically. This is another module with a relatively specific focus where the quite weak usage figures seem to advocate the need for a more active strategy of promotion among relevant academic circles.

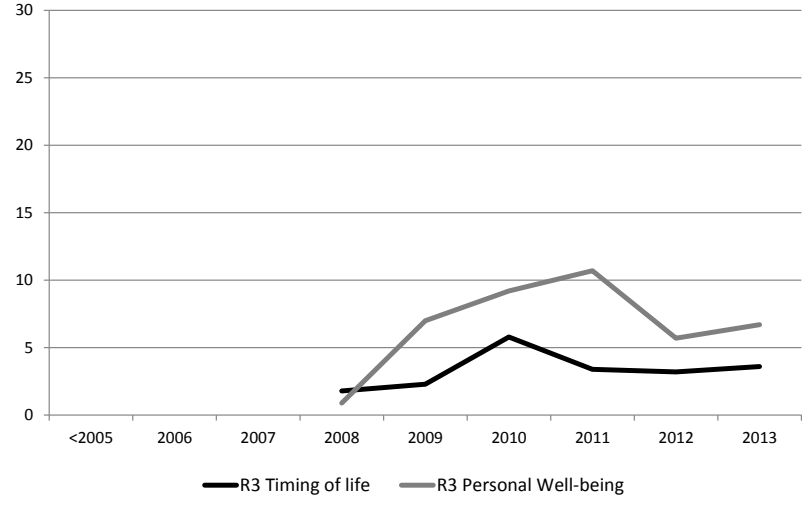
In stark contrast to both half-modules, *R2 Family and Work* is on top of the most used ESS modules, with a peak in 2009 where nearly 20% of ESS publications used at least one of its items. Then its use began to decline to about 10%, but picked up again after the module was repeated in Round 5.

FIGURE 5.22 **Trend of R2 Modules Usage Based on Item Count**
(*Google Scholar 2003–2013, N=1190*)



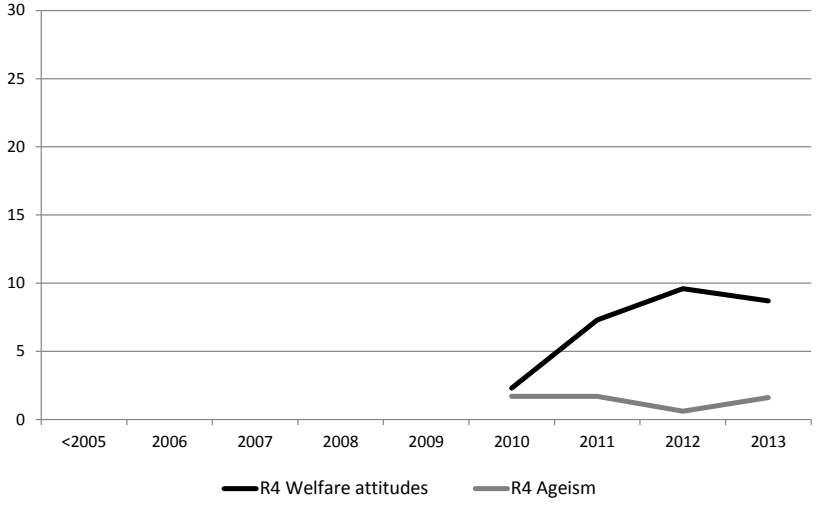
The use of Round 3 modules (Figure 5.23) is also quite uneven. While use of the *Timing of life* module never exceeded 3%–5%, use of the *Personal well-being* module reached its peak in 2011 with an 11% share and later fluctuates around 6%.

FIGURE 5.23 **Trend of R3 Modules Usage Based on Item Count**
(*Google Scholar 2003–2013, N=1190*)



Finally, the use of Round 4 modules (5.24) reveals another significant discrepancy in usage. While use of the *Ageism module* remains very low (near 2%), usage of the *Welfare module* remains close to 10%.

FIGURE 5.24 **Trend of R4 Modules Usage Based on Item Count**
(*Google Scholar 2003–2013, N=1190*)



Generally, the trends of module usage suggest that the value of data declines with time, with usage shares starting to drop after about 5 years. Most users seem keen to avoid the risk that the phenomenon under observation has changed in the years since the measurement, even if this means shifting their research focus to some extent. Typically, social scientists are not extremely specialised, so they can move between topics with relative ease, giving preference to those with fresh data. Specific topic coverage seems to come second to the freshness of the data in the majority of cases. On the other hand, the case of the R2/R5 Work and Family module indicates that repeating a module quickly revitalises and possibly stabilises its usage by offering the possibility for cross-time comparisons, a possibility to pool samples, as well as for robustness checks. As more modules will be repeated, their usage will likely receive a similar boost due to additional analytical options.

5.2.6.3 Associations between Topics and Modules

As demonstrated by the low usage numbers for the R2 Health module, the strong presence of a certain topic cannot necessarily be attributed to the associated modules, which highlights the relevance of an item usage count for precisely locating the link between a topic and the questionnaire parts that are its data source.

FIGURE 5.25 **ABC Core and Modules as Data Sources for Topics**
(*Google Scholar 2003–2013, N=1190*)

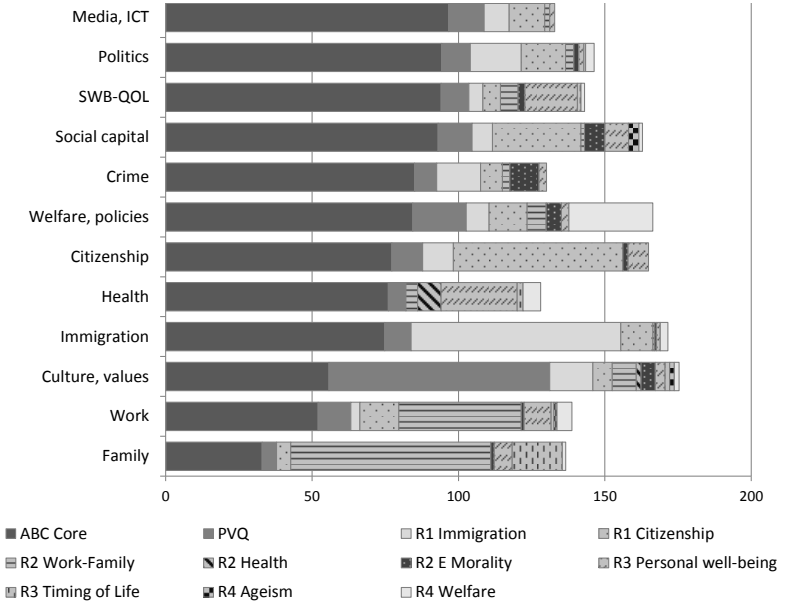


Figure 5.25 shows that, in addition to health, ABC Core is the main data source for many other popular topics, such as media and ICT, politics, subjective well-being, social capital, crime, welfare policies etc. There are only a few major exceptions, *i.e.* topics predominantly supported by the respective modules – most notably immigration, values, family, citizenship and partly work.

FIGURE 5.26 **The Dispersion of Topics across Rotating Modules** (*Google Scholar 2003–2013, N=1190*)

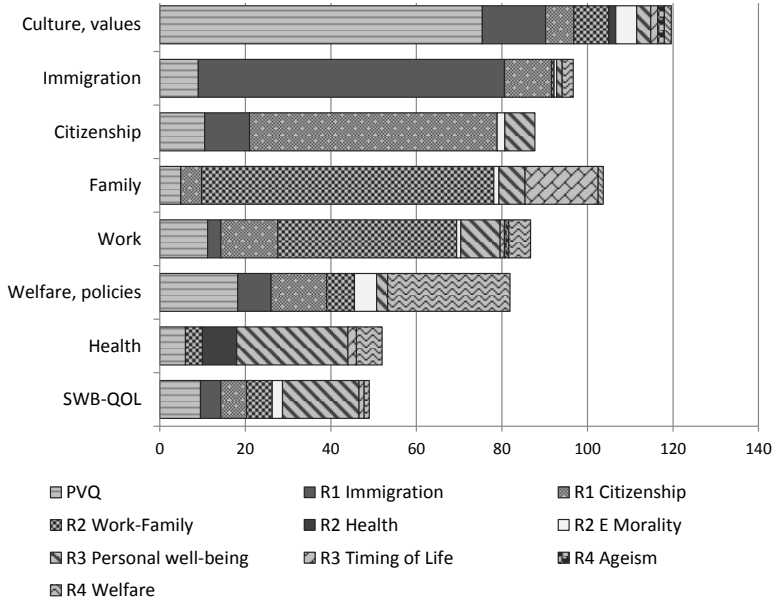


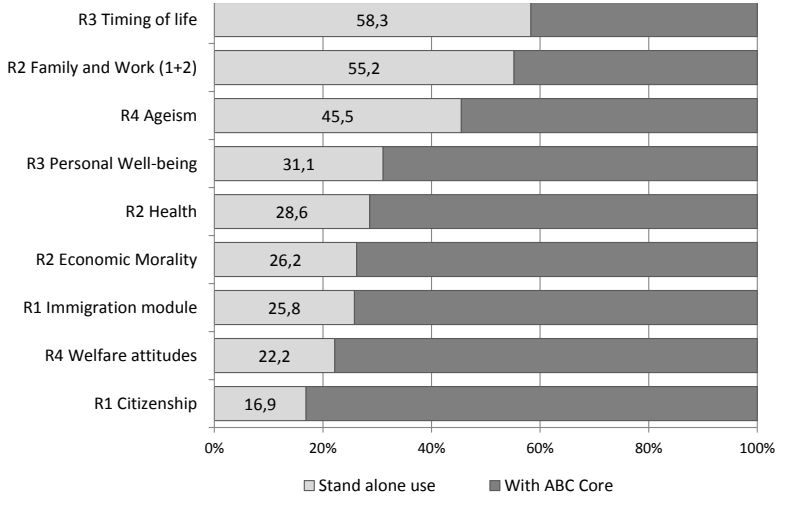
Figure 5.26 excludes the ABC Core part and shows that some topics are informed from different rotating modules, not only those specifically designed to cover them. For instance, the topics of work and family are mostly based on R2 Work and Family module items, but a significant share of publications about family are also based on the R3 Timing of Life module. The welfare topic seems to have the most diverse 'module base', informing itself strongly from R4 Welfare, PVQ and R1 Citizenship. On the other hand, Immigration, Citizenship and Family are topics which are the most limited to their 'mother modules'.

5.2.6.4 Associations between Modules and the Longitudinal Part (ABC Core and PVQ)

While most modules provide a dominant or at least important data source for their associated topics, the ABC Core part with its batteries of key concepts

such as social trust, social capital, political participation, subjective well-being and other plays a strong supporting role. Figure 5.27 shows the proportion of 'support' the ABC Core provides to individual modules in terms of combining items from both parts of the questionnaire. The most 'self-sufficient' modules with respect to the share of items coming from them are R3 Timing of life and R2 Family and work and, to a lesser extent, R4 Ageism. On the other hand, R1 Citizenship, R4 Welfare and R1 immigration rely strongly on the ABC Core, with most authors drawing a large share of concepts and items from the longitudinal part to combine them with those from the modules. If the ESS were to reduce, revise or alternate the ABC Core, care should be taken about associations with modules, not to diminish their combined analytical potential. Item-usage information enables us to identify specific connections between a module and the core items.

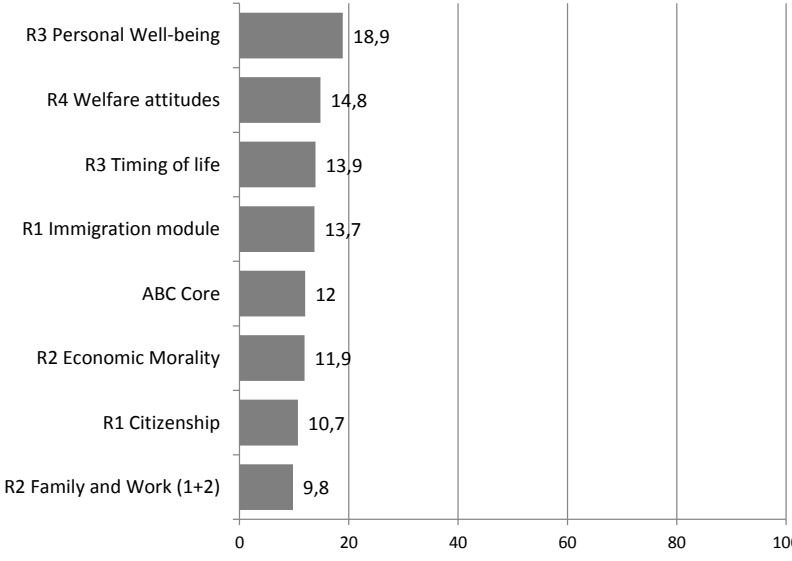
FIGURE 5.27 **Association of Modules with the ABC Core**
(*Google Scholar 2003–2013, N=1190*)



In a similar way, PVQ's association with modules was examined. Figure 5.28 shows that the Human Values Scale usage varies according to the module present in the questionnaire. Since sometimes initiatives emerge within the ESS to alternate the PVQ module with other content (*e.g.* methodological experiments), this information is vital to decide when to include or exclude it for the minimal loss of analytical capital. For instance, not having PVQ with the R3 Personal well-being module would cause twice the 'damage' as not having it with the Work and Family module. A qualitative review of publications showed that PVQ comes into play every time culture or values are part of the

explanatory model. In addition, some writers use individual PVQ items for concepts that were not originally predicted, or as proxies for a missing concept, *e.g.* environmental attitudes.

FIGURE 5.28 **PVQ Association with the ABC Core and Modules**
(*Google Scholar 2003–2013, N=1190*)



5.2.7 The Usage of Individual Items

The smallest unit of the ESS questionnaire the study examined was individual items. This level provides additional insight into the micro usage of the questionnaire and is – as mentioned – sometimes corrective of the more general information obtained through the coding of topics. This level of information is also crucial when making specific questionnaire-related decisions as it clearly identifies the 'sleeping matter', *i.e.* items that are rarely or almost never used, as well as widely used items which should preferably be kept when redesigning the questionnaire and repeating modules.

5.2.7.1 Use of the ABC Core Items

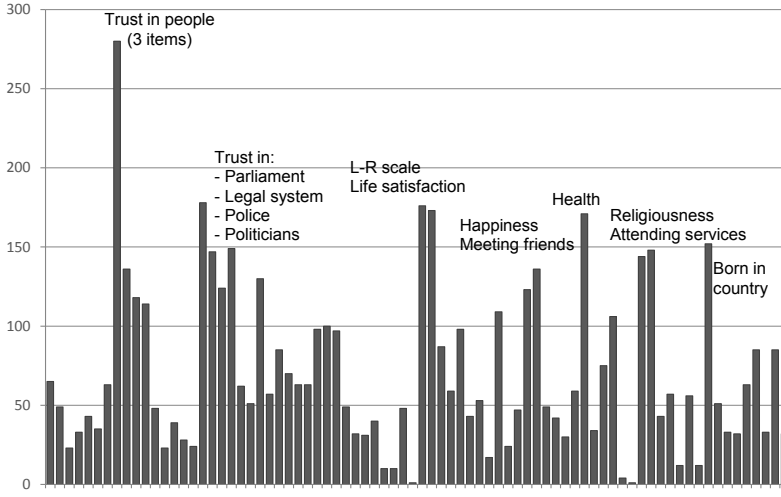
Documenting item usage can be considered a form of global feedback on the whole item-testing process. As detailed in the ESS ERIC Work Programme, various criteria are applied to each item in an attempt to establish whether it

reaches an appropriate quality standard. Issues such as likely item non-response, predicted reliability and validity, translatability, social desirability bias, and conceptual coherence are considered. New items are pre-tested via cognitive interviews and quantitatively in pilot surveys. Based on pilot results, a decision is made as to which items to adopt, amend or eliminate, considering factors such as non-response, fulfilment of anticipated correlations, translation issues, scalability and reliability and validity based on the MTMM experiments (Billiet *et al*., 2007; Harkness 2007, Saris and Gallhofer, 2007).

However, items can sometimes be perfectly sound from the methodological point of view, and yet they seem to be largely overlooked by most users. This opens up the dilemma of whether such items should remain in the questionnaire in the long run, or should be replaced by more 'user-relevant' items. The very goal of the item-use statistics is to examine how the questionnaire is being used at the micro level and, consequently, to decide how its content can be further optimised (*e.g.* via repeat modules or revisions of the core part). It highlights which items are being used strongly and which rarely or never, how many items authors use on average, which items users draw on when covering specific topics etc. It also enables the 'profiling' of items considered for exclusion or rotation by providing information about which other items, topics or modules an item is typically associated with, and similar. This sort of specific feedback is particularly welcomed by the repeat modules Questionnaire Design Teams in order to avoid the risk of dropping frequently used items and taking away from users something they value. The end result of such informed choices should be modules, better tuned to the needs of academic and policy users.

Empirically, item-usage frequencies were obtained by documenting the presence of individual items in 1.190 downloaded *substantive* publications. Figure 5.29 shows item frequencies in the ABC Core part. As already noted, this longitudinal section of the questionnaire is a powerful analytical engine with practically all items being used to a considerable extent and some items being used extremely frequently. The most used ESS core item (excluding the demographic F section) is *trust in people* which was detected 280 times in 1.190 publications, or in 23.5% of them. Trust is a dimension of social capital and an overwhelmingly popular concept among sociologists, economists, political scientists and other analysts. Several other 'super items' belong to the concept of subjective well-being, *i.e.* subjective health (171), life satisfaction (173) and happiness (123). Also extremely well used is the left-right ideological scale item (176) and items on religiosity and religious attendance (144–148). Overall, practically all core items show strong usage, there is no 'sleeping matter' which testifies to the efficiency of the item selection and testing processes.

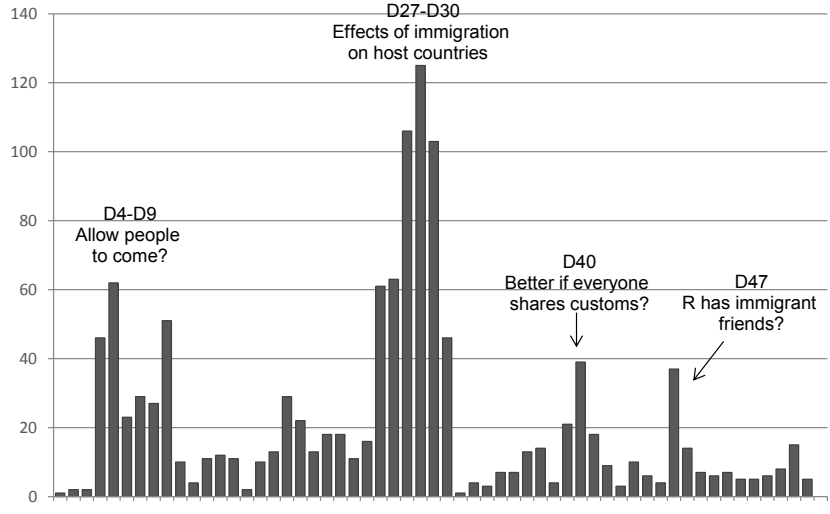
FIGURE 5.29 **Item Usage Frequencies for the ABC Core**
(*Google Scholar 2003–2013, N=1190*)



5.2.7.2 The Use of Items in Rotating Modules R1-R4

Figure 5.30 shows item-usage frequencies for the *R1 Immigration* module, one of the four most successful ESS rotating modules in terms of usage.

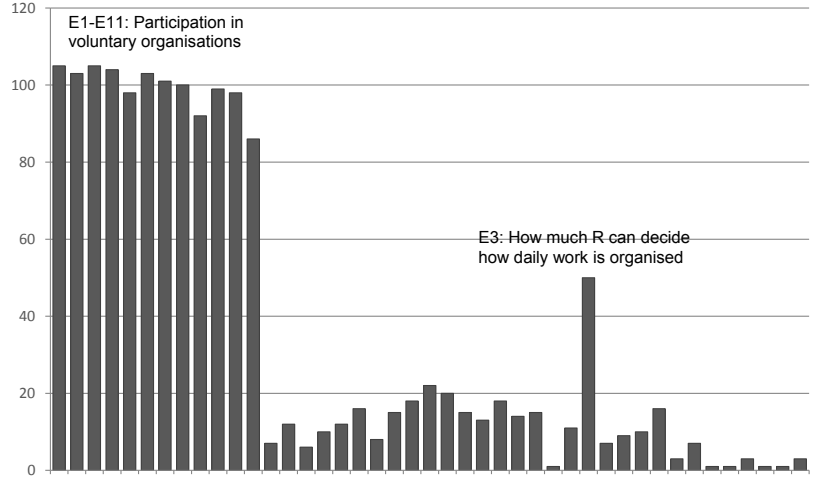
FIGURE 5.30 **Item-Usage Frequencies for the R1 Immigration Module**
(*Google Scholar 2003–2013, N=1190*)



Most items exhibit strong or at least moderate usage, with the clear champions being three items that measure the effect of immigration on a host country's economy (present in 106 publications), cultural life (125) and way of life (103), which are now part of the ABC Core.

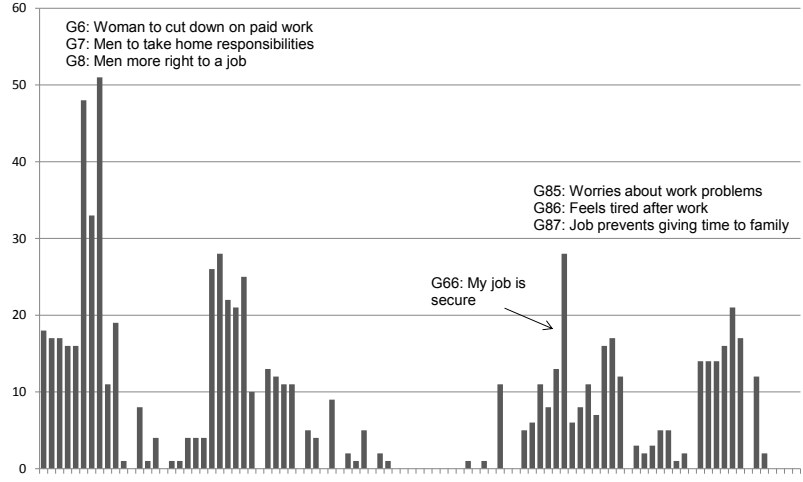
As revealed by the previous section, *R1 Citizenship* is another successful module in terms of overall usage, but its use was down to a 5% share in 2013. As clearly revealed by Figure 5.31, the popularity of this module relies heavily on the voluntary organisation battery which measures formal social capital (86–105 uses). Unfortunately, these data are now more than 10 years old and as such unlikely to be widely used anymore, except by highly topic-focused users who have no other alternative. Given the popularity of the voluntary organisations battery, which according to many writers is a unique advantage of the ESS compared to similar surveys, the ESS would seem to profit considerably by repeating it. Another heavily used item is one about a respondent's autonomy at work, which later became part of the Core section.

FIGURE 5.31 **Item-Usage Frequencies for the R1 Citizenship Module** (*Google Scholar 2003–2013, N=1190*)



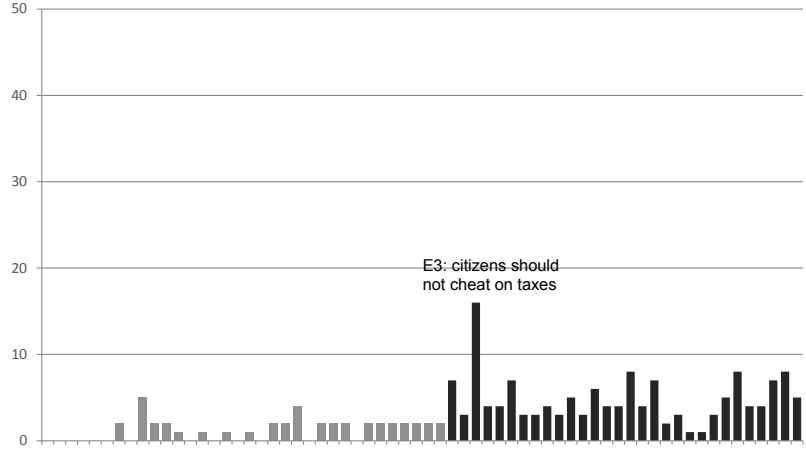
R2 Family, work well-being is another module which exhibits very good usage of many of its items, particularly items that measure gender roles (48–50 uses), division of housework (21–28), Work-Family stress (14–21) and Job security (28) (Figure 5.32). But there are also some items that were completely overlooked, most notably a block of questions about respondents' school experience, which were omitted in the R5 repeat module.

FIGURE 5.32 **Item-Usage Frequencies for R2 Family, Work Well-being** (*Google Scholar 2003–2013, N=1190*)



The R2 Economic Morality half-size module attracts much lower usage, with most of its items used by 3–8 publications (Figure 5.33). The most popular item (*Citizens should not cheat on taxes*) was used in 16 publications. *R2 Health*, the other half-size module, also exhibits very weak usage. The most popular item asks what a respondent did with a prescribed medicine and was used 5 times. For about one-third of the items, no usage was detected.

FIGURE 5.33 **Item-Usage Frequencies for the R2 Health and Economic Morality Modules** (*Google Scholar 2003–2013, N=1190*)



R3 Personal and social well-being is another widely used module, particularly its CES-D Depression scale battery (31–20 uses) and an item asking whether a respondent has become involved in the work of voluntary organisations during the past 12 months (21 uses), which again testifies to the popularity of this concept. Most other items also exhibit good usage (Figure 5.34). The CES-d battery was repeated in the R7 Health inequalities module and may again prove to be an important 'vehicle' for expanding ESS usage among scholars in the medical field.

FIGURE 5.34 **Item-Usage Frequencies for the R3 Personal and Social Well-being Module** (*Google Scholar 2003–2013, N=1190*)

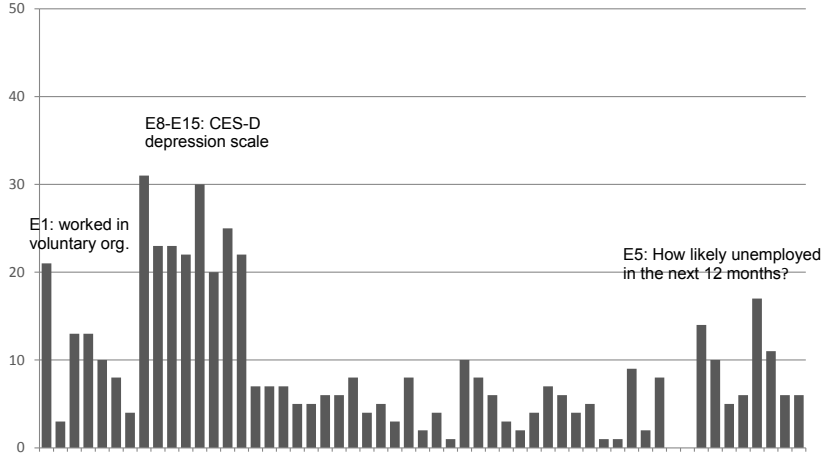
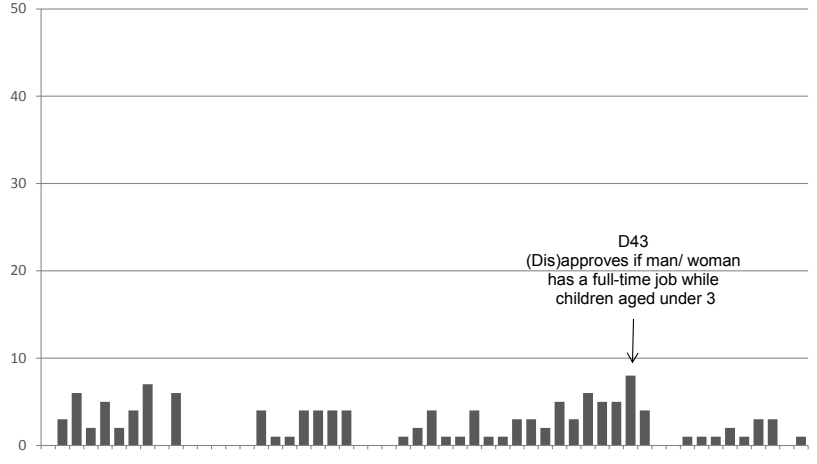


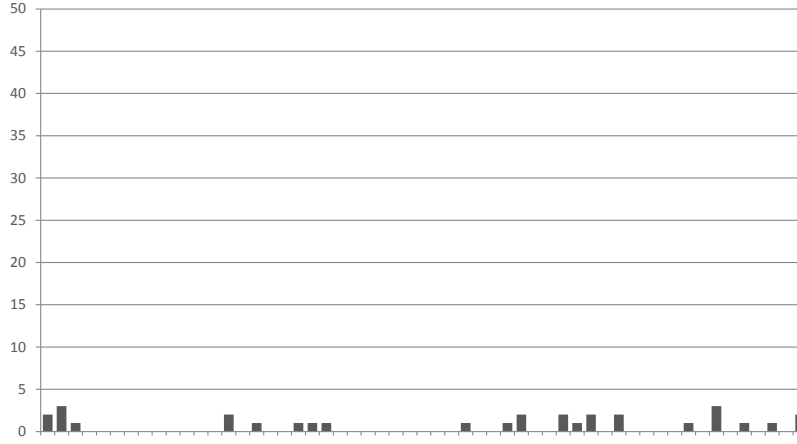
FIGURE 5.35 **Item-Usage Frequencies for the R3 Timing of Life Module** (*Google Scholar 2003–2013, N=1190*)



The *R3 Timing of life* module from the same round is used much less, with none of the items exceeding 8 uses (Figure 5.35).

Similar to R2 Health, *R4 Ageism* may turn out to be another narrowly focused module which may be used by relatively few analysts. So far, authors have barely touched it and the situation is not likely to improve without an active strategy to popularise it among relevant audiences (Figure 5.36). However, this goal will not be easy to achieve considering that the 'age' of this dataset now exceeds 5 years, which seems to be the psychological point after which users become reluctant to use it.

FIGURE 5.36 **Item-Usage Frequencies for the R4 Ageism Module** (*Google Scholar 2003–2013, N=1190*)



Unlike Ageism, the other R4 module, *Welfare attitudes*, is turning out to be another success story (Figure 5.37). Its usage is stronger than that of several earlier modules and also very balanced across items, with the most popular battery being the (welfare) role of government (10–14 uses). The good use of this module demonstrates that welfare is one of the topics with wide appeal among the ESS user communities.

R5 Criminal justice is the most recent module examined and, according to its initial usage numbers, it seems reasonable to predict that its use will continue to grow in the next few years. However, a relatively large share of these publications was produced by the QDT members, so it remains to be seen how the module will resonate with the wider academic user community (Figure 5.38).

Another way to look at the 'efficiency' of the questionnaire parts is to examine the share of items with no detected usage. Figure 5.39 reveals large differences among different sections in this respect. While the ABC Core and five modules have zero or close to zero items with no detected usage, the R3 Timing of life

and R2 Family-Work modules have about 25% of such items, R2 Health almost 40% and R4 Ageism almost 64%. This picture largely corresponds to the picture of modules' usage, with the exception of R2 Family and Work where most of the 'blanks' come from interviewer codes and items with hidden usage, not the attitudinal items.

FIGURE 5.37 **Item-Usage Frequencies for the R4 Welfare Module** (*Google Scholar 2003–2013, N=1190*)

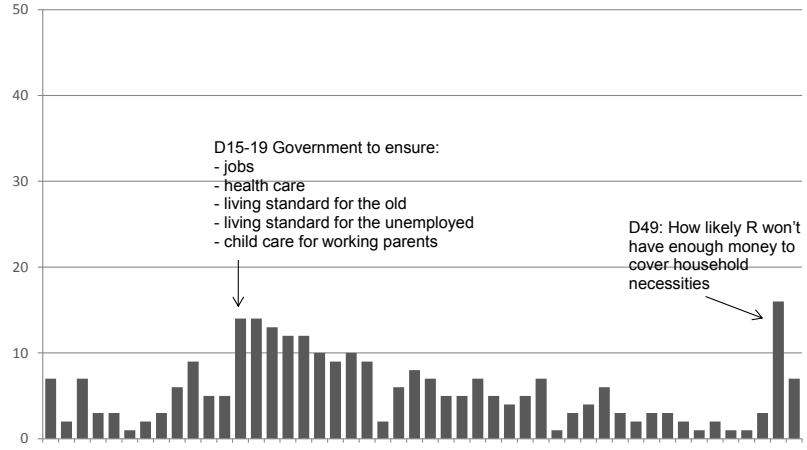
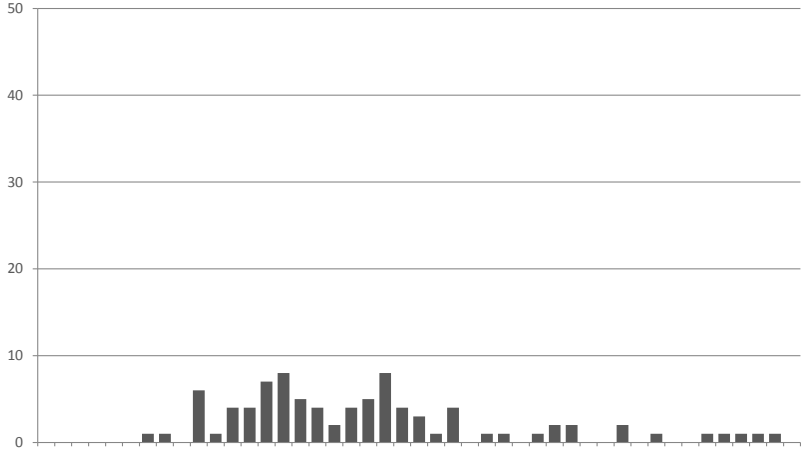


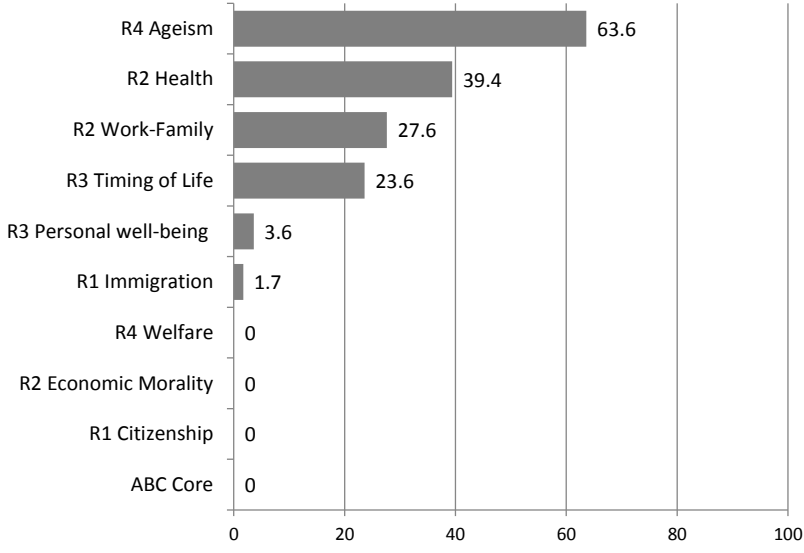
FIGURE 5.38 **Item-Usage Frequencies for R5 Criminal Justice** (*Google Scholar 2003–2013, N=1190*)



All in all, item-usage patterns reveal that the ABC Core items which form a cross-time series are an exceptionally strong analytical set and that their careful selection is generating the expected result in terms of academic impact. The same

could be said for the majority of rotating modules, particularly those with a more general subject matter, while at least two of the modules – R2 Health and R4 Ageism – failed to become a relevant source of data for the target analysts. The patterns of item use within modules differ, with some modules exhibiting strong usage across a wide range of items (*e.g.* R1 Immigration, R2 Family and Work and R4 Welfare), and some where a smaller battery of items accounts for a large share of their usage (*e.g.* R1 Citizenship and R3 Personal and Social Well-being).

FIGURE 5.39 **The Share of Items with no Detected Usage**
(*Google Scholar 2003–2013, N=1190*)



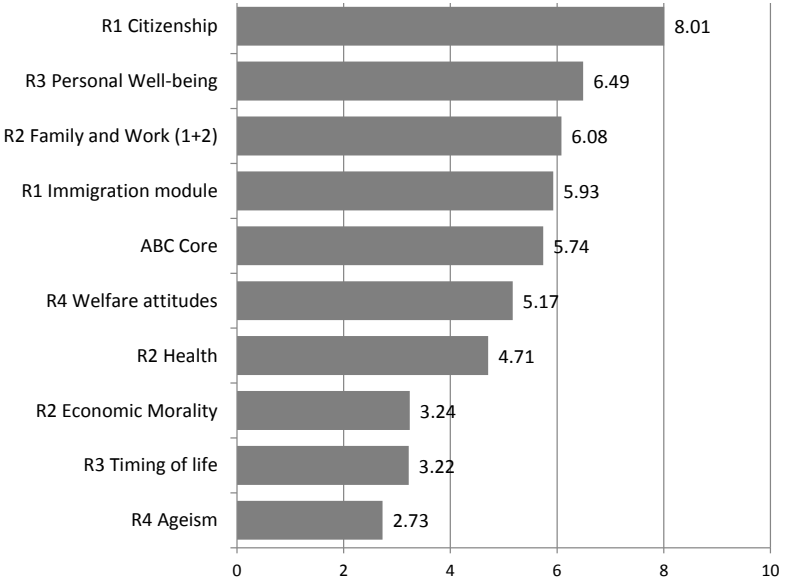
Given that item-usage statistics draw a very precise micro-level picture of the most used questionnaire parts, the ESS could at some point perhaps consider the possibility of producing a 'super ESS Core' that would consist of the current ABC core items and the most used items and batteries from the rotating modules. Obviously, such a 'super questionnaire' would be less conceptually- and more usage-driven (*i.e.* following the 'wisdom of the crowds' principle), but on the other hand it is reasonable to assume that strong usage in itself is theoretically produced by promoting items and batteries with strong and consistent explanatory power.

5.2.7.3 Number of Items Used

We also examined the average number of items authors use when analysing particular questionnaire parts (Figure 5.40). The figure is highest for R1 Citizenship (8 items) and lowest for R4 Ageism (less than 3 items). The large average for

the Citizenship module is mainly due to the popularity of the membership in voluntary organisations concept where most authors construct and index from the 12 voluntary organisation items. As a rule, the most used modules also have the largest average number of items taken from them for analysis.

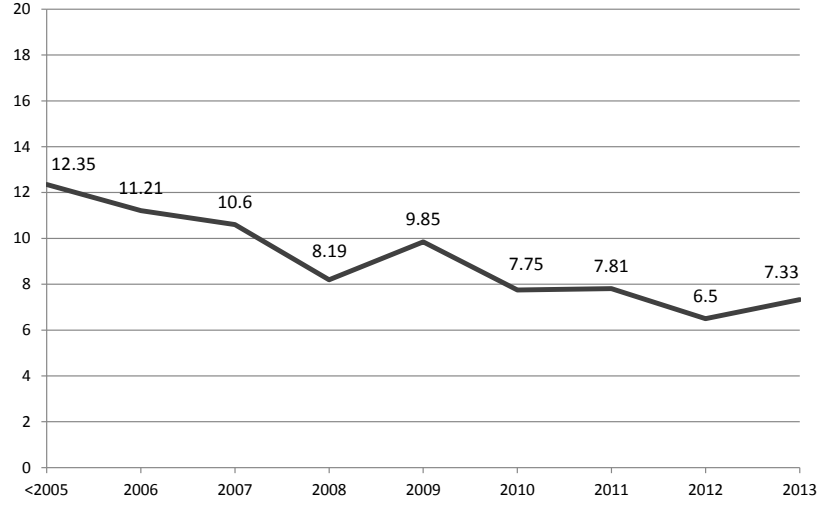
FIGURE 5.40 **Average Number of Items Taken from the ABC Core and Modules** (*Google Scholar 2003–2013, N=1190*)



The average number of items varies to some ewxtent, but the trend of a decrease is quite obvious (Figure 5.41). Before 2005, the average number of items used in the analysis was more than 12, while this number dropped to 6–7 during the last few years. This may indicate a more general shift in the patterns of ESS data usage (see Section 5.8).

The next section will discuss, among other things, another relevant aspect of item use, namely, how item relevance in the questionnaire can be enhanced or altered by enlarging the sample size.

FIGURE 5.41 **Average Number of Items Taken from the ABC Core and Modules – Trend** (*Google Scholar 2003–2013, N=1190*)



5.2.8 The Use of Rounds

5.2.8.1 Frequency of Rounds Use

Examining patterns of round use turned out to be another key bibliographic indicator which provides strategic feedback on ESS data usage trends and patterns. So far, the ESS has fielded and published 6 rounds and their combined data files. However, given the lead time needed for publications to appear, the use of the first 5 rounds was explored by our second-order study.

The study examined two aspects: which rounds authors used, and how many rounds they used. As evident from Figure 5.42, there is an obvious timing effect in the frequency of rounds use – earlier rounds have a time advantage over later ones and were used more often. For instance, Round 1 was used in 53.4% of all downloaded publications (the sum of single and multiple round use), while Round 5 was only used in 5.9% of them.

The stand-alone usage of individual rounds (Figure 5.43) shows that Round 1 was used as a stand-alone source most frequently, being the only round available for a few years. The proportions of stand-alone usage are falling with each new round.

FIGURE 5.42 **Rounds Usage, Stand-alone and Combined**
(*Google Scholar 2003–2013, N=1190*)

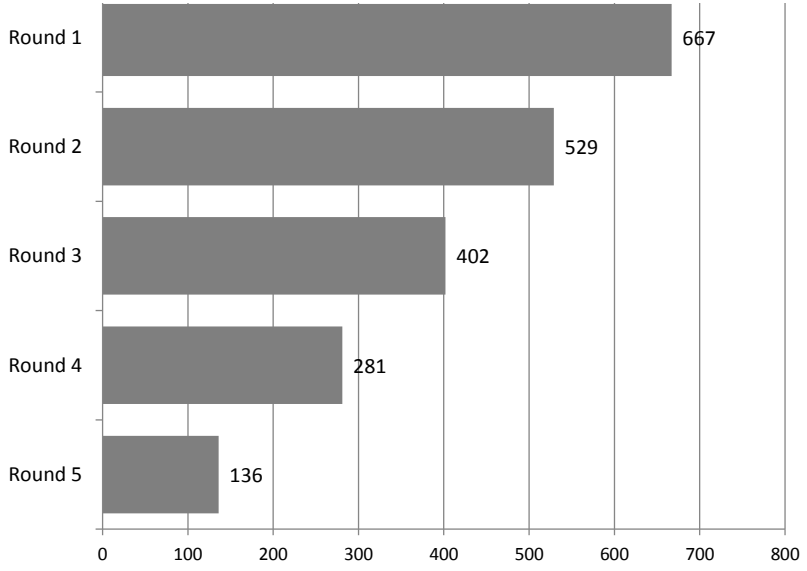
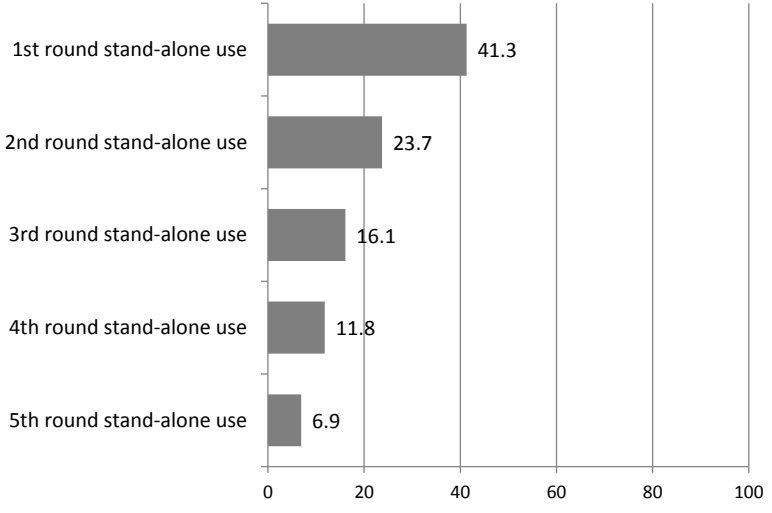


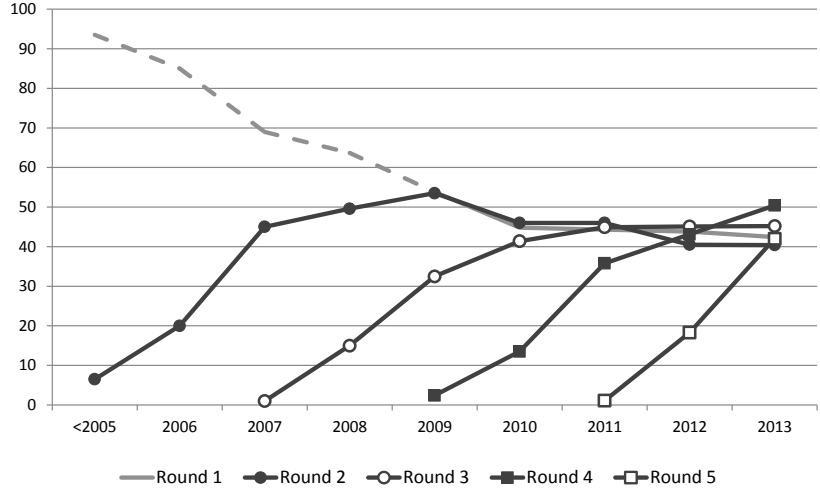
FIGURE 5.43 **Stand-alone Usage of Individual Rounds**
(*Google Scholar 2003–2013, N=1190*)



5.2.8.2 Trends in Rounds Use

A cross-time examination of the round-use dynamics (Figure 5.44) reveals a much more balanced picture than the initial overall percentages. It generally takes about 2 years for the first publications to appear from a specific round, and 4–5 years for a round to reach its full publication potential. The use of new rounds has been 'catching up' very regularly with the previous rounds, with all of the first five rounds reaching near convergence in 2013, each with a 40% to 50% inclusion rate in publications.

FIGURE 5.44 **The Dynamics of Round Usage**
(*Google Scholar 2003–2013, N=1190*)



As to the other aspect we explored – the number of rounds used – Figure 5.45 shows that 71.7% of ESS-based publications are based on a single round of data, and about one-third (28%) on multiple rounds of data (at least two of them). The chart may suggest quite a strong preference for single-round use which is in fact not the case. As the cross-time Figure 5.46 reveals, the 'static' picture does not tell the essential part of the story. Namely, that the ESS is in fact experiencing a steady and relatively steep growth of multiple-round use. In 2013, no less than 43.6% of publications used more than 1 round in their analysis and, according to the chart, authors quickly include every new round that becomes available. The use of 3 rounds peaked in 2009, then diminished and was overtaken by the use of 4 rounds and then 5 rounds. This trend also explains why the popularity of earlier rounds does not seem to be diminishing with time (the previously mentioned convergence of usage in 2013). Multiple-round usage is becoming a

norm rather than the exception and it is becoming less and less likely for new (as well as old) rounds to be used as a stand-alone data source. This is now typically the case mainly for publications which are strongly modules-based, but even this will change when modules are repeated.

FIGURE 5.45 **The Number of Rounds Used**
(*Google Scholar 2003–2013, N=1248*)

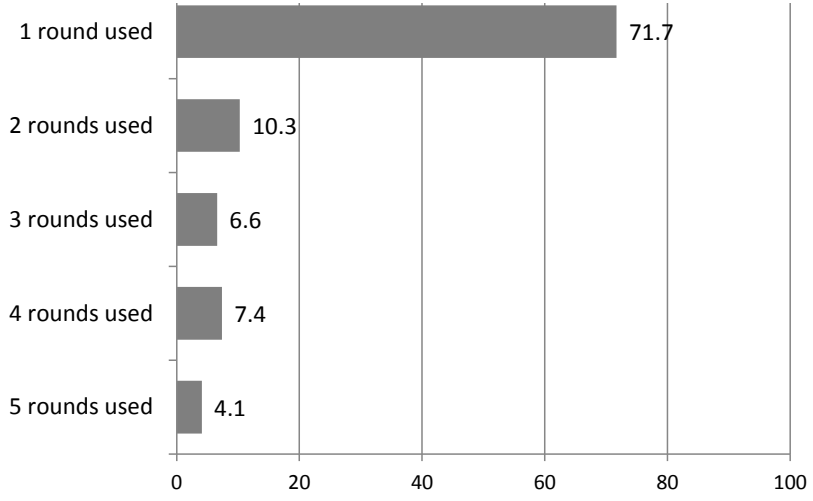
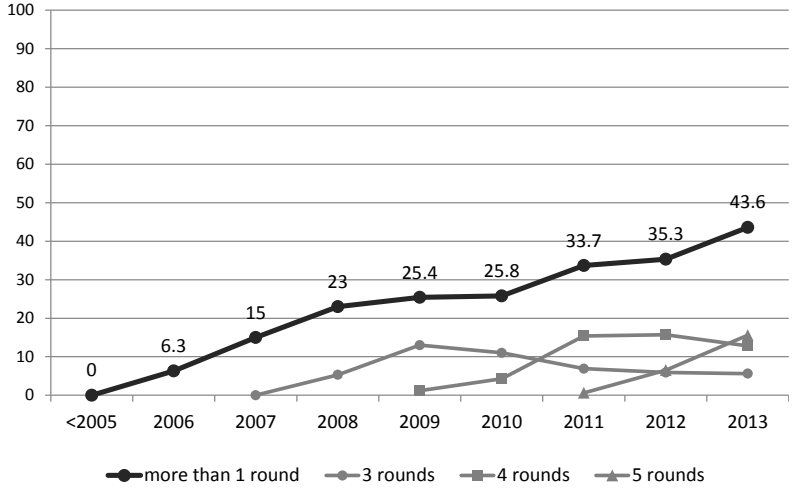


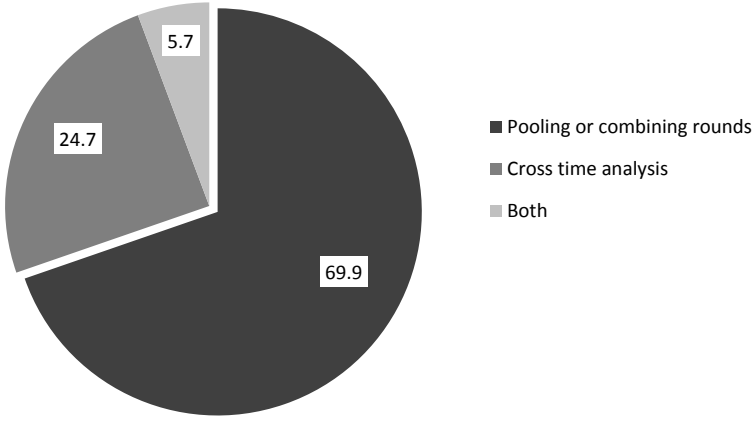
FIGURE 5.46 **The Trend of Multiple-Round Usage**
(*Google Scholar 2003–2013, N=1248*)



5.2.8.3 Reasons for Multiple-Round Use

What are the reasons for the growing popularity of using multiple rounds? At first glance, such use seems to imply a time-series analysis but, as revealed by the qualitative reviewing of publications, this is not the main reason for using multiple rounds. As indicated by Figure 5.47, 70%-75% of writers use multiple rounds to either pool them to increase sample sizes, or combine them to increase the number of countries in their analyses.

FIGURE 5.47 **The Reasons for Multiple-Round Usage**
(*Google Scholar 2003–2013, N=336*)



Qualitative analysis was used to explore the motivations behind multiple-round use in more depth. As indicated, the main goal seems to be to increase the sample sizes. By pooling rounds, analysts gain statistical access to subpopulations which were traditionally too small to analyse. Examples include first- and second-generation immigrants (a most frequent target group), political party members, occupational groups, specific age cohorts, but also the general population, with sample sizes reaching 200.000 cases when the first five rounds are merged (see Box 5.6).

Pooling rounds can also change the analytical value of the individual items and subgroups they identify. For instance, in analytical terms the item on party membership seems quite 'weak' within a single-country context as the number of party members is usually very small. However, by pooling countries and rounds the number increases to several thousand, which is a number that allows for sound and extensive statistical analysis. The same logic applies even to individual ISCO occupational groups, which are normally way too small to be analysed in general social surveys, but not so when rounds are pooled (see Box 5.7 for details).

On the other hand, adding countries that participated in different waves is the most frequent reason for combining rounds. Many authors combine (close) rounds in order to obtain indicators for a larger set of countries than provided any single ESS round. Measurements for individual countries are simply drawn from several rounds in order to include all countries of interest, which is mainly possible for the longitudinal set of ABC Core items. In some cases, authors combine rounds to 'catch' events (*e.g.* general elections held at two different time points in two countries being compared).

In about one-third of publications with multiple-round usage, cross-time analysis is the main or one of the main goals. In this case, authors observe trends such as the rapid decline in party membership, the association between Internet use and well-being before and during the financial crisis, how the public's consumption of news has developed over the last decade, whether terror attacks have an impact on public opinion and other (see Box 5.7). Finally, some authors use multiple rounds to calculate cross-round country average values for robustness.

As already mentioned, the possibilities of multiple-round use are limited to the topics that allow it, *i.e.* core topics that contain repeat items (Figure 5.48). It is common with topics such as politics, immigration, SWB, health, values, social capital, media or religion. The theme of immigration in particular benefits from merging rounds by creating a sizeable group of immigrants to be examined. On the other hand, the topics of citizenship (voluntary organisations), family, work and age are not analysed much using multiple rounds, due to the fact they are based primarily on single-round modules. This is likely to change when modules are repeated.

Box 5.6 Pooling Rounds to Increase Sample Sizes

We investigate to what extent cross-national variation in the health gap between the lower and higher educated in Europe is explained by governmental health expenditure, namely, how much governments contribute to a country's total healthcare costs, and labour market conditions … We used information from the European Social Survey (ESS) 2002–2008 on more than 90,000 individuals in 32 European nations.

This study is based on the cumulative materials gathered for the European Social Survey 2002–8 from 22 countries. The study compares the level of generalized trust among police officers and other respondents. The respondents' occupational classification was based on the International Standard Classification of Occupations. This enabled the separation of 'police inspectors and detectives' and 'police officers' from other respondents. Consequently, the material included 707 respondents representing the police and 158,308 respondents representing other occupations.

We analysed data from the first four waves and we selected participants who indicated membership in a political party... This resulted in a total sample of N = 7,314 with 4,352 males and 2,955 females. The sexes were equally distributed in the various ideological groups.

Previous research has suggested that a new marriage gradient has emerged in the United States, with marriage becoming increasingly the privilege of the better-educated. ... We use cross-sectional data from five waves of the European Social Survey (2002, 2004, 2006, 2008, 2010). Our sample includes 25 European countries, providing a good design for examining micro/macro effects. We select all respondents who were between ages 40 and 49 at the time of the survey. ... The total number of cases was 33,062, with an average of 1,322 per country.

This chapter analyses occupational matching of immigrants from over seventy countries of origin to 22 European countries. ... The sample is restricted to men and women employed at the time of the survey, and aged 20–64 as to insure focusing on individuals likely to have completed their formal schooling. ... The final sample consists of 59,477 native born and 4425 immigrants in 22 host countries and from 76 source countries.

In this study, we examined origin, destination, and community effects on first- and second-generation immigrants' health in Europe. We used information from the European Social Surveys (2002–2008) on 19,210 immigrants from 123 countries of origin, living in 31 European countries. Cross-classified multilevel regression analyses reveal that political suppression in the origin country and living in countries with large numbers of immigrant peers have a detrimental influence on immigrants' health.

In this article, we study to what extent cyclical, structural, and institutional factors explain cross- national variation in youth labour market integration... To answer these questions, we use data on young people from 29 countries who were interviewed in the European Social Survey of 2002, 2004, 2006, or 2008 and left day-time education in the period 1992–2008... After list-wise deletion of cases with missing information on any of the variables included in the multilevel analysis, the analytical sample contains 18,956 respondents.

Box 5.7 Time-Series Use

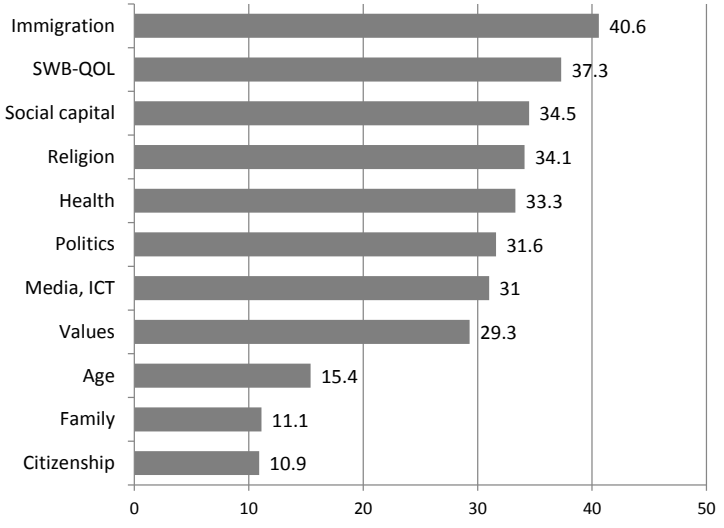
We use the cumulative file of the ESS (Rounds 1–5), which implies that we have five observation points covering an eight-year observation period. Given the rapid decline in party membership figures we can assume that such a period is sufficient to detect any meaningful trends.

Using the four waves of the European Social Survey 2004–2010, this study examines the association between Internet use and well-being before and during the financial crisis in Europe which started in 2007. ... The 2004 and the 2006 ESS present data from the period before the crisis, while the 2008 and 2010 ESS represent the time during the crisis itself...We find that before the crisis, Internet use is not associated with well-being, in contrast with during the period of crisis. Beyond documenting the associations between Internet use and well-being, we find that using the Internet to respond to a situation of unemployment may help individuals for improved well-being.

In this article, we study how the public's consumption of news versus entertainment has developed over the last decade in countries with significantly different media systems...(based on data from five waves of the European Social Survey)... Our analysis confirms some of the same tendencies that have been documented in the U.S. case. Greater choice of TV channels and TV programs has not resulted in increased TV exposure in Europe during the last decade, but it has reduced the time citizens spend watching news and programs about politics and current affairs.

Do terror attacks have an impact on public opinion, even if the terror attacks happen far away? We exploit the fact that the fourth round of the European Social Survey was conducted in several West European countries at the time of the 2008 terror attacks in Mumbai, India, in order to identify the causal effect of the Mumbai attacks on public opinion.

FIGURE 5.48 **Multiple-Round Usage across Topics**
(*Google Scholar 2003–2013, N=336*)



5.2.8.4 Added Analytical Value due to Multiple-Round Use

The self-reflection value of the round use analysis for the ESS is quite significant. As already mentioned, the assessment of the value of a specific item can change when multiple-round use is taken into account. In addition, multiple-round use is likely to prove one of the ESS' most valuable features, *i.e.* one of the main sources of its added analytical value particularly in research designs where subgroups are being analysed. To begin with, ESS data sets have larger sample sizes than other similar surveys. As detailed in the ESS ERIC protocols, the specified minimum effective sample size is 1.500 for each country whose population exceeds 2 million, and 800 for each country whose population is smaller. These requirements yield achieved net sample sizes of around 2,000 or more for countries with relatively large populations, and around 1.100 for countries with less than 2 million people.

Yet these samples become much larger as rounds are progressively pooled by more and more analysts, and multiple-round use was one of the signature aspects of the ESS data usage in 2013 publications. Owing to its dense time series and high equivalence standards, the ESS is a very suitable dataset for merging 'close' rounds (anything within 10 years or even more), with the effect that previously 'obscure' analytical groups become feasible for statistical analysis. In this sense, the ESS provides new analytical opportunities for comparative attitudinal research, making it possible to explore issues and groups that could not be explored before.

On the other hand, the ESS' relevance for the time series analysis is not as high as in the case of cross-national surveys with a much longer time of existence. The ESS time series is still relatively short, which is an obvious limitation for research questions which consider medium or long-term dynamics. In most cases, social scientists seem to seek a larger time span to observe meaningful social changes (*i.e.* several decades), yet the appeal of the ESS time series will definitely grow with each new round fielded. The sort of time-series analysis the ESS is presently the most suitable for are not long-term value changes, but the effects of events, *e.g.* the financial crisis, terrorist attacks and similar. Its high frequency of fielding makes it particularly suited for a before-after analysis.

5.2.9 The Use of Multiple Data Sources

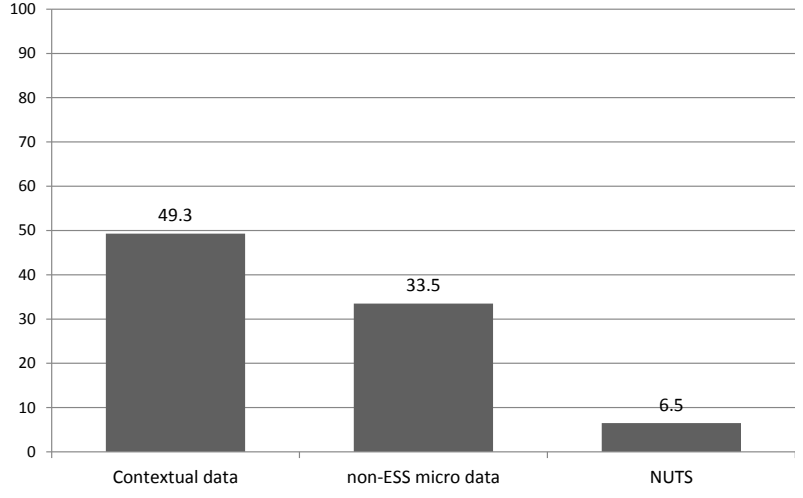
5.2.9.1 The Use of Multi-Level Data

Apart from the academic use of ESS questionnaire content, another aspect the study explored was the 'context' of ESS data use within publications. Namely,

whether the ESS is being used as a stand-alone data source, or in combination with other macro and micro sources. This sort of information reveals the extent to which authors combine micro and macro indicators in their analytical models, which macro indicators are included most, as well as how often authors combine several micro data sets, and why.

The first indicator in this block is the use of contextual (macro-level) data in ESS-based substantive publications. During the last few years, the ESS has been putting considerable efforts into the development and improvements of the *ESS Multilevel Data resource*, which was specifically designed to facilitate multilevel analysis and promote a new genre of combined social and statistical analysis. Figure 5.49 well demonstrates the need for such a resource, showing that almost half (49.3%) of 1.190 downloaded publications used contextual data. The coding did not provide information on how many authors obtained contextual data from the ESS webpage resource (they seem to use a variety of different sources), but the fact that such a large share of publications use contextual data testifies to its relevance. Typical macro indicators that authors included in their models were, among many others, GDP (used in 37.9% of publications), Gini (10.6%), HDI, CPI (corruption perception index), unemployment rates, growth rates, social expenditures, welfare policy type and similar.

FIGURE 5.49 **The Usage of Contextual Data, Micro-Data and NUTS** (*Google Scholar 2003–2013, N=1182*)



Another analytical possibility the ESS offers is regional analysis. To obtain an insight into the use of regional-level geographical units, downloaded publications were coded for the presence of NUTS1-3 regions. Generally, the

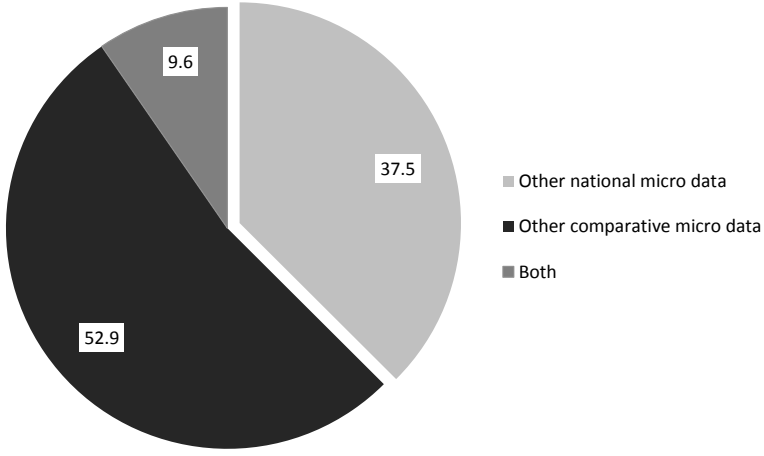
usage of NUTS regions indicates that a country-level analysis is too broad or too restrictive for a particular analytical purpose, in which case regional units may be more appropriate. Among 1,096 coded publications, 76 or 6.5% used regional-level analysis. Specifically, in 1,022 relevant downloaded publications, authors affiliated in 13 ESS member countries used NUTS regions at least once, while authors affiliated in the remaining 19 countries did not. NUTS-region use seems to be especially frequent with authors affiliated in Italy (30.2%) and Estonia (15.4%). Authors from southern Europe seem to be more prone to using regional-level analysis, possibly due the stronger regionalisation of these countries. Judging by ESS-based publications, topics where a regional-level explanation seems particularly important are religious behaviour, culture (*e.g.* the culture of entrepreneurship or innovation with regions as 'cultural units'), immigration (regional ethnic diversity and its consequences), social capital (regional trust and voluntary activity levels) and others.

5.2.9.2 The use of other micro data sources

The downloaded publications were also coded for the presence of other micro data sets (*i.e.* other attitudinal data sets), either national or comparative. The goal was to establish how many times the ESS is used as a stand-alone micro data source and how many times authors use it in combination with other micro data sources – and why. The quantitative part of the analysis revealed that 33.5% of publications use another micro data source along with the ESS data (Figure 5.50). Among these, 37.5% use another national-level micro data source and 52.9% another comparative data source, most often the WVS, EVS or ISSP.

To supplement this quantitative information with an insight into why authors combine micro-data sources, we used qualitative reviews and found four typical reasons for combining micro data sources. The first typical reason is to expand the length of a time series. As already mentioned, the ESS time series is not as long as some research questions would require it to be. Some authors addressed this problem by incorporating ESS measures into a longer series of measures taken from other micro-level surveys, most often the WVS and EVS. This practice seems particularly popular among Eastern European authors (42% of who use another micro data source – Figure 5.51). This may be due to the fact that many Eastern European countries typically do not have a consistent history of participating in every major cross-national survey and combining several micro data sources seems a handy solution to construct a proxy longitudinal series. Of course, this is only possible where the same concepts are being measured, using similar scales, or at least adjustable scales.

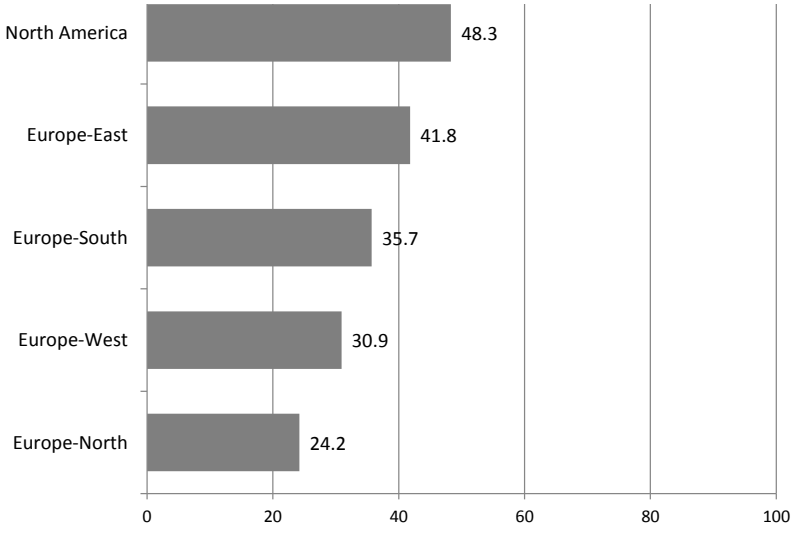
FIGURE 5.50 **The Structure of 'Other' Micro-Data**
(*Google Scholar 2003–2013, N=395*)



The second typical reason for combining micro data sources is to expand the geographical scope. A frequent reason to combine micro data sources is to broaden the comparative perspective, which is achieved by using multiple surveys which include different member countries. For instance, authors who want to compare European and North American attitudes to redistribution often combine measures from the ESS and the General Social Survey, which seems to be a very popular combination. It also explains the seemingly surprising fact that a significant share of North American authors uses ESS data. As shown by Figure 5.51, 48% of North American authors use ESS data in combination with other micro data sources, which is the largest share among all regions.

The third reason for combining micro data sources is to seek robustness. Some authors choose to use an average of measurements from several micro data sources (*e.g.* religious attendance) to minimise idiosyncratic measurement errors. Others perform the same empirical analysis on two distinct data sets in order to test the robustness of findings. Finally, the fourth typical reason for combining micro data sources is to expand analytical possibilities, *i.e.* to answer analytical questions which would otherwise be impossible to address, usually due to limitations in individual data sources. By 'creatively' combining several data sets, these problems can be bypassed (see Box 5.8).

FIGURE 5.51 **The Shares of 'Other' Micro-Data Usage According to the First Authors' Region** (*Google Scholar 2003–2013, N=395*)



Box 5.8 Combining Two Micro Data Sources to Expand Analytical Possibilities

By utilizing the natural experiment of migration, this study attempts to answer whether generalized trust in other people is the result of cultural heritage or institutional quality. Looking at immigrants having migrated from a broad range of countries of origin to destination countries in Western Europe, we examine how their generalized trust is affected by the culture of their country of origin (in terms of the level of trust of this country) as well as institutional quality in the country they have migrated to (in terms of freedom from corruption) ...

The data set consists of self-indicated immigrants in the three first rounds of European Social Survey (ESS). ... The trust data for the country of origin are calculated from the collapsed file of all waves of the World Value Survey (WVS) and European Value Survey (EVS) (average of all available waves), which contain survey data from a vast number of countries around the world. The level of trust in the country of origin is differentiated by educational groups in order to reduce the risk of immigrant self-selection.

In the above example, the authors took the micro trust measure for immigrants in the ESS survey, taking advantage of the 5,995-strong ESS immigrant sample in 18 Western European countries, obtained by pooling the first three ESS rounds. In the next step, they compared these scores with country-level trust

scores for their home countries taken from the WVS, a survey which includes many immigrant countries of origin that the ESS does not (*e.g.* Algeria, Armenia, Bangladesh, Bosnia and Herzegovina, China, Egypt, Ethiopia, Ghana, Indonesia, Mali, Nigeria, Pakistan, Vietnam, Zimbabwe...). By combining the two micro data sources, added analytical value was achieved as none of the data sets alone could have done the job.

To sum up – if adding member countries is one way to widen the geographical reach of the ESS data, the alternative way to achieving this goal seems to be to combine data sources at both macro and micro level. By doing so, many authors extend longitudinal series, compare countries that are members of different surveys, or combe micro-level measurement from one dataset, with country-level measurement from another, thus expanding their analytical models in time or space. From the perspective of the ESS, the basic pre-condition for facilitating such operations is sharing indicators with other surveys, particularly those with global membership. At the practical level, such item sharing is already happening, with several standard items such as trust, subjective health, subjective well-being etc. being included in more or less all general comparative surveys (although not usually with equal scales). In the future, the ESS could make a strategic decision to establish an item-sharing programme with global-reach surveys or, on a bilateral basis, to expand its analytical reach and increase its appeal for global audiences. Questionnaire design teams, for instance, could be asked to actively search for such items when designing rotation modules. Alternatively, the entire modules could be shared, as was the case with the R1 Citizenship module, which was also fielded in the USA as part of the Citizenship, Involvement, Democracy (CID) survey in 2005.

5.2.10 The Inclusion of Countries in Analysis

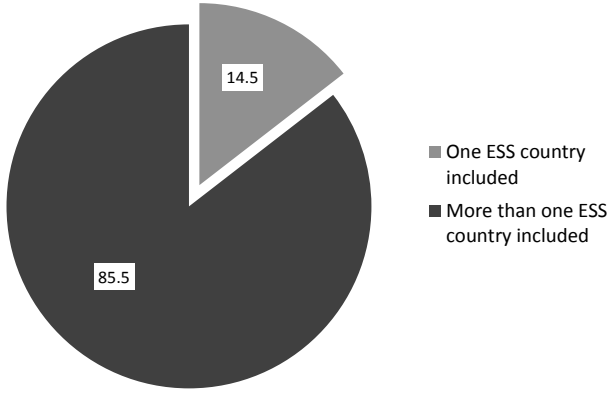
5.2.10.1 Comparative Use of the ESS data

The next section will examine the inclusion of countries in analysis, an aspect of feedback which is most relevant for national coordinators and national funders. As mentioned in Sections 5.1 and 5.4, questionnaire content and geographical coverage are the key determinants of survey choice. By 2014, 34 countries had fielded at least one ESS round: 22 in round 1, 26 in round 2, 25 in round 3, 31 in round 4, 28 in round 5 and 29 in round 6. However, not all participating countries are included in every analysis and for various reasons some are included more often than others. This section explores the patterns of country inclusion in ESS-based publications, and the factors that explain it.

The first chart (5.52) draws a general line between comparative and non-comparative use of ESS data. Even though the ESS is a comparative survey,

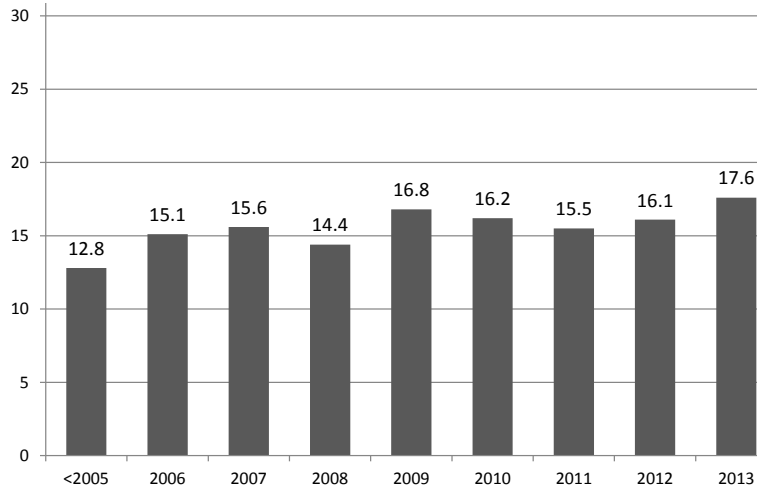
14.5% of publications only use a national data subset. However, in the majority of publications (85.5%), ESS data are being used comparatively, with more than one country studied.

FIGURE 5.52 **Comparative Use of the ESS**
(*Google Scholar 2003–2013, N=1169*)



The average number of countries included in analysis varies between 12 and 18 for the first 5 rounds (Figure 5.53). Many authors tend to include all available countries or provide explicit explanations as to why they dropped some of them (reasons are detailed and summarised later in this section).

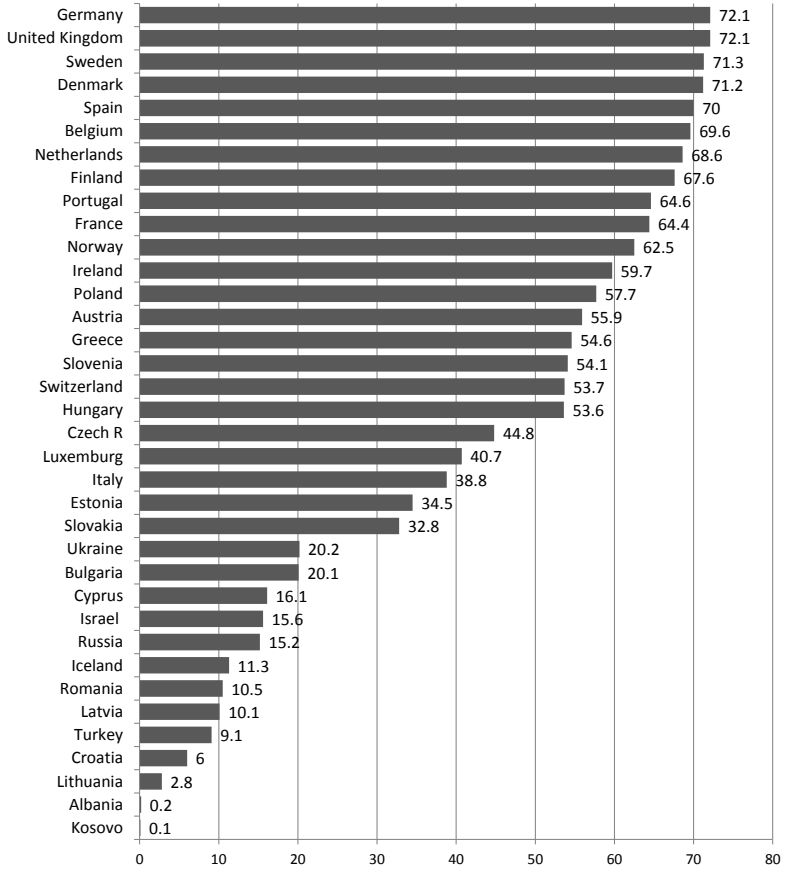
FIGURE 5.53 **Average Number of Countries Analysed**
(*Google Scholar 2003–2013, N=1169*)



5.2.10.2 Country Inclusion Rates

However, despite the prevalent tendency to include a large set of countries in comparative analyses, there are still large differences in shares of inclusion among the ESS member countries. While Germany and the UK were included in 72.1% of the 1,190 examined publications, Kosovo stands out at 0.1% (Figure 5.54). Obviously, the availability of country data is the main explanation for such huge differences. As a rule, countries that fielded more rounds have higher inclusion rates overall. Skipping one or more rounds removes a country from a segment of comparative analysis by the very fact that its data are not available for at least two modules and one time-point.

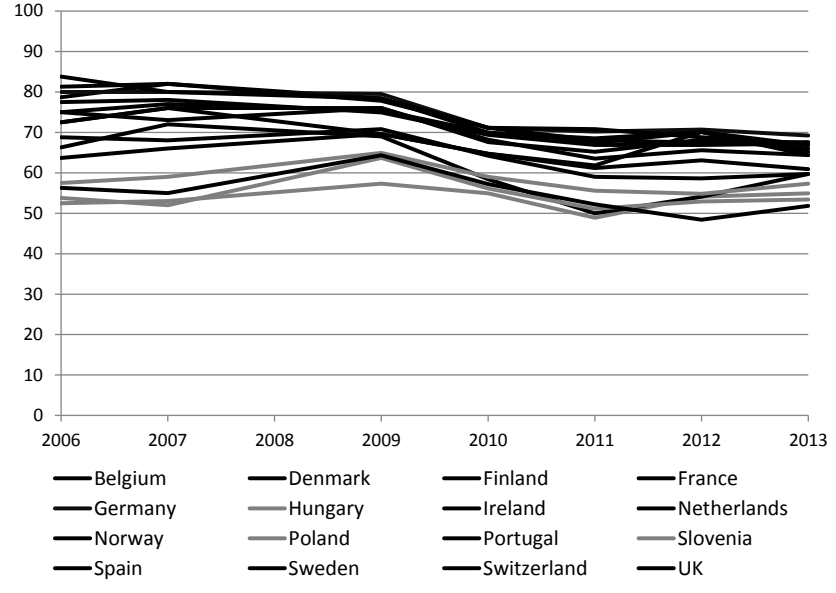
FIGURE 5.54 **Country Inclusion Rates**
(*Google Scholar 2003–2013, N=1190*)



Cross-time country-inclusion data reveal the sensitivity of inclusion rates to membership changes. There was a steep rise in the inclusion of Eastern European countries as they began to join in the ESS more massively with Round 2, while the inclusion of other regional groups remains largely stable, reflecting the relative stability of their membership. On the other hand, the study detected falling rates of inclusion for four ESS countries which either discontinued their fielding for several rounds (Italy, Luxemburg, Iceland), or fielded the rounds with long delays (Austria).

On the other hand, Figure 5.55 presents the 16 ESS countries which fielded all 5 rounds between 2002 and 2010. There is a decline of about 10% in the second period, possibly due to the addition of many new countries, but the inclusion rates are generally very stable and hover between 50% and 80%. This indicates that the regular fielding of rounds results in stable and strong inclusion rates. Another thing that works in favour of regular participation is the fast increasing multiple-round usage, which makes it more likely to include countries that have participated in more rounds. Nevertheless, there is still a difference of about 20% between the most and least included '5-rounds' countries. Eastern European countries, for instance, are being included consistently less and not all countries that skipped rounds suffer the same 'damage' in terms of inclusion.

FIGURE 5.55 **Inclusion of Countries with Five Rounds Fielded**
(*Google Scholar 2003–2013, N=1190*)



To find out more about the reasons for dropping individual countries, we carried out a qualitative review of journal articles for the period 2011–2013. Seven typical reasons for non-inclusion were identified. First, individual countries can be dropped due to *missing items or concepts* in their data file (*e.g.* a respondent's or spouse's educational level, father's occupational position, involvement in voluntary organisations, household income, educational field, Schwartz values, language proficiency etc.), or due to *high item non-response* on crucial variables. Switzerland, for instance, is often excluded for not having a harmonised battery of voluntary organisation questions from R1, which is extremely popular.

Non-inclusion can also be the consequence of *missing contextual data*. Given the large share of papers that use multi-level (contextual) data, many countries are dropped because authors were unable, or did not make enough effort, to find matching macro indicators. Examples include data on ethnic diversity at the regional level, information on various state policies, the general absence of a country from the Eurostat source (*e.g.* Norway, Switzerland, parts of Eastern Europe), degree of poverty among single-parent households, enrolment in childcare, standard pensioning ages, regional GDP, suicide rates, a welfare generosity measure and others.

Often a group of countries is dropped because their characteristics are in *a mismatch with the specific research question*. For example, authors may want to include Western European immigrant countries (as opposed to countries with atypical migration processes), countries with a comparable labour market history or experience of independent trade unions, countries with GDP per capita of US$ 30,000 or more, stable democracies, industrialised countries with a developed system of social security, countries with radical right-wing parties, EU member countries etc. This item largely explains the (previously mentioned) lower inclusion of Eastern European countries in general, as they are not the prime target group for most of the above-mentioned topics.

Non-inclusion can also be due to *quality or equivalence issues* flagged on the ESS website. Examples include missing design weights, the sampling plan not being approved by the ESS sample team or other problems related to sample design, incompatibilities in key variables (*e.g.* different scales), possible deviations or problems during the data collection process, 'dubious' results and similar.

Another reason for non-inclusion is an insufficient *sub-sample size* or variation. Such cases are most common when immigrants are the target group, *e.g.* excluding countries where '*the number of surveyed non-EU immigrants is lower than 10 people*', or '*the number of second-generation immigrants lower than 25',* or *'number of people with a migrant background below 100'*. One example of a lack of variation is the citizenship variable (all respondents coded as citizens or only three (native born) non-citizens).

As already mentioned, a common reason for non-inclusion is *skipping rounds*. Primarily in cases where multiple-round data are used, authors often drop countries which failed to field all relevant rounds or a certain number of them ("*Our analysis includes all 21 countries that were surveyed in both the third and fourth rounds of the ESS*" or "*Countries selected for inclusion in the analysis were those that featured in both 2002 and 2008 waves*" or "*We first selected countries that had participated in at least two ESS rounds; 30 countries met this requirement*". Finally, non-inclusion can be due to delays in depositing data. In a certain number of cases, countries that fielded a particular round but did not make it into the first release are not included because the timing of the data download was earlier than their country data was published (*e.g.* "*The survey was conducted in 30 countries of which 28 were available in the 3rd release of the data which is used here*", or "*At the time of the submission of this article, the data for Austria, Ireland and Lithuania were not available*").

The statistics on inclusion rates demonstrate in a quite powerful way how ESS member countries are being analysed in an increasingly large number of comparative academic studies, and that a large body of findings about various aspects of their societies is being produced, which is certainly important feedback for research teams and national funders. While the number of authors affiliated in a particular country reveals the scope of its academic community involvement with the ESS, it is in fact the country inclusion rate that defines the scope of findings that national policymakers can harvest. While some writers focus primarily on their own country, an overwhelming majority focus on comparisons between many countries and, accordingly, produce policy relevant outputs for many other countries, as long as they include them in their comparative models. Running a second-order analysis on hundreds of academic papers would yield a large and comprehensive volume of information on societal trends in all ESS member countries and wider. Such country-level comparisons are the best substitute for randomised controlled trials that are a common way of informing policy (Haynes *et al*., 2012), but are usually impossible to run at the societal level.

5.2.11 Impact of the ESS among Policy Communities

Finally, our study examined, as far as this was possible by using the tools of quantitative analysis, the content of ESS-based publications which is relevant for the policy communities. Apart from academics, policy communities and policymakers are another primary target group for the ESS outreach. Social scientists in general are intensely involved in societal goals. While scientists mainly address other scientists, humanities scholars and social scientists have to

cater as well to the general public and policymakers. A high percentage of social science studies is (in)directly relevant to policy and in some social science and humanities fields a large share of publications researchers produce may address the lay public (Nederhof, 2006: 88; Kyvik, 2003: 44). In addition, the need for more accountability on behalf of the various beneficiaries of public R&D money has become a high priority on the agenda of policymakers (Debackere and Gliinzel, 2004). Informing policy is also one of the key societal goals of the European Social Survey. However, while academic relevance is relatively easy to measure through the number of academic publications and topic mapping, policy relevance is hard to assess in a quantitative way. Our study used a relatively simple and robust quantitative indicator to measure the presence of policy-oriented content in ESS-based publications, namely counting the number of times the word "policy" or "policies" appeared in them.

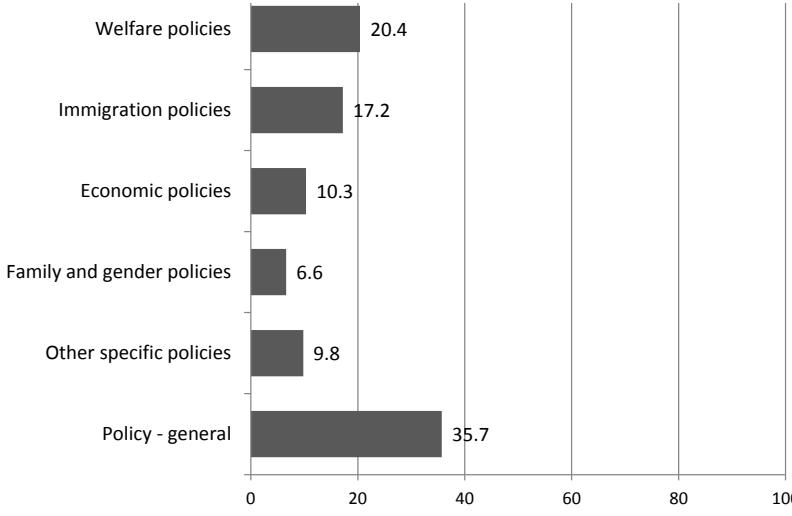
Statistical analysis revealed that a large majority of publications (78.4%) contained the keyword "policy" or "policies", and that in 50% of them the keyword was present more than 3 times. Altogether, in 1,157 downloaded publications the word "policy" or "policies" was used (at least) 11,835 times, on average 10.2 times per publication. It can therefore be reasonably concluded that ESS academic outputs are impregnated with policy content.

In addition to measuring the presence of the general policy concept, the presence of specific policy references was also coded. Up to 64.3% of publications which contain policy references also contain specific policy references (Figure 5.56). The policies authors most often referred to are welfare, immigration, economic and family, which seem to be the policy areas that the ESS survey is best equipped to inform. In addition to these, ESS publications contained many other specific policy references (*e.g.* crime, the environment, agricultural, sport, housing, privatisation, media, research etc.), and new policy domains are likely to be addressed more strongly as publications on new rotating modules become more numerous (*e.g.* R5 Criminal justice). By harvesting publications and highlighting leading academic topics, ESS bibliographic self-monitoring is essential for producing relevant outreach publications such as booklets containing findings, and top-line results. Similarly, by identifying the policy issues most frequently addressed by ESS-based authors it identifies the most relevant content for the programme of policy seminars which bring together ESS scientists, other academics and policymakers with a shared interest in an ESS topic.

The task that remains is how to translate these findings into policy measures in the most efficient and systematic way, *i.e.*, how to bridge the gap between academia and policymakers. With such a large mass of policy-oriented papers being produced every year, there seems to be a need for a more powerful second-

order analytical tool that would summarise, organise and synthesise the findings. Any form of manual or automated mining for policy content would doubtlessly yield a great volume of policy relevant outputs. According to some analysts (Sundberg and Taylor-Gooby, 2013), one possibility is the *Systematic review method* which is considered a best practice at this point and essentially sums the number of studies in the literature which point to specific conclusions and which meet particular quality criteria. According to the authors, the method has generated enormous interest at the interface between social science and policymaking, but care should be taken no to limit the review on the material conveniently available in electronic databases, as books, book chapters and other material offer important sources of information in the social sciences. Another technique to summarise policy-relevant outputs is the *Realist synthesis method* which, rather than merely focusing on 'what works', takes into account the context in which interventions have taken place when assessing evidence of the effectiveness of an intervention (*ibid.*). Such 'policy mining' exercises could be incorporated in ESS activities themselves, or they could merely be recommended to policy user communities.

FIGURE 5.56 **Specific Policy References in ESS Primary Analysis Papers** (*Google Scholar 2003–2013, N=1159*)



Another angle explored was the connection between use of the ESS questionnaire parts and policy references where some clear associations were identified. The three ESS modules that inspire the largest share of specific policy references are R1 Immigration which primarily informs immigration policies, R4 Welfare which primarily informs welfare policies, and R2 Family and work which primarily

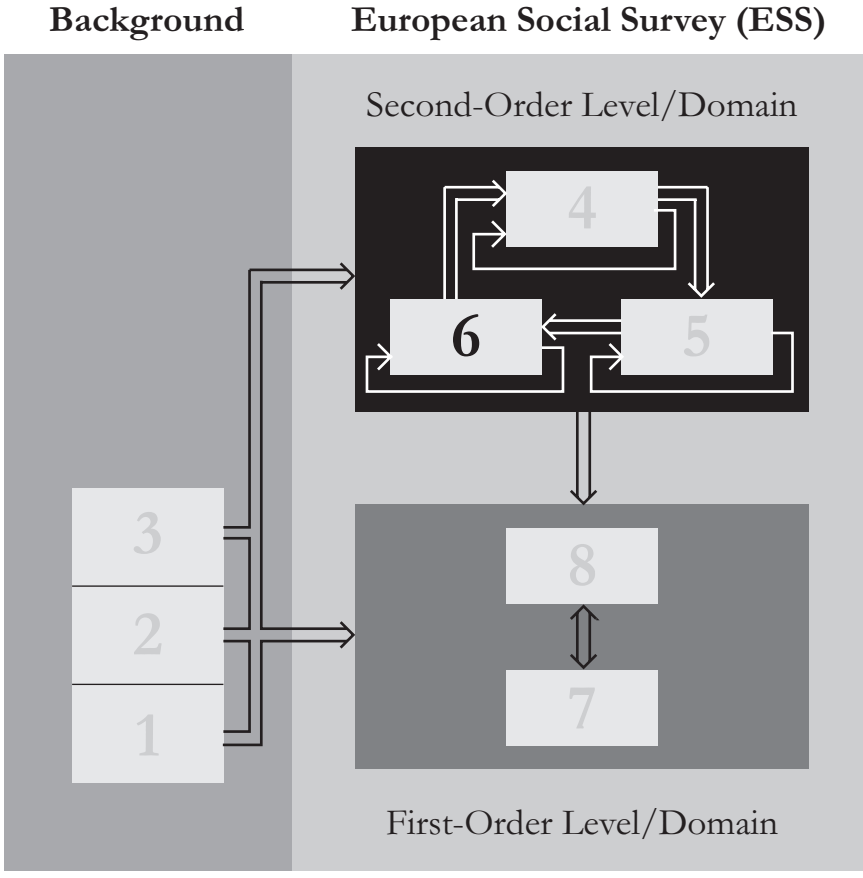
informs family and labour market policies. The shares of publications without policy references are smallest in these modules (between 10%–20%). On the other hand, the two least policy-oriented questionnaire parts (according to the keyword search method) are PVQ and the R3 Personal well-being module which both focus on more individualistic psychological and well-being concepts. However, even publications based on these least policy-oriented parts contained policy references in 60% of cases. Publications based on the ABC Core and R1 Citizenship are most likely to offer general policy references.

5.2.12 Conclusion

As stated at the beginning, a large comparative survey such as the ESS increasingly needs continuous feedback on its academic impact to optimise its functioning. Quantitative and qualitative feedback obtained through the study of ESS-based publications proves to be a rich source of such feedback. This chapter was based on reports that are integrated into ESS activities, which testifies that reflexivity is, in this way, integrated into the ESS survey management in a relatively systematic way. Informing a variety of ESS bodies was the main goal behind construction of the bibliographic monitoring model, and the second-order feedback loop created this way is expected to result in a further increase in ESS academic and policy usage. The second-order ESS-study of ESS-studies has identified parts of the questionnaire that are being heavily used, as well as those that are barely used at all. Specific explanations for these discrepancies remain largely obs
cure, but can in general be attributed to item and module characteristics themselves, the theoretical and policy relevance of the issue, as well the issues of item/module visibility among relevant academic communities. They revealed that the typical life-span of a new dataset of a general international social survey is about five years, after which the data begin to age and users turn to other data sources unless a fresh wave is fielded. They demonstrated how a relatively narrow battery of questions can attract use by another academic community and that the main determinants of survey choice are its content and comparative span, only then the level of equivalence it achieves. The topic-mapping exercise highlighted interest patterns of European social scientists and social issues that are most often addressed by academics using ESS data, while the qualitative analysis of policy content identified the policy areas which the ESS survey seems best equipped to inform. All of these findings can be incorporated into the future management processes and decisions of ESS bodies, either those that concern questionnaire content and module selection, or ESS outreach and communication actions, a strategy that corresponds – at the survey level – to a significant extent with Ulrich Beck's vision of 'reflexive' science, increasingly concerned about its own

internal and external effects and with the broad framework of second-order science which, *inter alia*, reflects on the results of first-order science.

6 A Deep Search for Second-Order Survey Analyses



My understanding of your understanding is
(precisely) not your understanding.

Ranulph Glanville, *The Black B∞x, Volume III*

Chapter 4 provided an outline of two major roads to second-order survey studies in general, namely an input- and an output-path, and emphasized that these two major roads for second-order survey investigations include a relatively large number of different types of second-order studies.
Chapter 5 gave an extensive overview of the results of a second-order investigation which is based on outputs, namely on ESS-publications over the last twelve years.
The present chapter will start from this single second-order ESS study which was presented in Chapter 5. We will now extend the scope of second-order survey analyses in a systematic manner with a focus on ESS-publications with ESS-data. The notion of a deep search means that second-order survey analyses can be significantly enlarged and expanded, once a specific type of analysis was undertaken. The path which was chosen in the previous chapter does not end with Chapter 5 but can be continued and strengthened in a multiplicity of ways. These additional possibilities for second-order investigations will become the main focus for the subsequent sections.

6.1 A Second-Order ESS Study of ESS Studies: A Summary

The previous chapter showed, at least in our view, the power and the scope of a single second-order ESS-study which is based on a large number of ESS-studies in the format of articles, book chapters and the like. Three large groups of results could be obtained.

- First, this type of investigations produced profiles for survey research and for survey researchers especially within Europe, although the ESS is used also by researchers outside Europe.
- Second, the previous chapter generated a profile on the utilization of the ESS in terms of variables, variable groups and modules selected for publications.
- Third, the study showed several comparisons between ESS, the World Value Survey (WVS), the European Value Survey (EVS) and ISS (International Social Survey Program) and the preferences of social science disciplines for these four surveys.

Subsequently, the potential for this type of second-order publication study of the ESS will be analyzed in its full potential and will point into different new directions and possibilities which were not used throughout the previous chapter. This investigation will move into two stages, namely

- first, with an exclusive focus on the ESS (internal dynamics) and
- second, by adding other large-scale European surveys (external dynamics).

6.2 A Deep Search for New Dimensions and Widening the Second-Order Database for ESS Analyses

In a first step the dimensions and the classifications for a deep search are centered exclusively on the ESS and on its output or publication dynamics in the last twelve years. Therefore, the term internal dynamics refers to this exclusive focus on the ESS.

Chapter 5 presented a dense, diversified and advanced second-order publication study of the ESS. Nevertheless it seems worthwhile to systematize the outcomes of the previous chapter in terms of different dimensions as well as classifications of each of these dimensions. Two types of results will be produced.

- First, for each dimension which was already used one can expand the classification schemes and enable, thus, a second-order study in terms of new aspects for a particular dimension.
- Second, the range of dimensions can be expanded as well so that new second-order investigations can be focused on new themes, not already included in the previous chapter.

The first exploration will be centered on the dimensions which were already used in Chapter 5 and for which a second-order database was already constructed.

The first dimension for a deep search is based on the internal dynamics of ESS-themes which are focused on the available ESS questions, items or variables. Initially, the notion of an ESS theme will be laid out and developed in a systematic way. In its current format the ESS is composed of several parts or blocks. For example, the seventh ESS round was composed of the following segments as summarized in Table 6.1

From Table 6.1 one can see that the ESS is composed of ten blocks A–J. This separation can be classified as the main ESS themes or as the reference differentiation of ESS-themes. However, a second-order study might be interested in a more detailed separation of ESS questions and question groups.

TABLE 6.1 **Composition of ESS Questions in Round 7**

Blocks	Position within ESS	Domain	Questions
Block A	Core	TV watching, social trust	QA1 – QA5
Block B	Core	Politics	QB1 – QB34a
Block C	Core	Social Issues	QC1 – QC281
Block F	Core	Socio-demographics	QF1 – QF61
Block D	Rotating Module	Immigration	QD1 – QD33
Block E	Rotating Module	Health	QE1 – QE32
Block H	Supplementary Section H	Human values scale	*
Block I	Supplementary Section I	Test questions	*
Block J	Interviewer	Interview	QJ1 – QJ9

*: Dependent on the type of administration (face to face or self-completed version)

- A single ESS theme comprises usually several ESS questions or variables. In its minimal version, an ESS theme is composed of one question or variable only.
- In its maximal version the ESS comprises at least two very large-scale themes like the questions for respondents and the questions for interviewers. It depends on the goals of a second-order analysis and on the second-order analysts to select a large or very large number of ESS questions or variables as an ESS theme.

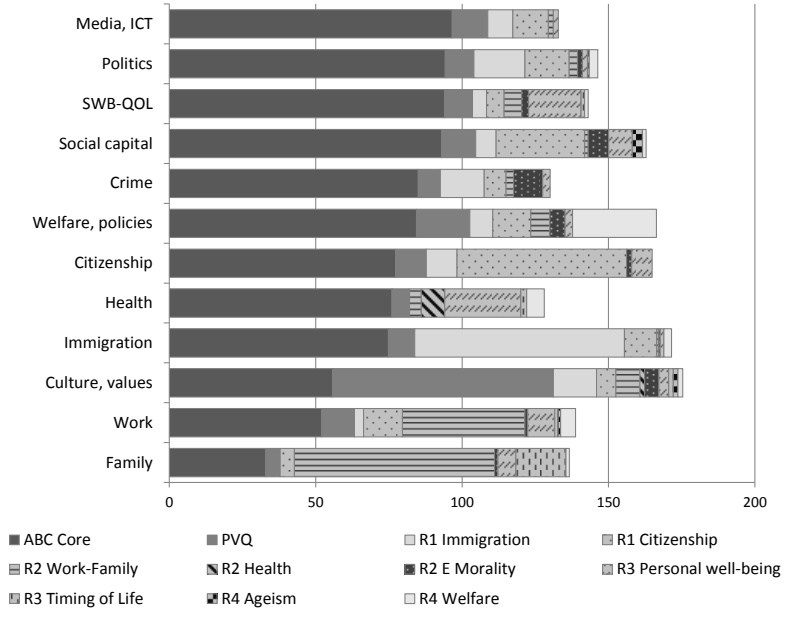
A specific database on ESS themes can be classified as complete if the following conditions are fulfilled:

- First, the segmentation of ESS themes covers the entire ESS data sets across all rounds.
- Second, a variable or item count has been undertaken for all ESS publications on a yearly basis.

Aside from ESS themes which are based on the variables or items of the ESS a second dimension of a deep search can be undertaken in terms of the topics in the ESS-based publications.

An ESS-based topic differs from an ESS theme in the following way, given a particular segmentation of ESS themes. An ESS-based topic like health, work or family can be composed of various ESS themes. Figure 5.25 in Chapter 5 will be reproduced, once again, as Figure 6.1 in order to show the different variable composition for ESS topics like media/ICT, politics, social capital, etc.

FIGURE 6.1 **ABC Core and Modules as Data Sources for Topics**
(*Google Scholar 2003–2013, N=1190*)



Again, one can specify the basic conditions for a complete database of ESS topics which enables a second-order investigation on the dynamics of ESS topics.

- First, all ESS publications have been classified in terms of their main topics.
- Second, these topics were specified on a yearly basis and these topics can be ordered according to their frequencies in the annual ESS-based publications.

Obviously, different second-order researchers will produce different classification schemes for topics, some of them very detailed, some rather general.

A third deep search on the internal dynamics can be undertaken with respect to methods and methodological issues in general. This type of investigation was covered partially in Chapter 5 already, but can be expanded significantly. Table 6.2 shows additional options for classifications in terms of different statistical methods used in a publication or differentiation by theory/hypothesis/description. Here, a significant widening can be reached which extends the current second-order ESS database significantly.

The fourth dimension of survey researchers was also presented in Chapter 5, but it can be widened additionally. Table 6.2 demonstrates that a series of additional classifications can be added to the current second-order ESS database. The same result can be obtained for the fifth and last dimension in Table 6.2 which is centered on the types of ESS publications.

TABLE 6.2 **Dimensions and Classifications for a Second-Order ESS Database**

Dimensions	Empirical Basis	Search and Classification Processes
ESS Themes	ESS Publications	ESS Item or Variable Counts in Publications; Grouping of ESS Items or Variables to ESS Themes
Topics	ESS Publications	Keywords for Publications
Methodology	ESS Publications	Classifications of Statistical Methods (Cluster-, Factor-, Regression- Analysis, Correlation-, Variance-Analysis, etc.); Types of Visual Methods; Static/ Dynamic; Type of Dynamic Analysis (Two Points in Time up to Full Time Series); Single Level/ Multilevel Analysis; Testings (Theory/Hypothesis) or Descriptive; Types of Models, etc.
Researchers	ESS Publications	Authorship (Single, two Authors, Several Author); Principal Investigator; Nationality of Authors and Principal Investigator; Discipline(s) of Authors; Academic (University/ Research Institute) / Other Affiliations of Authors; Socio-Demo-graphic Characteristics of Authors (Gender, Age, etc.), etc.
Publication Forms	ESS Publications	Classification of Publications (Journals, Book Chapters, Research Reports, Others); Language of Publication; Length of Publication, etc.

Thus, Table 6.2 presents the dimensions which were used already in Chapter 5 plus a substantial number of additional classifications which can be added to the current second-order ESS database.
However, the number of dimensions can be increased as well. Table 6.3 points to four new dimensions and some of their classifications.

TABLE 6.3 **Additional Dimensions for a Second-Order Database**

Additional Dimensions	Empirical Basis	Search and Classification Processes
Socio-Economic Policy (National)	ESS Publications	Inclusion of Socio-Economic Policy Issues at the national level; Types of National Socio-Economic Issues; Impact, etc.
EU-Policies	ESS Publications	Inclusion of Socio-Economic Policy Issues at the EU-level; Types of EU- Socio-Economic Issues; Impact, etc.
Innovation	ESS Publications	Degree of Innovation; Types of Innovation (Topic/Method/Theory), etc.
Quotations	ESS Publications	Scope of Quotations; Range of Scientific Disciplines; Share of Self- Quotations, etc.

Obviously, the search for additional dimensions does not end with Table 6.3 but can be extended, depending on the thematic interests of second-order researchers to new domains.

6.3 Second-Order Analyses of the Internal Dynamics

With a comprehensive second-order database the general format for a deep thematic search of the internal ESS dynamics requires the following specifications.

Initially, the first step towards a second-order dynamic analysis asks for the specification of an appropriate time interval where one can choose between the available yearly base, but researchers can also opt for a two year interval, a three year interval or longer time periods. Depending on the choice for a specific time frame one has to re-group the orderings in accordance with this frame.

- First, a selection has to be undertaken for the available dimensions of a dynamic analysis since the advancement of second-order studies and the widening of the ESS databases makes it more and more unlikely that second-order researchers want to cover all dimensions in all possible aspects and variables.
- Second, the various aspects within a specific dimension must be specified explicitly. A quick look at Table 6.2 makes it obvious that the dimensions of researchers and of methodology, if selected, require further work in terms of groupings and orderings.
- Third, the basic second-order profiles for each of the selected dimensions and aspects have to be built which present the empirical results of the intended second-order investigation.
- Fourth, further statistical analyses like rank correlations, numerical calculations or visual methods can be used to provide additional information of the dynamic stability or instability for each of these dimensions.
- Fifth, additional groupings can be undertaken in terms of stable ESS-dynamics, ESS dynamics with medium changes in time and ESS dynamics with large-scale changes within and across different dimensions.
- Finally, generalizations or hypotheses can be produced which throw a more theoretical light on these ESS dynamics.

In this way a very comprehensive overview has been generated for studying the internal dynamics of the ESS in various dimensions and aspects with an exclusive focus on ESS publications. Obviously, these types of dynamics will change themselves, due to the inclusion of new data from most recent ESS publications.

6.4 An Extension of the Second-Order ESS Database with Multiple Surveys

Chapter 5 was already able to point to other important European or global surveys like ISSP (International Social Science Programme), EWV (European Value Survey), SHARE (Survey of Health, Ageing and Retirement in Europe) or WVS (World Value Survey) and to compare ESS-based publications with publications in these other surveys. However, this comparison was still very restricted and covered just one aspect of survey utilizations.

From a systematic point the second-order ESS databases can be very strongly expanded by a comprehensive inclusion of other surveys where the data bases are built along the dimensions and classification in the previous section.

The initial step in our deep search procedures requires at least one additional European survey which is comparable in its regional and thematic scope to the ESS like ISSP, WVS, SHARE, EVS and the like. Here, the same procedures must be used which were operative in the construction of the ESS database.

In August 2015, for example, Google Scholar produced the following gross, *i.e.*. unedited, numbers of publications (journal articles, book chapters, conference papers, etc.) for the period from the beginning of the surveys until December 2014 for two surveys from Eurofound in Dublin, namely for the

- European Quality of Life Survey, implemented in 2004, 2009 and 2013, with 1800 publications and the
- European Working Conditions Survey with five rounds so far and with 2920 publications.

It is estimated that about two thirds of Google Scholar hits would be excluded during the selection process, so the final number of publications for these two groups of European surveys may be around 1500. Again, each of these 1500 publications in these two surveys can be documented in the same way as the ESS, using the same dimensions and aspects so that the European Quality of Life Survey with three rounds and the European Working Conditions Survey with five rounds can be analyzed in a second-order manner, too.

Evidently, the second-order data bases can be widened to include four or more large-scale European surveys. In the next years the Center for Public Opinion and Mass Communication in Ljubljana will undertake several expansions of the current second-order ESS database, starting at the moment with ISSP so that this option for very large second-order databases can be effectively realized and implemented.

6.5 Analyzing the Comparative Dynamics across Multiple Surveys

With the help of these significantly extended second-order databases a variety of new types of investigations can be undertaken on the comparative dynamics of different European surveys, based on the publications with these survey data. Initially, the first step towards a comparative second-order dynamic analysis requires, once again, the specification of an appropriate time interval for all surveys included where one can choose between suitable options like one year, one round, etc.

In the case of a comparative second order study on survey dynamics one needs to fulfill the same steps which were also used for the ESS dynamics.

- First, a selection has to be undertaken for the scope of comparative analysis in terms of its dimensions. Likewise, the various aspects within a specific dimension must be specified explicitly and must be applicable to the available second-order databases.
- Second, the basic second-order profiles for each of the selected dimensions and aspects have to be built for each of the surveys included in the comparative second-order analysis of survey dynamics.
- Third, the results from these separated second-order analyses can be combined and integrated to a comparative investigation which should exhibit the differences and similarities between the survey dynamics included in this comparative second-order study.
- Fourth, further statistical analyses like rank correlations, numerical calculations or visual methods can be used to provide additional information of the dynamic stability or instability across these surveys.
- Fifth, additional groupings can be undertaken in terms of stable dynamics, dynamics with medium changes in time and dynamics with large-scale changes within and across these different surveys.
- Finally, generalizations or hypotheses can be produced which cast a more theoretical light on these groups of survey dynamics.

In this way an entirely new frontier can be opened for comparative second-order survey analyses which have the genuine advantage that the empirical results are almost completely unknown at the present time, not only to us, but to the entire community of survey researchers. Thus, research in this new area of comparative second-order survey dynamics becomes, by necessity, innovative.

6.6 Combining Multiple Types of Comparative Survey Analyses

So far, the main emphasis was placed on a deep search for second-order survey analyses based on publications. Thus, the deep search up to this point was focused on widening a specific type of output studies, starting with the ESS and extending it to other European surveys and to the analysis of comparative survey dynamics. However, an output study with its focus on publications can be combined with another second-order investigation either from the input or from the output side. For example, a second-order study on survey outputs can be combined with a second-order study on survey inputs.

For the input side, a second-order study can be assembled on the role of social science theories and their impact on the construction of survey questions for a larger group of surveys. For this purpose available documents must be compiled on the early stages of survey constructions[1] and a second-order study can be undertaken which focuses on the scope of social science theories used (marginal/small/medium/large), the links between theories and the constructions of survey questions, the quality of survey questions, the potential for theory testing, etc. This second-order input study could be combined with a second-order output study of survey publications and their bibliographies. Such a combination could produce interesting and new results on the coherences between the input supply of social science theories and the output utilizations of these theories.

More generally, through combinations between different types of second-order studies one can open an additional frontier for new second-order investigations with most probably innovative results and perspectives.

6.7 Second-Order Survey-Studies of Second-Order Survey-Studies

The next and final step in a deep search is currently not feasible at all because this final step presupposes that a large number of second-order survey analyses have been produced over a long time period. In such a configuration which will be available only within the next decade(s), these second-order survey studies on specific aspects of survey inputs or outputs can be analyzed in much the same way as the procedures necessary for a second-order study based on first-order elements.. As a terminological convention a survey study of second-order survey

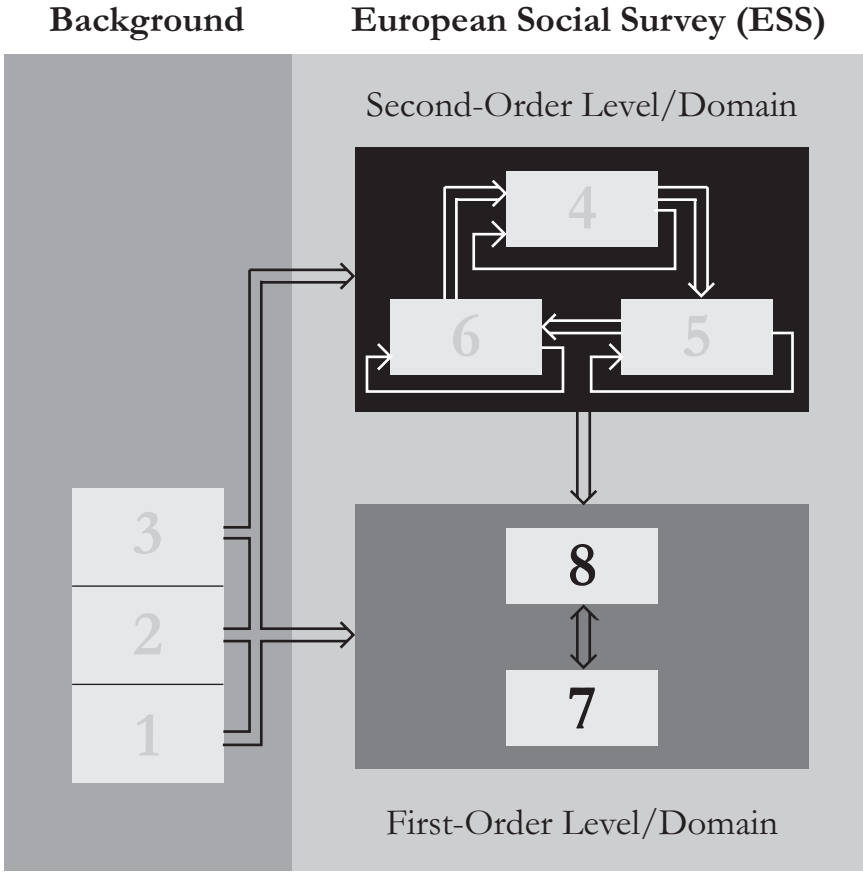
1 In the case of the ESS as just one among many surveys in such a study, each round is organized as an open call for rotating modules and applications are provided usually by international teams with a specific expertise in a potential topic. Here, the documents on the theoretical background of these rotating modules can be used for a second-order input analysis.

studies should still be classified as a second-order study and not as a third-order study. The second-order level was characterized as the level of reflexive designs and research and second-order investigations of second-order investigations exhibit the same basic logic of re-entries. One can differentiate between different degrees of order so that a second-order study of first-order studies is categorized as order 1, a second-order analysis of second-order analyses as order 2, etc.
Since this publication constitutes the first second-order survey studies with all the ingredients for second-order research and the necessary reflexivity background, we are currently in an almost maximum distance to the wave of second-order survey analyses of second-order survey analyses. Nevertheless, it becomes an interesting point in itself that the accumulation of second-order investigations leads to new second-order investigations of higher order, *and so ad infinitum* ...

6.8 Outlooks

At this point, the deep search for the second-order ESS-study in Chapter 5 has reached its logical endpoint in the future format of second-order ESS-studies of second-order ESS-investigations. This chapter on possible deep searches made it clear that the innovation and novelty potential of second-order survey analyses increases with the number of surveys which have been analysed in a second-order manner with respect to their respective inputs and outputs. In this way our current book on the ESS marks only a starting point for a rapid increase of second-order survey-investigations, not its endpoint.

Part III
Meeting the Grand Challenges



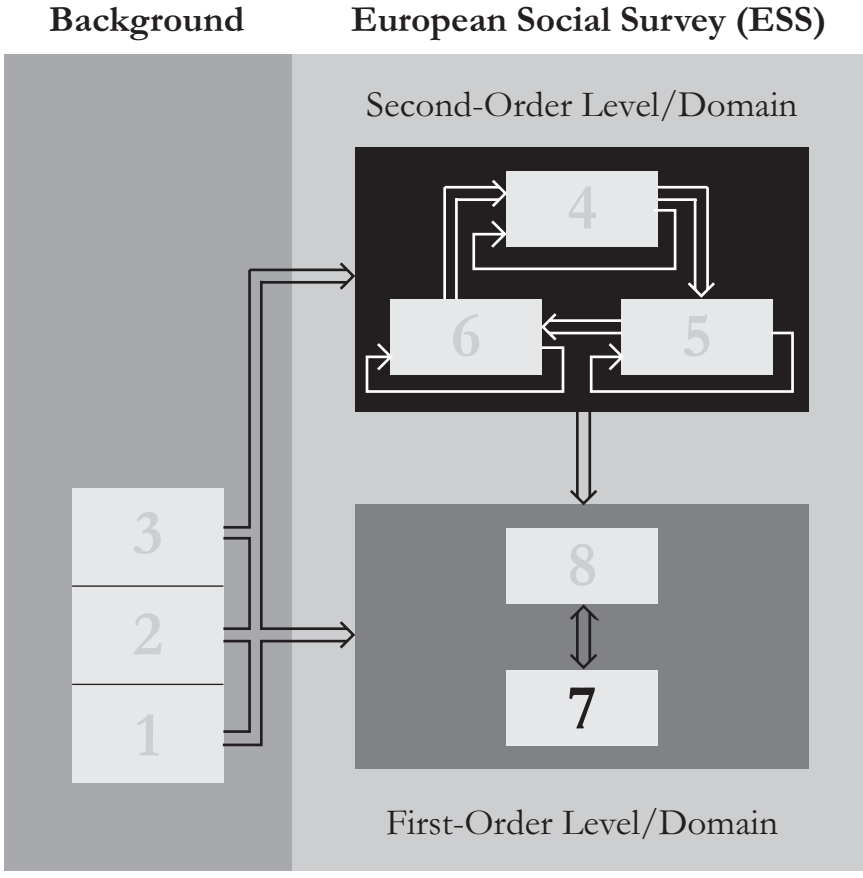
> We are left with two options. To try to control the world by reducing its variety ... or to go with it, accepting that it's beyond our control and enjoying the novelty it offers us through its variety ... Variety and creativity are, in this interpretation, connected. The more variety there is available to us, the more creative we are likely to be. So long as we let it remain unmanageable, and don't restrict the variety available to that we have.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

Part III concludes the present volume in two significant aspects which are both closely connected to its title and its focus on surveys and reflexivity.

- Chapter 7 provides a strategy for the European Social Survey as an organized European Research Infrastructure Consortium (ESS ERIC) to move on its success-path and to expand despite its current three grand challenges. This proposal is based on a simultaneous empowerment of ESS ERIC along its three levels of operations, namely along its zero-order, first-order as well as its second-order level.
- Finally, Chapter 8 adds a significant number of reflexive designs for survey research which are largely unexplored so far and offer new perspectives for survey research in general. These new reflexive alternatives, with the exception of second-order survey studies, play mostly within first-order science.

With Part III a wide intellectual journey will come to an end which started with great transformations in the overall science system and which will finish with a total of five clusters for reflexive designs for survey research where each cluster comprises different types of investigation.
Viewed in a different context, this book demonstrates the high relevance of an ongoing revolution in reflexivity across the overall science system within the field of survey investigations and specifies how survey research can be widened and empowered along various reflexivity dimensions.

7 Widening ESS ERIC across Three Levels



> We tend, in finding similarities, to forget the differences: the majority of discussions of our experience are focused towards acknowledge based on what we hold in common, ignoring difference. In contrast, I am less interested in what we have in common than what we have that supports and keeps us different. I hold this difference to be self-evident.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

This chapter provides a set of suggestions or solutions which, in our view, are able to meet the three grand challenges for the European Social Survey (ESS) which were described in Chapter 3. Our general strategy proposes a simultaneous expansion of ESS ERIC with new modules or components which are situated at each of the three science levels. These new elements should widen the scope and the horizons of ESS ERIC, should generate a new wave of pioneering work at the frontiers of complex visual and neuro-based survey research and should transform ESS ERIC to become the leading flagship of the research infrastructures in the domain of the social sciences and humanities.

7.1 European Research Infrastructures as Organizations

On the ESFRI-Roadmaps (2006, 2008, 2011) one finds lists of more than 35 large-scale research infrastructure projects which were implemented recently or will be built in the near future. Usually, these European research infrastructure projects can be organized as stand-alone units like a hard x-ray free electron laser in Hamburg with construction costs of approximately one billion Euro or as distributed networks with a common hub and very low construction costs for the central unit. The European research infrastructures for the social sciences, namely the ESS, SHARE (Survey of Health, Ageing and Retirement in Europe) and CESSDA (Council of European Social Science Data Archives), are organized as distributed networks, with a relatively small hub in London (ESS), Munich (SHARE) or Bergen (CESSDA) and networks of national organizations.

ESS ERIC can be described in at least two different ways, namely, on the one hand, in terms of its organizational profile and, on the other hand, its service modules for researchers across Europe and worldwide.

- In terms of its organization, the governance structure of ESS corresponds to the usual format of ERICs with a general assembly, composed of the national funders, Rory Fitzgerald as ESS director, a scientific advisory board and several other units like a forum of national ESS-coordinators.
- From its services to researchers ESS ERIC can be differentiated into several modules which provide such a support for a specific domain. Obviously, the ESS-data module with the ESS-data sets from roughly 30 European countries in seven rounds or waves can be seen as the core-module, accompanied by an additional data module, a documentation module or a methodology module. These modules are available permanently on a 24/7 basis and offer significant support and information for survey researchers in their work with ESS data.

Moreover, ESS ERIC is currently operating at two science levels, namely at the zero-order level of research infrastructures and at the first-order level of survey research.

- At the zero-order level, the Core Scientific Team of the ESS is responsible for launching the respective rounds for the data production of the ESS in two year intervals.
- At the first-order level, ESS ERIC has assembled and accumulated high competencies in comparative survey methodology and succeeded in advancing the state of the art in methodological standards for large-scale surveys with many different countries, languages and cultural contexts significantly.

The strategy for facing and meeting the three grand challenges will be organized in terms of additional modules which should be created and developed within the next years and which should strongly expand the services and the research capacities of the ESS.

- Several modules will be proposed for the zero-order level which offer additional support for data analysis and hypothesis construction.
- A research module at the first-order level will move into the domain of the cognitive sciences and into the field of situated cognition and neuro-cognitive response patterns.
- A module for the second-order level will provide the results of second-order ESS studies as well as second-order studies of other European surveys for a very wide audience, namely for ESS-users or users of other surveys, for coordinators of large-scale surveys, for the European social science community, for national governments, for the EU or for NGOs.

In this way the next section will offer specific guidelines for the construction of these new ESS-modules at three science levels.

7.2 Expanding ESS ERIC at the Zero-Order Level: New Data Modules

The modules at the zero-order level comprise two new modules for ESS-relevant data. Since the ESS Core Scientific Team is constantly providing new data sources and is discussing further expansions of data, our suggestions will not cover entirely new territory and will be presented, thus, as very short overviews only.

- The first additional module should be developed in co-operation with CESSDA AS and should become a module on ESS-data compatibility with other international or national surveys or panels which are available at the national social science data archives. The aim of this module lies in an overview of ESS data compatibility where the highest level should be reserved for ESS data with a high degree of compatibility with a large number of (inter)national data findings and the lowest level for ESS data with a low degree of data compatibility with a significant set of (inter) national results. Such a module could operate with two columns of colors, namely green (high compatibility), yellow (medium compatibility) and red colors (low compatibility) on the one hand side, and with a second column of green (large number of comparable data), yellow (medium number of available data) and red colors (low amount of available data) on the other hand . Such a dual system of traffic lights for ESS-questions and data would offer valuable hints on the status of ESS data in different rounds with respect to other international and national surveys or panels.
- The second module is a direct consequence of one of the three grand challenges and should be based on process-generated data which offer additional interpretations for the available ESS data. Such a module should be organized in the long run as a common European infrastructure project of CESSDA AS, ESS ERIC and SHARE ERIC and should be the starting point for closer links between ESS data and the vastly expanding area of process-generated data.

As indicated already, these two modules with data expansions are also considered and discussed within ESS ERIC so this proposal is not particularly new and was presented only in a minimal form.

7.3 Expanding ESS ERIC at the Zero-Order Level: A Module for Complex Visualization of ESS Data

A highly relevant component in widening ESS ERIC which is not widely discussed so far lies in the field of complex data visualization for surveys[1] and in online facilities for the creation of complex ESS data patterns which support and stimulate survey researchers in their heuristic processes of hypothesis and theory formation.[2]

7.3.1 A Short Outline of Complex Visual Data Analysis for Surveys[3]

Before specifying the details for a visual ESS-module a short outline will be presented on the scope and the potential of complex visual data analysis for surveys which differs significantly in scope and function from the usual survey data visualizations as a means of representation and as a visual *ex post* form for the results of a survey analysis. Moreover, this overview should make it clear that development of a suitable program support becomes a complex research project in itself which requires the inclusion of several fields outside survey research and graphic design like the cognitive sciences, psychology or art history.
In terms of its functions a complex visual data analysis for surveys can be qualified as a mode of exploration of basic features of a complex survey data set, in our case of the ESS. A complex visual data analysis for ESS data operates *ex ante* and fulfills the heuristic function of stimulating the formation of hypotheses or assumptions on basic characteristics of the underlying ESS data set by competent observers, *i.e.*, survey researchers. These hypotheses and assumptions can then be tested, confirmed or rejected with the help of statistical analyses. In this division of work, a complex visual data analysis of surveys does not substitute the available statistical methods, but offers potential results which can be further

1 Visual Data Analysis (VDA) can be seen as an element of visual methods which include also Visual Text Analysis, Visual Image Analysis and Visual Model Analysis. Visual methods, in turn, should be considered as the third cluster of methods in the social sciences which become part of a triangular configuration with quantitative and qualitative methods as the other two components. (On Visual Data Analysis especially for survey data, see Müller/Reautschnig, 2010, 2011, 2012, 2013).
The field of a complex visual data analysis for surveys should be classified as a special branch within VDA which is specially designed for large-scale national and, more importantly, international surveys. As a reference point for VDA, see Tufte, 1983, 1990, 1996, 2006.

2 On relevant literature in the general field of data visualization, see Chen/Härdle/Unwin, 2007; Inselberg, 2009 or Young/Valero-Mora/Friendly, 2006.

3 The overview of a complex visual data analysis applies for panels as well. For reasons of simplicity and due to the ESS-context, only surveys will be mentioned as application field.

investigated with available statistical methods. The basic comparative advantages of a complex visual data analysis for surveys lie in the following points.

- First, a complex visual data analysis allows a quick pattern recognition of basic characteristics of survey data sets, due to the extremely high visual competencies of pattern recognition by human observers.[4]
- Second, a complex visual data analysis enables the integration of very large-scale data sets. In the case of the ESS, a complex visual data analysis is able to operate with ESS data from several and even of all ESS-rounds, across a large number of nations or even all participating countries and with several ESS themes simultaneously where each ESS theme, according to the last chapter, is composed in its minimal form of several variables. As Chapter 5 showed clearly, ESS-analyses which utilize the full information of ESS data turned out to be, so far, as rare events. Here, a complex visual data analysis could become an important tool for ESS studies with very large-scale ESS data sets in the future.
- Third, a complex visual data analysis is based, as will be laid out in detail, on a rich visual heuristics and can search for various basic features of a complex data set like visual clusters, visual distances, visual coherences and the like.

Turning to a basic outline of a complex visual data analysis for surveys it must be emphasized at the beginning that this type of analysis differs significantly from the usual statistical or quantitative investigations which operates in a sequential manner from data D, the application of statistical methods M^{ST} to the production of statistical results R

$$D \rightarrow M^{ST} \rightarrow R$$

Visual Data Analysis in general is based on an interactive design with data D on the one side, competent observers O on the other side and visual patterns VP as the interaction field between data and observers. Visual Data Analysis is strongly observer-based and its range of potential results goes from zero up to very high numbers.

$$D \rightarrow VP \leftarrow O$$

With respect to the basic concepts of a complex visual data analysis for surveys, one can distinguish at the outset between two modes of complex visual data analysis, namely

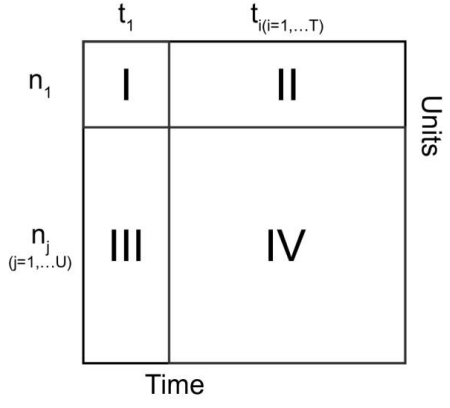
- an atomic mode which is based on a single survey which however, like in the case of the ESS, can be composed of different rounds or waves and

4 On this point see, for example, Boden, 1996; Gibson, 1972, 1977, 1979, 1982; Kosslyn, 1980; Kosslyn/Andersen, 1992; Marr, 1981 or Ratey, 2001.

– a molecular mode which combines two or more different surveys and supports the production of joint visual data patterns which are based on at least two different surveys.

For reasons of simplicity the subsequent remarks are focused on the atomic mode only and will be concentrated, not surprisingly, on ESS-data exclusively. The next relevant concept for a complex visual data analysis is the term of a data context which is based on time, on the one hand, and on the spatial units of analysis, on the other hand. Figure 7.1 shows the four relevant spatiotemporal contexts where the third and the fourth context become the relevant ones for a complex visual data analysis.

FIGURE 7.1 **The Four Main Spatiotemporal Data Contexts for Complex Visual Data Analysis**



With the help of Figure 7.1 the four different spatiotemporal data contexts can be described in a more detailed manner.

– The first context is focused on a single spatial unit u for a single point in time t. In its minimal form, only a single variable or, alternatively, dimension, is needed. Usually the first context is characterized by a smaller or lager number of variables or dimensions.
– The second data context is still restricted to a single spatial unit, but uses at least two points of observation t_i (i = 1,2,...T). Thus, the second context is the most elementary instance for a dynamic study of changes, using several dimensions for the spatial unit u across time.
– The third data context uses at least two different spatial units u_j (j =1,2,...,U), but is restricted to a single point in time t. The third context may be seen as the minor context for a complex comparative visual data analysis.

– Finally, the fourth data context comprises at least two spatial units and two points of observation. The fourth context becomes the most complex one for complex visual data analyses with t_i x u_j data sets where each of the u_j is characterized by a smaller or larger number of dimensions or variables.

Each of these four contexts comprises six different data groups which can be ordered according to their compositional complexity.[5] Data groups become the next basic concept in our overview of a complex visual data analysis for surveys. In the case of the ESS these data groups exhibit the following formats.

– The first ESS data group is focused on a single ESS-theme which is composed of several ESS-variables at one or several points in time and for one or many countries.
– The second ESS data group expands the first configuration by two or more sub-groups like gender, age, qualifications, etc., again for a single or several points in time and for one or many countries.
– The third ESS data group is characterized by two or three themes with several ESS-variables for each theme, for a single or several points in time and for one or many countries.
– The fourth ESS data group increases the third group with a subgroup for gender, age, etc., again for one or several points in time and for one or many countries.
– The fifth ESS data group uses four and more ESS themes, again for one or more points in time and for one or many countries.
– Finally, the sixth ESS data group becomes the most complex one because here four or more ESS-themes are combined with sub-groups for gender, age, qualifications or other socio-demographic variables, again for a single or several points in time and for one or many countries.

The next basic concept for a complex visual data analysis can be introduced as visual templates or prototypes which establish the necessary bridge from the realm of modes, contexts and data groups to complex visual patterns. These templates can be assembled to five different groups where each of these groups produces specific types of visual patterns. Each of these five groups is composed of several templates which are able to perform specific tasks within their overall type of pattern. Again, these sets of visual templates will be described with reference to the six ESS data groups.

5 On different ways to define and measure complexity, see Rescher, 1998. Nicholas Rescher distinguishes between formulaic, compositional, structural and functional complexity (Rescher, 1998: 9).

- The first group of visual templates produces patterns which enable a rapid recognition of outliers and of maximal or minimal values. In the case of maximal or minima values for example, a specific visual template can use colors like red and green to enable a quick recognition of the spatial distribution of these extreme values.
- The second set of visual templates is concentrated on patterns which exhibit the variances for one or several variables for the six ESS data groups. Here visual templates are able to show the variances of one, two or more ESS variables.
- The third set of visual templates allows the production of visual patterns of the distributions of variables or dimensions for each of the ESS data groups in different quantiles like the median, quintiles, deciles, ventiles, etc.
- The fourth group of visual templates is especially well suited for the production of geometric features like symmetries or of geometric forms like squares, circles, etc.
- The fifth set of visual templates shows visual similarities and dissimilarities in multi-dimensional data groups and contexts. This set of visual templates can be considered as the core group for a complex visual data analysis for surveys and is composed of several templates which allow a search for different aspects of visual similarities or dissimilarities as will be demonstrated in the paragraphs on visual heuristics.

Thus, the visual templates VT fulfill a central role because they create the bridges from data domains to complex visual patterns. Visual templates themselves are constructed as visual rule systems (VRS) which transform data sets D with the help of visual building blocks BB^V (like points, lines, squares, rectangles, circles, etc.) into spatial arrangements SA. These complex visual patterns can then be further analyzed visually and interactively.

$$VT: D \rightarrow [VRS\ (D\ \&\ BB^V) \rightarrow SA] \rightarrow \text{Complex Visual Patterns (CVP)}$$

V: Visual Template, VRS: Visual Rule System,
D: Data, BB^V: Visual Building Blocks, SA: Spatial Arrangement

This concludes the side of data-transformations for a complex visual data analysis which in the case of the ESS has the following format.

$$\text{ESS-Data} \rightarrow [\text{Mode, Context, ESS Data Groups}] \rightarrow [\text{Visual Templates}] \rightarrow \text{Complex Visual Patterns}$$

The next concept leads to the side of observers, to their cognitive abilities to deal with visual patterns and to their cognitive-neural support. Here, visual schemes VS belong to the cognitive-neural repertoire of competent observers for visual pattern recognition and for visual data analysis. These visual schemes

can be understood as stable and neural-based forms which operate on neural rule systems (NRS) for the analysis of pattern arrangements PA by competent scientific observers O in two-dimensional visual fields VF. A visual field VF can be decomposed from its elementary building blocks BB^E into three main groups, namely in forms, the spatial arrangement and, finally, colors.[6]

$$VS: O \rightarrow [NRS\ (VF\ \&\ BB^E) \rightarrow PA] \rightarrow \text{Analysis of Complex Visual Patterns}$$

VS: Visual Scheme, O: Observers, NRS: Neural Rule System,
VF: Visual Field, BB^E: Elementary Building Blocks,
PA: Pattern Arrangements

Visual heuristics becomes the next basic concept of a complex visual data analysis for surveys and it specifies the goals for such a complex visual analysis. The visual heuristics can be specified in close correspondence to the available visual templates as a set of potential goals which can be reached through a complex visual investigation. More specifically, the visual heuristics offers the following potentials goals of a complex visual data analysis of surveys which must be specified by observers, *i.e.*, by survey researchers, *ex ante*. For the ESS, the visual heuristics can be summarized in the following manner.

- The first goal of a complex visual data analysis lies in the specification of special characteristics of ESS data sets like outliers or maximal and minimal values. The available templates should enable a rapid recognition of these features.
- The second goal of a complex visual data analysis lies in the specification of patterns of variances in the ESS variables.
- A third goal of a complex visual data analysis looks for geometric properties like symmetries or geometric objects like squares, lines, etc. in ESS data sets.
- A fourth goal searches for visual similarities or dissimilarities between subpopulations in ESS data sets like gender, age groups, levels of qualifications, etc.
- A fifth goal aims at the identification of visual coherences or incoherences between two or more ESS themes. In this case observers start with initial expectations on coherences or incoherences between two ESS themes and a complex visual data analysis provides tentative answers with respect to these coherences or incoherences.
- A sixth goal of a complex visual data analysis for surveys can be classified as a search for homogeneities where homogeneity refers to two or more coherence domains. In its minimal form, a coherence domain with two ESS themes is expanded with a another coherence domain with two different ESS

6 On the neural foundations of these separations, see, *e.g.*, Ware, 2004, 2012.

themes and this larger configuration is visually analyzed for its homogeneities or inhomogeneities.

- A seventh goal for a complex visual data analysis lies in the identification of multi-dimensional distances in large-scale ESS data sets. These distances become especially relevant when an observer deals with several ESS themes with several variables for each theme across many countries either for a single point in time or for two or more points in time.
- Finally, an eighth goal of a complex visual data analysis for surveys can be described as the specification of visual clusters in multi-dimensional ESS data sets. Usually, the results of this type of investigation lead to a small number of clusters with countries with a similar distribution of ESS dimensions.

Finally, the last basic concept for a complex visual data analysis for surveys can be introduced as visual grammars. In the multiplicity of grammars[7] cognitive grammars become of special interest for building these visual grammars. Cognitive grammars can be conceptualized as systems of linguistic building blocks, cognitive-linguistic production rules and linguistic-symbolic schemes.[8] These visual grammars are required in two domains, namely for visual templates and for the neural support of pattern recognitions by observers and can be constructed as visual or neural rule systems of visual or neural building blocks, visual or neural production rules and templates or visual schemes.
Table 7.1 presents an overview of a complex visual data analysis for surveys in both aspects, namely from the side of the visual data transformation and from the side of competent observers.

TABLE 7.1 **The Procedural Organization of a Complex Visual Data Analysis for Surveys**

Visual Pattern Production (Visual Data Transformation)		**Visual Pattern Recognition(Observers)**
$VP^S \rightarrow$ {[M, C, DG] → [VT (D & BB^V) → SA]} →	[Complex]←[PA← (VF & BB^E) NRS] ⟵ CN^S Visual Pattern Analysis]	
Visual Program-Support VP^S	[Interface between Data Patterns and Observers]	Cognitive Neural Support of Observers CN^S

7 Grammars can be differentiated in multiple ways like generative, functional, cognitive, historical or descriptive grammars.

8 On cognitive grammars, see *e.g.*, Langacker 2008, 2009 and on cognitive linguistics Croft/Cruse, 2004; Geeraerts, 2006 or Geeraerts/Cuyckens, 2007.

In this way the basic concepts of a complex visual data analysis for surveys have been assembled and can be reproduced, once again, in Table 7.2.

TABLE 7.2 **Basic Concepts of a Complex Visual Data Analysis for Surveys**

Basic Concepts	Main Characteristics
Mode	Number of surveys used for a complex visual data analysis (atomic mode, molecular mode)
Context	Spatiotemporal composition of one or more surveys (four contexts for each mode)
Data Group	Different formats of survey data sets as basis for a complex visual data analysis
Visual Template	Visual rule systems for the transformation of data into complex visual patterns
Visual Scheme	Visual competencies for the recognition of specific patterns by observers
Visual Heuristics	Goals for a complex visual data analysis (observer-based)
Visual Grammar	Rule systems for visual building blocks (data) and visual schemes (observers)
Interface of Patterns and Analyses	Common interaction field for data and observers; domain for a complex visual pattern analyses

This concludes the overview on a complex visual data analysis for surveys. This summary makes it obvious that the development of suitable visual programs for large-scale surveys like the ESS require the co-operation of specialists from various fields. Aside from graphic designers one needs cognitive psychologists, art psychologists,[9] cognitive scientists and survey specialists as well to build visual programs which support a complex visual data analysis in all its desired features.

7.3.2 Three Paradigmatic Examples of Complex Data Patterns for the ESS

In recent years a prototype of a program for a complex visual data analysis was developed under the name of WISDOMIZE within the former Austrian social science data archive WISDOM (Wiener Institute of Social Science Documentation and Methodology) (Müller/Reautschnig, 2013). Figures 7.2, 7.3 and 7.4 reproduce three examples from this program which was developed according to the above summary for a complex visual data analysis for surveys.

9 As a reference point for the relevance of art psychology, see especially Arnheim 1969, 2009, 2010.

Figure 7.2 shows the four different contexts for a visual coherence analysis for two ESS-themes which, on theoretical grounds, should be weakly linked and correlated. In this case, the two themes were specified as trust in five national institutions (parliament, legal system, police, politicians, political parties) on the one hand and mental and social capital (happiness, life satisfaction and health as mental capital, plus four ESS variables on social capital like trust in other people).[10]

The visual template for multidimensional visual coherence analyses was constructed in the following way which, despite the black and white reproduction in Figure 7.2, can be recognized for the Context I and Context II where Austria was selected as basic unit with two points in time, namely in 2003 and 2007. All twelve ESS variables used the same scale between 0 and 10 and the mean value of the scale (M = 5) was chosen as the horizontal (Context I) or as the vertical (Context II) reference line. In Context I values above the reference line (V > 5) were colored in blue (light gray in Figure 7.2), values below this line (V < 5) in red (dark gray). In Context II positive changes between 2003 and 2007 were colored in blue (light gray) and pointed in the right direction, negative changes between 2003 and 2007 were colored in red and pointed in the left direction. Thus, in the case of Austria all variables for trust in institutions decreased between 2003 and 2007, whereas the majority of variables for mental and social capital showed relatively big increases during this period, only one bigger decrease and two marginal negative changes.

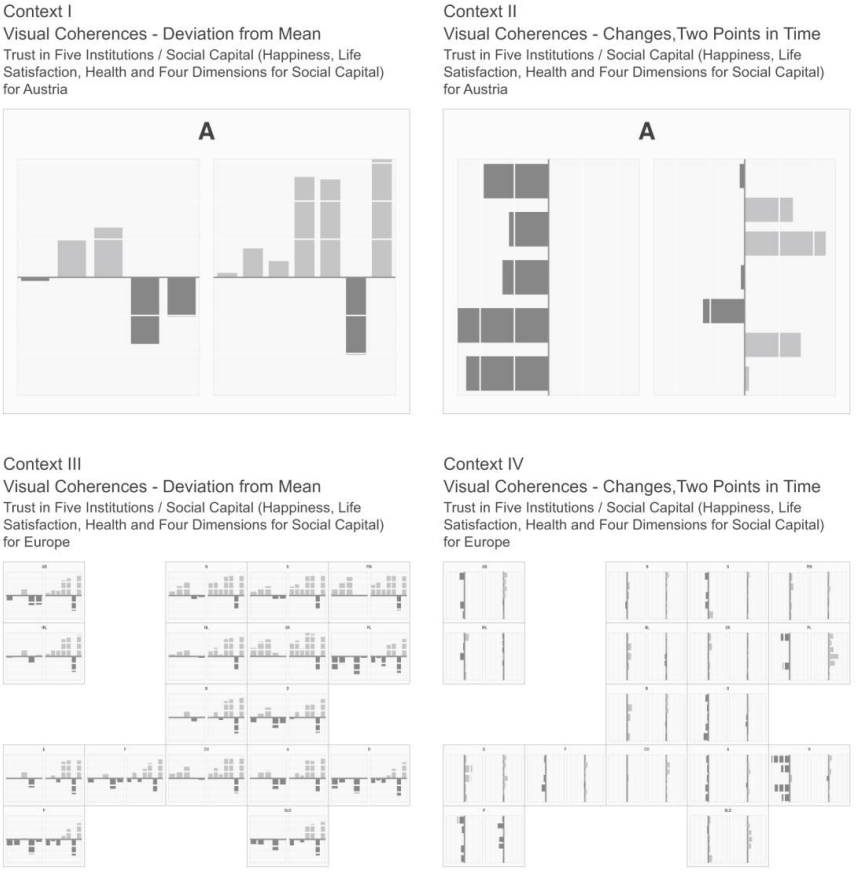
As can be seen in Context II and Context IV, the expectation of weak positive relations was strongly rejected in these two dynamic contexts where trust in national institutions decreased strongly in Austria (Context II) and across Europe (Context IV) between 2003 and 2007, whereas mental and social capital increased during the same time.

Figure 7.3 shows a complex visual coherence analysis for Context III which, again, requires two ESS-themes. In this case, the two themes were specified as objective and subjective working conditions, seven ESS variables were chosen for the first theme, six ESS variables were selected for the second theme. The initial expectation was that, due to the similarity of these themes, one will find a high coherence between them. As can be seen in the European Context III, this assumption was strongly rejected by the overall patterns which revealed an astonishing degree of incoherence between these two seemingly strongly related

10 Unfortunately: these diagrams can only be reproduced in black and white. In its online version, users could see the colors of red (below mean value of scale) and blue (above mean value of scale) and obtain additional information on the different ESS variables in these online diagrams.

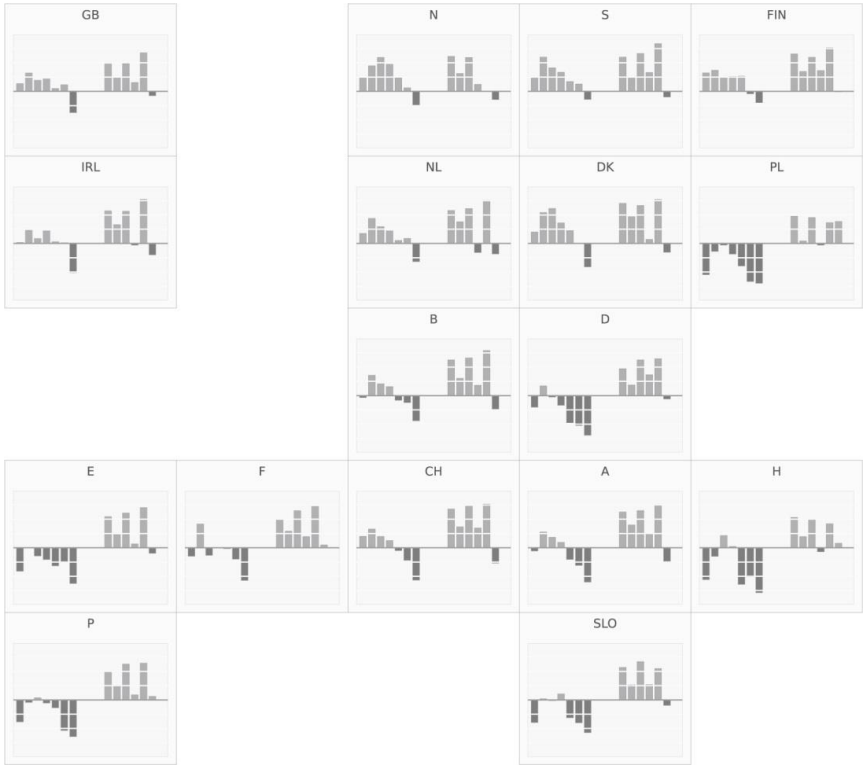
themes and a high similarity between subjective working conditions, despite deep differences in the objective work situations.

FIGURE 7.2 **Visual Coherence-Analyses for Four Contexts [Trust in National Institutions (left) and Mental and Social Capital (Right)]**



The next example is of particular interest because it shows a visual template from the fifth group for visual similarities. Here it depends on the visual heuristics of observers in which direction a complex visual data analysis should be undertaken. Figure 7.4 assumes a visual heuristics for distances, but this visual template could also be used for visual clustering and for a clustering of European countries as well.

FIGURE 7.3 **Visual Coherence-Analyses for Context III**



The visual template for Figure 7.4 requires the selection of seven ESS themes and the specification of seven ESS variables per theme so that each country is represented by a 7 x 7 block, *i.e.*, by 49 ESS variables. For a single point in time (Context III) each of these 49 ESS variables for each country was colored in the following way:

- blue (a shade of light gray) for values significantly above the mean value for all countries (upper third)
- yellow (a shade of medium gray) for values around the mean value for all countries (middle third)
- red (a shade of dark gray) for values significantly below the mean value for all countries (lower third).

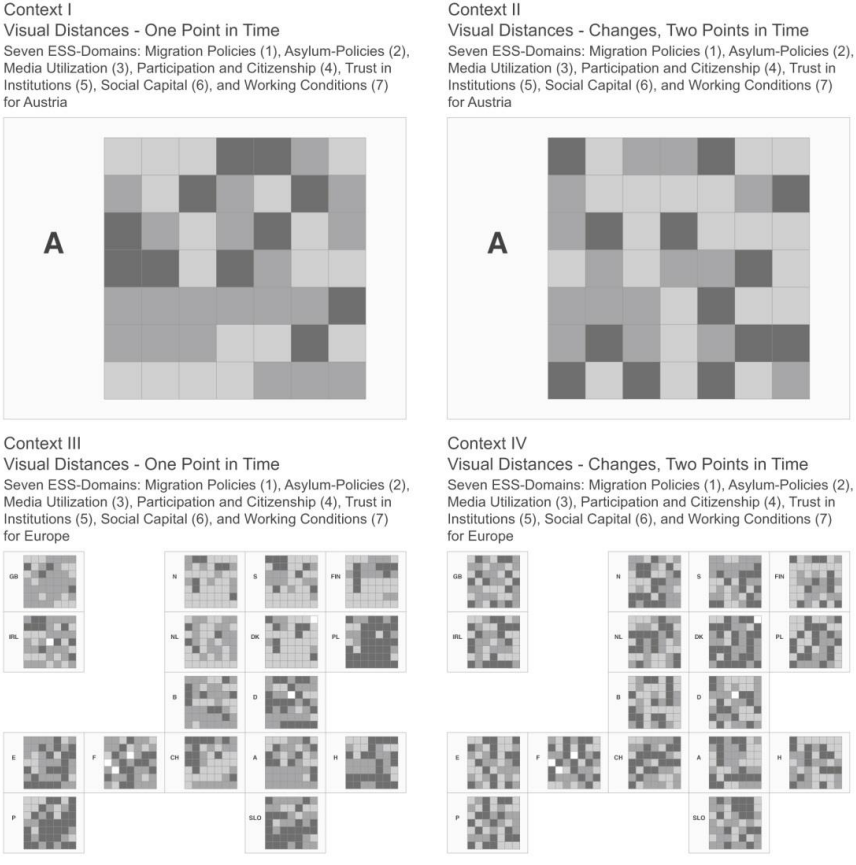
For two points in time, namely for 2003 and 2007, (Context IV) each of these 49 ESS variables for each country was colored in the following way:

- blue (a shade of light gray) for changes significantly above the mean value for changes between 2003 and 2007 across all countries (upper third)

– yellow (a shade of medium gray) for changes around the mean value for changes between 2003 and 2007 across all countries (middle third)
– red (a shade of dark gray) for changes significantly below the mean value for changes between 2003 and 2007 across all countries (lower third).

In Context III one can observe the big socio-economic differences between Scandinavian countries (mostly light gray) and Eastern or South Western Europe (mostly dark gray), whereas the overall dynamic patterns for changes between 2003 and 2007 in Context IV loose this clear differentiation for the static case.

FIGURE 7.4 **Visual Distance-Analyses in Four Contexts**



7.3.3 Building a Tool for Complex Visual ESS-Analyses

The detailed description of complex visual data analysis culminates in the recommendation to create a visual ESS-module which allows the production of highly complex ESS data patterns by users. This visual ESS-module should be capable of transforming very large quantities of ESS-data into visual patterns and should exhibit the following features.
The first basic feature lies in the possibility to use very large quantities of available ESS data. In terms of spatiotemporal contexts, users should be able to select ESS data from

- a single ESS-round (up to all ESS-rounds
- a single country up to all countries.

In terms of complex visual data analysis users can and must be able to specify

- a single ESS-theme with several variables up to several ESS-themes
- sub-populations for age, gender, qualifications or other relevant socio-demographic characteristics.

Second, users should be able to select

- a specific visual heuristics as the goal of a complex visual data analysis
- a suitable visual template which is capable to achieve this specific goal for a complex visual investigation.

Such a complex visual module is more and more needed in the future, due to the constant accumulation of new ESS data and the rather restricted use of available ESS data for quantitative analyses, as pointed out I Chapter 5. This module should be expanded in the future from its ESS-based mode to the molecular mode where users can select, for example, between ESS variables and variables from SHARE or from other European surveys in order to undertake a complex visual data analysis. Such a complex visual module would expand the current ESS support system as well as the attractiveness of the ESS for survey researchers to a very significant degree.

7.4 Expanding ESS ERIC at the First-Order Level: Building a Cognitive Science Module for Situated Cognition

In its research capacity, ESS ERIC should aim to establish strong ties with the cognitive sciences in order to meet one of its three grand challenges. In 2009, Robert E. Fay came up with the general observation that survey research in the United States or Europe is characterized by a time lag of twenty years

with respect to its understanding and reception of cognitive psychology or the cognitive sciences.

> The apparent understanding of cognitive psychology and cognitive science within survey research is more consistent with the state of research approximately two decades ago rather than with recent developments. (Fay, 2009: 845)

Initially, some examples will be provided on a general time lag between cognitive science and survey research. Even in his rather critical theory of survey responses John R. Zaller uses the following strong introspective assumption for his RAS (Receive-Accept-Sample)-model.

> Individuals answer survey questions by averaging across the considerations that are immediately salient or accessible to them. (Zaller, 1992: 49)

Similarly Zaller and Feldman (1992) developed three axioms for survey responses, namely an ambivalence, response and accessibility axiom:

> Most people possess opposing considerations on most issues, that is, considerations that might lead them to decide the issue either way ... Individuals answer survey questions by averaging across the considerations that happen to be salient at the moment of response, where salience is determined by the accessibility axiom ... The accessibility of any given consideration depends on a stochastic sampling process, where considerations that have been recently thought about are somewhat more likely to be sampled. (Zaller/Feldman, 1992: 585–586)

In general, heroic attributions or ascriptions with respect to the cognitive neural architecture are undertaken in survey research which emphasizes internal stochastic sampling processes, memory, internal brain activities with higher and lower frequencies, etc. Another assumption which was mentioned in Chapter 3 already, namely the storehouse or file drawer image of attitudes by Jon A. Krosnick, Charles M. Judd and Bernd Wittenbrink, presupposes neural objects as well as neural net evaluations and hypothesizes

> that a single attitude exists in a person's mind: the net evaluation associated with the object. (Krosnick/Judd/Wittenbrink, 2005: 26)

Despite an interesting critical tradition[11] from the 1930s onwards survey researchers use untested neural attributions like averaging, neural objects, memory effects, recall, neural information storage, etc. These neural ascriptions could be undertaken until recently without further consequences like empirical instant falsifications, but they become more and more testable and a normal object of neuro-cognitive desire and study in the present time and in the future. From the neuro-cognitive sciences (*e.g.*, Hemmen/Sejnowski, 2006; Rose/Abi-

11 On this critical tradition see, for example, LaPiere, 1934, 1938; Converse 1964, 1970 or, more recently, Bishop, 2005.

Rached, 2013; Sporns, 2012) one gets even a more and more subversive impression on the status of notions from folkpsychology like the self or of (self)consciousness as consistent controller (Dennett, 1991; Damasio, 1994, 2003, 2012), of memory as storage (Foerster, 2003; Kendel, 2007), or of the freedom of will as autonomous act (Ainslie, 2001; Dennett, 2003 or Wegner, 2002). Book titles like the self-illusion (Hood, 2012) point in the direction of complex neural networks operating in massive parallelism (Churchland, 2013) with embedded competences of (de)coding (Holland, 2012), which are based on strange loops (Hofstädter, 1982, 185, 1997, 2007; Hofstädter/Sanders, 2013 and on) neuro-evolutionary processes of group selection and evolutionary learning rules (Edelman, 1987, 1990, 1992, 2007). And more and more the neuro-generative mechanisms become transparent in which the brain or the cognitive neural system computes its stable environments (Macknick/Martinez-Conde/Blakesle, 2011), creates narratives (Shermer, 2011) or operates in a thinking and reflecting mode (Kahnemann, 2011; Kurzweil, 2012).
More and more the communicative competences of answering questions change into fascinating and extremely complex neural processes which were characterized, for example, by Daniel C. Dennett with the metaphor of a pandemonium of word demons and which were described by Dennett for the process of continuing or opening a dialogue in the following way.

> Let's consider ... a pandemonium of word-demons ... First we go into vocal noise-making mode
>
> Beeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeep ....
>
> The internal 'noise' excites various demons in us who begin trying to modulate the horn in all sorts of random ways by interfering with its stream. The result is gibberish, but at least it's English gibberish (in English speakers)
>
> Yabba-dabba-doo-fiddledy-dee-tiddly-pom-fi-fi-fo-fum ...
>
> But before any of this embarrassing stuff actually hits the outside world, further demons, sensitive to patterns in the chaos, start shaping it up into words, phrases, clichés ....
>
> And so, how about that? baseball, don't you know, in point of fact,
> strawberries, happenstance, okay? That´s the ticket. Well, then ...
>
> which incites demons to make further serendipitous discoveries, augmented by opportunistic shaping, yielding longer bits of more acceptable verbage, until finally a whole sentence emerges:
>
> I'm going to knock your teeth down your throat!
>
> Fortunately, however, this gets aside, unspoken, since at the same time (in parallel) other candidates have been brewing and are now in the offering, including a few obvious losers, such as
>
> You big meany!
>
> and

> Read any good books lately?
> and a winner by default, which gets spoken:
> Your feet are too big!
> ... We can suppose that all of this happens in swift generations of 'wasteful' parallel processing, with hordes of anonymous demons and their hopeful constructions never seeing the light of the day. [Dennett, 1991: 237]

The upshot of Dennett's metaphor of a pandemonium of demons involved in parallel processing in search for an answer in a dialogue lies in the suggestion that the cognitive-neural processes of searching and finding answers in a dialogue operate very far away from the usual assumptions of survey research.

As a first step from survey questions and answers to the domain of the cognitive sciences, a proposal will be made for a separation of survey questions and answers into two broad categories. For this division a cognitive differentiation can be introduced, namely the distinction between over-learned and under-learned responses (Müller/Toš, 2010, 2012a). This basic distinction is frequently used in memory research[12] and, at least partially, in the research on embedded cognition.[13] Here, a separation can be made between over-learned and under-learned contexts. In memory research, the terms over-learned and under-learned refer essentially to the duration and to the frequency of learning processes or to the all or none character of learning.[14] In embedded cognition, an over-learned or an under-learned context is characterized by the stability or the instability of action sequences.

Over-learned responses in surveys can be considered as relatively stable, constant and insensitive to different contexts or pre-histories of actors. Under-learned responses are, by necessity, creative, highly volatile, instable and sensitive to contexts or pre-histories. This distinction varies from one person to the other and it always involves the cognitive neural organization of actors as a whole. Table 7.3 offers some further hints on the differences between these two types of responses. Probably the most important element of this distinction between over-learned and under-learned responses lies in the fact that under-learned responses are quickly forgotten[15] and play no relevant role in the overall cognitive organization of actors. In the spirit of a cognitive science background over-learned responses can be considered as a permanent and stable component of the overall cognitive

12 On over-learned and under-learned facts in memory research, see, *e.g.*, Bower, 1977 or Taylor, 2004.

13 See, for example, Underwood, 1996.

14 See, for example, Glass/Lian, 2008.

15 Following Saris and Gallhofer, 2007: 220, twenty minutes within a conventional survey interview are sufficient for practically forgetting an under-learned response to a survey question.

repertoire of respondents and under-learned responses as just in time-reactions to a particular communicative interaction. Under-learned responses become a typical by-product of a communicative interaction and bear no or very little relevance for recurrent practices or for other relevant preferences of respondents.

TABLE 7.3 **Over-Learned and Under-Learned Responses in Surveys**

Dimensions	Over-Learned Responses	Under-Learned Responses
Response	Single Response	Multiple Responses Possible
Response across Time	Stable across Time	Highly Volatile, Unstable
Inputs	Constant Selection	Highly Selective of Inputs
Memory	Long-Term Memory	Short-Term Memory
Production	Recall	Just in Time Production
Type of Task	Non-Creative	Creative
Context	Context-Free	Context-Dependent
Path-Dependency	Path-Independent	Path-Dependent
State-Dependency	State-Independent	State-Dependent
Consistency across Time	Consistency in Time	Inconsistency in Time
Errors by Respondents	Errors by Respondents Possible	Errors by Respondents Not Possible
Bias	No Biases	Multiple Biases
Complexity	Trivial Configuration	Non-Trivial Configuration

Aside from over-learned and under-learned responses one can introduce a second dimension with respect to different forms of survey measurements which become relevant for survey items. Along this second dimension survey items can be differentiated between externally observable domains like recurrent practices which can be observed in principle by third parties and internal domains like assessments which rely predominantly on the respondents' answers alone. Survey items with externally observable domains can be validated with the help of other observational data whereas items with only internal domains offer no links to observable practices and routines of actors.

It becomes highly interesting to arrange the under-learned and over-learned forms of cognitive response productions and the two different types of observation and measurements domains. For surveys like the ESS Table 7.4 presents such a matrix with four different groups of survey items.

TABLE 7.4 **A 2 x 2 Matrix of ESS-Items**

	Externally Observable Domains (Recurrent Practices, Knowledge-Items, etc.)	**Internal Domains (Assessments, Attitudes)**
Over-learned Responses	Group I	Group II
Under-learned Responses	Group III	Group IV

Due to the differentiations in Table 7.4 the interpretation of these-four groups of ESS items should and must differ radically from one another.

- Group I-items can be interpreted at face-value and can be compared and checked, in principle, with other external data as well with respect to measurement errors or biases. Items on the daily time from home to work, on information activities, on the voting behaviour or on knowledge-items fall under the first category. Unfortunately however, Group I-items are not the most common ones in the ESS and rather restricted to the socio-demographic section of the ESS only.
- Group II-items, due to their internal cognitive production process only, cannot be linked with comparable external data sets, but may have similar data in the past. Group II-items are also strongly connected with the long-term cognitive repertoire of actors which manifests itself in these stable and context-independent responses. Most importantly, several additional items are usually needed to determine a Group II-membership of a particular item, otherwise a Group II-item becomes unidentifiable. While specific preferences or assessments might qualify as a Group II-item, Group II-items cannot be interpreted in terms of recurrent practices but must be understood as stable fixed-points in the cognitive domain of actors.
- Group III-items are composed of externally observable survey questions which contain an unusual component like a particular scaling device. For example, asking for daily TV-consumption in terms of minutes requires a creative reaction and, thus, an under-learned response. Usually, Group III-items are characterized by weak links to recurrent practices, although additional external information on TV-consumption patterns for various TV-networks would be needed for any substantial interpretation. For Group III-items, additional external information is necessarily required in order to transform the weak links to recurrent practices into stronger ties.
- At first sight, Group IV-items look similar to the other three groups although these items are fundamentally different form the rest of the groups. Responses

to these items are produced just in time, are forgotten almost instantly and, moreover, highly volatile and unstable within respondents. Trust in national or European institutions on a ten point scale can be considered as a paradigmatic example for a Group IV-item. In terms of interpretation, Group IV-responses offer no hints on recurrent practices and need, additionally, a large amount of similar cross-regional and inter-temporal data in order to identify a relevant *explanandum* at all. Persistent differences across and within countries on the trust in institutions-item, for example, makes it worthwhile to search for relevant external data on recurrent practices which are relevant for trust-issues. In a strong sense Group IV-items by themselves are void of interpretative content.

This short typology of ESS-items, based on a cognitive science background, makes three very clear points on the current distances between ESS items and recurrent societal practices.

- First, relatively few ESS-items, namely Group I-items only, allow a direct interpretation in terms of recurrent practices. Moreover, Group I-items can be analysed further with respect to significant differences in terms of class or stratification, gender differences or age groups.
- Second, Group II and Group III-items require a substantial amount of additional internal and especially external data in order to become interpretable at all. In combination with large external or internal data these items can be interpreted at least in terms of weak ties to recurrent practices or the cognitive organization of respondents.
- Third, Group IV-items need an enormous amount of additional internal as well as external data in order to close the gap to observable recurrent societal routines at least in a weak sense.

Additionally, a small study of cognitive interviewing with sixteen actual and potential ESS questions showed (Bischof/Müller, 2012) in a sample of ten persons that respondents used three different response strategies in fourteen of the total of sixteen questions, namely

- gradual transformations of questions by respondents
- creation of a profound difference to the original question
- sensitivity to national or cultural contexts.

Only two questions remained which were answered directly and, after several probes, unambiguously. This rich cognitive repertoire by respondents provides an additional stimulus for a deep search of survey responses with the help of the neuro-cognitive sciences.

The upshot of the typology of survey-responses as well as of cognitive interviewing lies in the observation that only few items of the ESS can be interpreted directly in terms of recurrent practices or stable assessments. The majority of ESS-items, especially the Group IV-items within the ESS, need a large amount of additional external as well as internal data in order to be interpretable at all. In other words, by relying on ESS-data and the established forms of interpretation a survey researcher can position her- or himself in relatively large distances to recurrent societal practices which, after all, were the target domain for introducing the ESS in the first place.

From this cognitive science background it becomes a very important research problem for ESS ERIC to be able to differentiate between these different responses in terms of their neural production processes. In the last decades the neuro-cognitive sciences have created the necessary technological environments for large-scale laboratory tests which can differentiate between different neural mechanisms for responding to various types of questions.

Thus, one should develop tests which are composed of two groups of questions. The first group consists of questions which ask for specific cognitive competencies outside the domain of the usual survey questions and which can be summarized as cognitive questions.

- Introspective questions on events in the immediate past (last hours, today, last week) or in the more remote past (last year, ten years ago)
- introspective questions to characterize one's emotional state at the moment or at previous instances (last hour, yesterday, last month, last year)
- general knowledge questions which are usually required for an average knowledge repertoire
- projective questions which require the production of a "true" sentence from a few words or a "true story" (Arthur Danto) from a small set of key-concepts
- projective questions where a few key concepts must be completed to a fictional situation or a longer fictional story
- cognitive problems with simple logical, mathematical or visual riddles as inputs and problem solutions by respondents as answers.

Parallel to the first group of cognitive questions one can select different types of survey questions.

- Survey questions which ask for recurrent practices in a past time interval (last week, last month, last year, etc.)
- Survey questions which are directly linked to the permanent knowledge repertoire like questions of one's profession, the number of rooms in the household, their age, etc. and which can be qualified as over-learned.

- Survey questions which ask for their current state in terms of health, life satisfaction, happiness and the like.
- Survey questions which ask for a general assessment like trust in different national or international institutions, etc.

These two groups of questions can be mixed in different ways and tests can be developed which are composed of these two question groups. These different types of questions can then be answered by probands under laboratory conditions, using techniques like positron emissions-tomography (PET), functional magnet resonance imaging (fMRI)[16] or functional magnet resonance tomography (fMRT). These laboratory sessions should yield a rich variety of neural patterns for these different types and groups of questions. In this way a neural search for the identification of characteristic patterns can be undertaken. With the help of multiple laboratory tests characteristic neural response patterns for different types and groups of questions should become recognizable. Due to the dual composition of different types of questions with different groups of cognitive as well as of survey questions one should be able to identify the neural patterns which correspond to different types of cognitive questions and survey questions.

Two potential results of these neuro-cognitive science investigations, one highly positive, one very negative for survey research, can be specified already in advance. In the best of all survey worlds the different types of survey questions follow the neural patterns of retrospective questions on past events, in the worst of all survey worlds the survey questions turn out to be similar to the projective fictional questions for storytelling.

With such a background a deep understanding can be created on the neural basis of different types of survey questions which become, then, an essential ingredient for interpreting the available answers and data in terms of their internal neural production processes.

As an obvious consequence of our presentation of significant links between the cognitive sciences and survey responses ESS ERIC should initiate research co-operations and cooperative projects on the neural basis of survey questions and responses. As our exploration indicated such a first-order cognitive science module for the ESS is needed on a permanent basis for two basic reasons.

16 On strong correlations between political orientations and the size of the anterior cingulate cortex and right amygdala, see, for example, Kanai *et al*. (2011). Using fMRI, political right-wingers showed a significantly larger amygdala which belongs to the evolutionary oldest regions of the brain whereas left-wingers by self-assessments exhibited thicker anterior cingulates which are usually linked to decision making or anticipation. On this point, see also Lyons, 2012: 83–86.

- First, such a module should help to create a neural map of ESS questions and available data in the medium and long run. Moreover, such a neural map of ESS questions becomes highly relevant for other large scale surveys as well.
- Second, relevant experts for this module can work on new questionnaires and provide overviews on the neuro-cognitive status of these new survey questions.

In this way, ESS ERIC can move to the frontiers of neuro-cognitive science investigations and can perform a big jump away from Robert E. Fay's initial assessment that survey research is two decades behind the advances in the cognitive science domain.

7.5 Expanding ESS-ERIC at the Second-Order Level: Building an Online Second-Order ESS Monitoring-System

The expansion on the second-order level is almost self-evident since it follows the content of this book. The full range of future second-order ESS-analyses, as outlined in the previous chapter, should be transformed into an online second-order monitoring system which should be added to the current ESS information support for survey researchers.

7.5.1 Online Monitoring Systems

Online monitoring systems are usually constructed for specific domains or populations. For example, living conditions of the population 50+ was the central topic of a monitoring system which was developed for the Austrian context and for special groups of users like ministries, NGOs, etc. (Bischof *et al*., 2012).
Monitoring systems are usually separated into two main components or blocks.

- The first block is related the past and users can select specific periods, regions and populations and receive information in the form of tables or figures on past processes.
- The second block is future oriented and users can select one or several time-series, specify target values for one or more time series or receive suggestions for these target values based on EU or national development goals and receive new information in figures and tables whether these target values can be probably reached in the future or not.

These monitoring systems must be updated on a regular basis with respect to data, changes in target values and provide a rich data and information base for a particular domain.

7.5.2 Main Components of a Second-Order Monitoring System for the ESS and for Other European Survey

Following the general outline of monitoring systems, a second-order monitoring system for the ESS can be built along the general scheme outlined above.

- The primary data-bases for this monitoring module come from the growing number of second-order ESS-investigations.
- Furthermore, this monitoring system should be open to include second-order studies of other European survey as well (SHARE, ISSP, WVS, EVS, etc.)
- A special emphasis must be given to the formation of relevant time series, based on the available second-order studies.
- Furthermore, the monitoring system should include a segment on available second-order survey studies with options of downloading or uploading papers.
- Finally, such a second-order monitoring system must be updated once a year to include new data and articles from recent second-order studies.

Again, different user groups can search for different types of information. Survey researchers might be interested on the profile of ESS data utilizations and on new topics of ESS-investigations which are based on rarely used ESS data. The Core Scientific Team could be interested in time-series and in the specification of target values for the next five or ten years. National coordinators of the ESS might search for the profiles of European survey researchers and could be motivated to increase their communication with their respective national communities of survey researchers. Statisticians could be interested in the development of the dynamic profiles of statistical methods and might look for new statistical tools for the analysis of survey data.
Finally, such a second-order monitoring tool opens and organizes a permanent recursive process between survey research at the first-order level and reflective feedbacks from the second-order level, *round and round* ....

7.6 Outlooks

Summarizing our coping strategy for ESS ERIC with respect to its grand challenges, three of the strategy suggestions can be considered as relatively new and challenging themselves, namely

- the development of an ESS-module for complex ESS data visualization at the zero-order level,

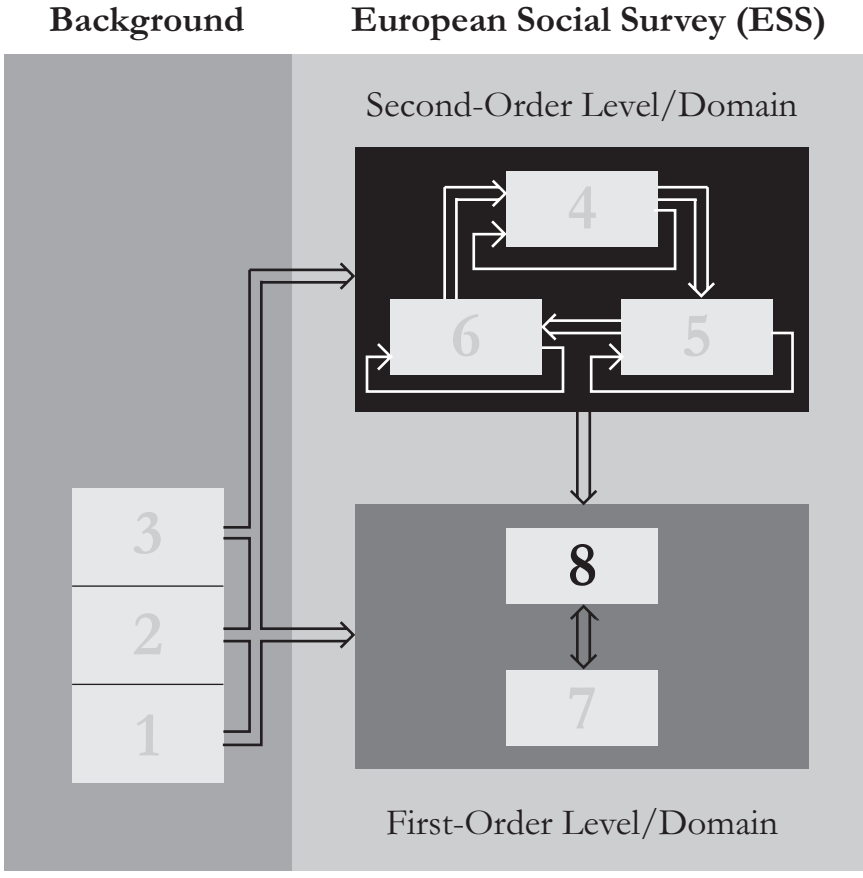
- the cooperation between cognitive science institutes and labs and the construction of a cognitive science module for ESS questions and responses at the first-order level and
- the building of an online ESS-monitoring system of the accumulated data and results of second-order ESS-studies.

The two remaining modules with data expansions are considered and discussed frequently within ESS ERIC so this proposal is not particularly new and was presented in this chapter only in a minimal form.
All new modules are developed as sustainable and long-term components which can and must be constantly enlarged and advanced.
The simultaneous expansion for ESS ERIC along all three science levels follows a more general logic which was developed for an expansion and an empowerment of the social sciences (Hollingsworth/Müller, 2008; Müller, 2016). This general empowerment strategy requires a widening of social science fields into the domains or dimensions of the

- Sciences of complexity
- Knowledge and information areas
- Neural foundations
- Second-order investigations (Müller, 2016)

The five modules of our proposal touch all four of these dimensions. The two data modules increase the available information bases, the visual module supports complex comparative investigations, the first-order module becomes relevant for the neuro-foundations of surveys and the second-order monitoring module expands the second-order dimension of survey research.
The important message for ESS ERIC at this point lies in the overall assessment that the ESS and ESS ERIC, as indicated in Chapter 3, have reached the peak of their methodological perfection, but have not arrived at the peak of overall perfection. There is still a surprisingly large and open space where ESS ERIC can expand and provide new and highly valuable modules for survey researchers. It will be entirely the task and the responsibility of the Core Scientific Team whether this high potential across all three science levels will be used in the future or not.

8 The Multiple Faces of Reflexive Survey Designs



> We have to take responsibility for our own meanings, and hence our own actions. This is not only because there are no meanings but the meanings we (each of us) make. It is also because when the form is circular and I am in that circle, there is no stop point but the one I choose; and the only one I can choose is where I am.
>
> Ranulph Glanville, *The Black B∞x, Volume III*

The final chapter extends the scope of survey studies from second-order survey analyses to reflexive survey investigations in general. As pointed out in the second chapter already, second-order survey explorations can be classified as a specific cluster or group of reflexive survey approaches, due to the re-entry operation of $X \rightarrow X[X]$ where X stands for a specific survey input or survey output.
In recent years more and more social science frameworks and designs outside of survey research were developed which contained aspects of reflexivity and of circular reflexivity relations. Reflexive configurations within the social sciences can be found, for example, in the following three instances.

- A method for qualitative research was built under the name of grounded theory (Glaser/Strauss, 1967, Strauss, 1987, Strauss/Corbin, 2015) which is particularly sensitive to the role of scientific observers in the production of data and interpretations.
- Michel Foucault in his "Order of Things" (2002) concentrates on the peculiar situation that man is at the same time a knowing subject and an object of his own study.
- Feminist epistemology places special emphasis on situated cognition and on the embeddedness of researchers in socio-economic settings. (See, for example, Barad, 2007, Haraway, 1991, 1997, Jannack, 2004 or Ule/Šribar/Venturini, 2015).

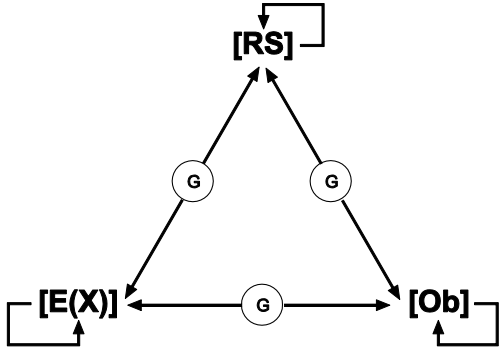
All three approaches were built in splendid isolation from one another, although they exhibit the same basic reflexive structure. Additionally, reflexivity plays a larger role in the work of Dirk Baecker, 2013; Ulrich Beck, 1986, 2000, 2007; Anthony Giddens, 1984, 1991; Niklas Luhmann, 1997; George Soros, 1994, 2001, 2007 or Greg Urban, 2001, to name only a few highly relevant contemporary authors.
More generally, reflexivity is characterized by a circular configuration for one single element like in the case of second-order studies or for two or more components like in the instance of the hermeneutic circle with its reflexive relation between the whole and its constituent parts. In the present time, scientific reflexivity manifests

itself not as a single approach, but in a variety of different clusters of research designs which were mostly unknown to the traditional science regime in general or to survey research in particular.

8.1 Five Clusters of Reflexive Survey Designs

The starting point for the subsequent reflexivity explorations for survey research lies in two basic triadic configurations which are both combined in Figure 8.1.
On the one hand, Figure 8.1 shows the relations between a scientific observer Ob as a survey researcher, a specific scientific building block X like a survey input or survey output and a set of rules and rule systems RS in survey research which become relevant for the production or transformation processes of X by a scientific observer Ob.
On the other hand, Figure 8.1 exhibits also the configuration of a scientific observer Ob as survey researcher, the wider social and natural environment E of an observer and a set of rules and rule systems RS in survey research which, once again, become relevant for the routines or practices of an observer Ob.
In this basic triadic configuration in two different versions, namely as Ob ↔ X ↔ RS and as Ob ↔ E ↔ RS, the four network nodes Ob, X or E and RSS generate each other, *round and round*.

FIGURE 8.1 **A Dual Scheme for Reflexivity Clusters**



In such an ensemble, reflexivity can arise or emerge, following Figure 8.1, in at least five different ways.
Observer-reflexivity: The first path is centered on observers Ob who in the present context are survey researchers, their actions, operations or routines and on the reflexivity relations of these observers with respect to their actions or operations Ob ↔ Ob(Op).

Building block-reflexivity: The second form of reflexivity focuses on inherent reflexivities for a survey input or output building block X and is typically based on a re-entry operation X(X) like in the case of the many examples which were introduced in Chapter 4 like a methodological survey study of methodological survey studies or a survey questionnaire analysis of survey questionnaires, etc.
Environmental/societal reflexivity: A survey within a multi-level societal system can exhibit reflexivity features due the multi-level architecture of societies or environments where practices or actions A at the micro-level generate an outcome O at the macro-level and this macro-element O, in turn, affects the practices or actions A at the micro-level: A ↔ O.
Rule system reflexivity: With the fourth way reflexivity is accomplished with respect to rules or rule systems RS in survey research and is constructed through a circular configuration between survey rules and rule systems RS ↔ RS.
Relational reflexivities: Finally, the fifth reflexivity trajectory comes about as circular relations between at least two nodes in Figure 8.1 and results in various different circular configurations: [Ob ↔ X, Ob ↔ E, Ob ↔ RS, X ↔ RS, X ↔ RS, Ob ↔ E ↔ RS, Ob ↔ E ↔ RS, Ob ↔ X ↔ E ↔ RS].
Moreover, these five different branches or clusters for reflexivity in survey research comprise a variety of different forms or types of reflexivity so that reflexivity in survey research can be accomplished in five clusters and different types within each of these five clusters. The next sections will describe these five clusters in reflexive survey designs in closer detail.

8.2 Reflexivity Cluster I: Survey Researchers and Their Operations

With respect to observers as survey researchers reflexivity can arise basically in two different forms which are strictly independent from one another.

- On the one hand, survey researchers and their routines or practices in exploring the world become the central topic of a scientific investigation by survey researchers, specialists in science studies or other scientific experts. Such an investigation falls under the domain of first-order research in sociology of knowledge, broadly conceived.
- On the other hand, the I of survey researchers can become an inclusive element in survey research processes. The resulting type of survey production differs significantly from the traditional approach and leads to a basic epistemological distinction between an exo-mode – survey research without observers – and an endo-mode – survey research with observers included.

The first type of reflexivity within the cluster of observer reflexivity is focused on survey researchers in her or his scientific operations or routines. As a para-

digmatic example of the first reflexivity type one can refer to a laboratory study on the specific practices in one or more survey laboratories (see, for example, for laboratory research in general, Knorr, 1984, 1995 or 1999) by a specialist of laboratory studies. Similarly, an empirical investigation of political preferences and party orientations of survey researchers, on the one hand, and the designs and results of their respective surveys, on the other hand, becomes a reflexive study on the relations between political attributes of observers and the inputs and outputs of their survey work. The first reflexivity type comes into play whenever a scientific observer focuses on research routines and practices of scientific observers as survey researchers and produces a tangible output in the form of an article, a book, a research report, etc. on these empirical relations.

The second reflexivity type deals with reflexivity in relation to the I or We[1] of a survey researcher(s). This requires a radical epistemological shift from the usual exo-mode of exploration to an endo-mode. The distinction between an endo-mode and an exo-mode can be traced back to Heinz von Foerster who developed a very intriguing list of characteristic differences between two fundamentally different epistemic attitudes towards one's world or environment.

> Am I an observer who stands outside and looks in as God-Heinz or am I part of the world, a fellow player, a fellow being? (Foerster, 2014: 128)

Subsequently, Heinz von Foerster provides us with the following list of distinctions which can be used directly for our differentiation between an endo-mode and an exo-mode.[2]

Heinz von Foerster emphasizes especially one distinction in Table 8.1.

> For me the most important distinction in the table is between 'Say how it is' versus 'It is how you say it.' These for me are the really fundamental differences between 'standing outside' and 'standing inside' – and here, of course, syntax fits as the set of rules you can see from the outside. Semantics, however, is like a roast that is being prepared and will soon be served. (Foerster, 2014: 129)

For Heinz von Foerster, the decision between a-mode from without (exo) or a mode from within (endo) belongs typically to the undecidable questions whose charm it is that they have to be decided by us. Survey researchers have to decide

1 The We of survey researchers is composed of at least two persons, responsible for a survey work, and can increase to large-scale teams which are responsible for the production of a specific survey.

2 It must be mentioned that Otto E. Rössler published a book on endo-physics (1992) which raised considerable interest. (See, for example, Atmanspacher/ Dalenoort, 1994). However, the distinction developed here between an exo-mode and an endo-mode differs significantly from the exo- and endo-differentiation by Otto E. Roessler who assumes a two-level structure of reality.

for themselves whether they want to operate in the traditional exo-mode or whether they want to shift to the rather unusual endo-mode.

TABLE 8.1 **Dichotomies for the Exo-Mode and for the Endo-Mode**

Exo-Mode	**Endo-Mode**
Appearance	Function
World and I: separated Schizoid	World and I: one Homonoid
Monological	Dialogical
Denotative	Connotative
Describing	Creating
You say how it is Cogito, ergo sum	It is how you say it Cogito, ergo sumus

In addition to the differentiation between an exo-mode and an endo-mode another distinction can be put forward, namely the separation between an endo-sphere and an exo-sphere. The exo-sphere focuses on the world or on the environment "as it is" in an exclusive manner and tries to minimize observer-induced biases. Eric R. Kendel provides a classical short summary of the exo-mode which attempts to eliminate scientific observers or to minimize subjective biases and which wants to establish objective knowledge.

> Scientists make models of elementary features of the world that can be tested and reformulated. These tests rely on removing the subjective biases of the observer and relying on objective measurements and evaluations. (Kendel, 2012: 449)

The endo-sphere concentrates on the world or the environment and on the I or We of its observers and links both in a triadic fashion by adding rule systems for the communicative and production practices of observers as a third node. The endo-sphere becomes, by necessity, more complex than the exo-sphere, due to the inclusion of the relations between world or environment and their many observers, including the I or the We of authors. Thus, the endo-mode includes the investigating scientific observer(s) in the domain or the sphere of investigation. An inversion of Kendel's quotation leads to a brief summary of the endo-mode.

> Scientists make models of elementary features of the world that can be tested and reformulated. These tests rely on removing the objective biases of observer-free tests and relying on observer-dependent measurements and evaluations.

This shift to the I or the We of survey researchers as well as to the endo-mode requires profound methodological changes.[3] At this point a concrete example for the endo-mode and the endo-sphere will be given for the field of survey research.
In the exo-mode I/We as survey researcher(s) would follow the usual rules and methods for questionnaire construction and survey data analysis. Within these survey production processes I/We as observer(s) would exclude myself/ourselves from the published output.
In the endo-mode I/We are also following the normal rule systems for survey construction and for quantitative survey analysis. But I/We start this work by specifying at least my/our goal set which I/We try to achieve in this work. Additional elements include my/our expectations or my/our survey responses and their similar or different profiles to the obtained results. Throughout the survey work I/We as survey researcher(s) as well as a reader can observe the relations between my/our results and my/our goal set as well as other components which were introduced by me/us in the beginning.
In the endo-mode I/We(Ob) become an explicit relator of the highest order who selects and relates the survey building blocks in my/our endo-sphere according to an explicit set of goals and other components. Thus, the endo-mode provides an inter-subjectively transparent form for relevant selection operations throughout my/our survey work.[4]
More generally, the endo-mode can be described as a dialogical first-person(s) exploration and the research processes and outputs in the endo-mode can be classified as endo-science. Operating in the endo-mode within an endo-sphere constitutes an essential reflexivity type which becomes particularly relevant for the social sciences and the humanities on the one hand and, on the other hand, for complex and "wicked" (Alrøe/Noe, 2014) research problems with many participating teams and a large number of scientific observers across different scientific disciplines.
As a self-referential remark, we should add that this book does not operate in an endo-mode or in an endo-sphere because important ingredients like our goal specifications or an in-depth documentation of creating this volume in terms of inter-subjective reproducibility are mostly missing.[5]

3 As a historical note it is interesting that for a short period the most radical empirical and anti-metaphysical philosophical tradition in the 20th century, namely the *Wiener Kreis*, proposed a version of first-person science under the name of protocol-sentences which served as the observational basic statements and which had to include the name of the observer. (See, for example, Neurath, 1981)

4 For more details on the endo-mode as well as on the endo-sphere, see Müller, 2015.

5 On the notion of inter-subjective reproducibility as a successor for objectivity in the exo-mode, see, once again, Müller, 2015.

8.3 Reflexivity Cluster II: Reflexivity in Survey Building Blocks X

The second reflexivity cluster is by far the most comprehensive one and also the backbone for the ongoing reflexivity revolution. This cluster advances reflexivity within a special building block or domain of first-order science X by re-entering this particular element or domain: X(X). This re-entry operation RE constitutes the vast number of new research problems of second-order science. This particular reflexivity cluster was fully developed for survey research within Part II of this book and will not be extended here any longer.

8.4 Reflexivity Cluster III: Survey Reflexivity in Societies or Multilevel Environments

A third cluster becomes reflexive because a special segment of the environment or within society contains reflexive features with respect to surveys. In political elections, for example, one can observe a continuous interaction between the overall results of opinion polls at the macro-level, their effects on the individual voting behavior at the micro-level, new opinion polls at the macro-level, individual changes in voting behavior, etc. practically up to the day of the actual election. The general importance of this type of reflexivity was, so far, recognized by survey research especially in the form of bandwagon effects, underdog effects or strategic voting behavior (Meffert/Gschwend, 2011; Schoen, 2014).

Similarly, consumer surveys on products and product quality may exert an influence on consumer behavior or surveys on financial options may lead to changes in financial decisions.

In general, complex multi-level systems with aggregated survey results at the macro-level may lead to changes in micro-behavior which yields corresponding effects at the macro-level, etc.

Finally, surveys with respect to future events are open to self-fulfilling and self-destroying effects as well. Aggregated survey results of future events can exert a mobilization at the micro-level and to the future occurrence of such an event. Likewise, future macro-expectations from a survey can mobilize policy interventions which can prevent an expected event from being realized.

This particular reflexivity cluster comes into play due to the embeddedness of surveys in multi-level configurations and due to the operation of media which provide information of the macro-outcomes of surveys to the micro-actors in such a multi-level ensemble (Gerber/Karlan/Bergan, 2009).

8.5 Reflexivity Cluster IV: Survey Rules and Survey Rule Systems

The fourth reflexivity cluster is centered on the node of survey rules and survey rule-systems for the operations of observers as survey researchers and is based, once again on re-entry operations. Initially, we have to emphasize that survey rules and rule systems must have a significant relevance for the operations of survey researchers, otherwise these rules and rule-systems fall outside the realm of reflexivity research.

Here, reflexivity can be accomplished in a variety of ways like a study of survey rules of survey rules or of survey rule systems of survey rule-system. In the available literature one finds a variety of meta-analysis of different survey methods, but no special approaches in terms of rules and second-order rules which can be defined as survey rules to generate survey rules.

A hypothetical example could start with a second-order study of different survey methods like face to face interviewing, telephone interviews and web-based surveys and their relative strengths and weaknesses. Second-order rules can then be specified as general procedural rules which must be followed in all three survey interaction types, albeit in specific variations.

Outside survey research one finds a large number of different approaches for second-order rules or, alternatively, meta-rules. For example, socio-economic institutions are defined by Douglass C. North (North/Thomas, 1970; North, 1994) as collections of rules and meta-rules. And an economy as a collection of institutions is characterized by a permanent circular interplay between fast changing rules and slowly adapting meta-rules. In linguistics, meta- or second-order rules were produced to increase the power of a grammatical formalism (See, for example, Uszkoreit/Peters, 1986). In large data-sets for sequential data one can mine for meta- or second-order rules which produce first-order rules (Cotofrei, 2005) and in design-methods one can search for second-order design methods to produce design methods (Teegavarapu, 2009). In general, one can search in domains of first-order rules for more general principles or second-order rules which generate first-order rules.

8.6 Reflexivity Cluster V: Reflexive Relations between Survey Researchers, Building Blocks, Multi-Level Ensembles, and Rule Systems

The fifth reflexivity cluster contains a significant number of different relational reflexivity configurations like the relations between observers Ob as survey researchers and their society/environment E, survey inputs or outputs X and their society/environment E, etc. A relational reflexivity type between observers Ob as survey researchers and survey inputs or outputs X is based on the relations of attributes of observers and the content or results of their survey work which would become a first-order study in the sociology of knowledge.
Several other relational reflexivity types could be specified, for example the interesting general heuristic advice by Stuart A. Umpleby to investigate the relations between new ideas in survey research and specific societal configurations (Umpleby, 1990). But at this point we will close the overview on the five reflexivity clusters for survey research with their different reflexivity types.

8.7 Combining Reflexivity Types

Aside from these five clusters of reflexivity within survey research an important point lies in the possibility of combining these clusters to more complex configurations and highly reflexive survey research designs. In principle, three reflexivity roads are open for survey research which are all based on the five reflexivity clusters and the various reflexivity types. In terms of classification, these roads can be categorized as low, middle and high reflexivity roads. The terms of a low, middle and a high road are not used as a quality predicate, but stand for different complexity and reflexivity levels of survey research designs and of survey research processes.
The low road to reflexivity is accomplished whenever a topic is analysed which exhibits a circular arrangement and which corresponds to one of the reflexivity types within one of the five reflexivity clusters. Any second-order survey analysis in the exo-mode without further reflexivity relations involved moves along this low road. More generally, second-order survey investigations in the exo-mode are bound to this low road with a high degree of probability.
The middle road to reflexivity is characterized by a recombination of two or three of the five reflexivity clusters. For example, a survey research design can be specified for a second-order analysis in an endo-mode or by adding the wider research and society relations to a second-order study. All these instances are characterized by more complex research designs and scientific production

processes, compared to the low reflexivity road of the single reflexivity types. Finally, the high road to reflexivity in survey research needs a recombination of four or five reflexivity types from four or five reflexivity clusters which results in a very high reflexivity level. In the instance of a maximal reflexive survey design a re-combination of all five reflexivity clusters must be undertaken by an observer-inclusive, rule-reflexive second-order analysis of a reflexive system or network which also adds a non-trivial relational component. This recombination becomes the most demanding and most complex one and requires time and resources which are currently unavailable in conventional survey research processes. The maximum state of reflexivity in survey research can be specified, thus, in a clear way as a recombination of all reflexivity types from all five clusters.

The differentiation into five independent clusters of reflexivity and their potential recombinations should become useful as a guideline for organizing higher forms of reflexivity in survey research processes. The possibility for recombinations of reflexivity types and clusters leads to the conclusion that the potential for reflexive survey designs and analyses is huge and can be pursued with a high potential of novelty and innovation.

This concludes our presentation of a systemic and systematic account of the realm of possible reflexive research designs in survey research, namely as

- Reflexivity with respect to survey researchers and their actions, *i.e.*, survey researchers ↔ survey researchers(operations)
- Second-order survey analyses of survey inputs or outputs X: X → RE → X[X]
- Multilevel survey configurations in societies or environments
- Reflexivity of survey rule system SRS: SRS ↔ SRS
- Relational reflexivity between these four components.

In combination, these five different clusters for reflexive survey designs constitute altogether an open field of new research paths which, so far, were only explored to a small degree and which become also significant in shaping the emerging silent revolution in reflexivity.

8.8 Surveys, Endo-Mode, Recursion, and Eigenforms

As a final point we want to mention an interesting point with respect to the dynamics of reflexive survey studies in an endo-mode. The endo-mode, due to its closed operation, provides intriguing endpoints which can be classified as states of cognitive equilibrium and which are based on an important theorem which can be stated in the following way.

> In every operationally closed system there arise Eigenbehaviors. (Foerster, 2003: 321)

The final form in a reflexive survey investigation within the endo-mode is reached when, following the quote from Heinz von Foerster, Eigenbehaviors or, more generally, Eigenforms emerge. An Eigenform EF can be an Eigenvalue in mathematical operations, an Eigentheory, an Eigenmodel, an Eigensentence, an Eigenfunction, an Eigenlaw, an Eigenbehavior, etc. Eigenforms are characteristic equilibrium states which reproduce themselves once they have been reached. For the operation extracting the square root of a positive number N the number 1 becomes the Eigenvalue of this particular operation and the square root of 1 generates, once again, 1. For the differential operator dy/dt *e* becomes its Eigenvalue and *e* generates *e* under a differential operation.
In addition to Eigenvalues Heinz von Foerster offers a highly interesting example of the necessity of biological Eigenlaws.

> The laws of physics, the so-called 'laws of nature', can be described by us. The laws of brain functions – or even more generally – the laws of biology, must be written in such a way that the writing of these laws can be deducted from them, *i.e.*, they have to write themselves. (Foerster, 2003: 231)

Moreover, a theory of the brain has to write itself and be able to account for its own operations in being able to write a theory of the brain.

> It is clear that if the brain sciences do not want to degenerate into a physics or chemistry of living – or having once lived – tissue they must develop a theory of the brain: T(B). But, of course, this theory must be written by a brain: B(T). This means that this theory must be constructed in a way as to write itself: T(B(T)). (*Ibid*: 195)

Obviously, this restriction on theory formation also applies to the I of the survey researcher and his or her survey work so a variation of the quotation from Heinz von Foerster is needed.

> It is clear that I as a survey researcher must develop a survey input like a questionnaire or a survey output like an analysis of survey data. Such an input or output X becomes an Eigenform if other survey researchers are bound to reproduce this particular input or output X.

Currently, survey research is situated far from its cognitive equilibrium points of Eigenforms. But at least one can point to a promising endo-path which could reach such an area in the future.

8.9 Final Outlooks

At this point we come to the end of an unusual and unusually long journey which started with a great transformation from Science I to Science II, proceeded to a level differentiation of the general science system and to three grand challenges for the European Social Survey and which tried to present the fruits and results from a second-order survey investigation which used ESS-based publications as its empirical base.

In our view we succeeded in this book to offer three different types of solutions.

- First, we were able to expand first-order survey research with a new and additional domain of second-order survey studies. Most of these new second-order analyses are still waiting to be implemented and their results should offer fresh impetus also for first-order survey investigations.
- Second, we presented a sustainable strategy for keeping ESS ERIC ahead of its grand scientific and societal challenges by a simultaneous empowerment of ESS ERIC with new building blocks along all three science levels of first-, zero- as well as second-order science.
- Third, we offered a general empowerment sketch for large classes of contemporary first-order fields within the social sciences to evolve into a strong, reflexive and complex domain. This empowerment process relies, as the current book demonstrated, on at least three dimensions, namely on
  - information and knowledge dimensions at the zero-order level or, alternatively, at the first-order level.
  - nano dimensions and cognitive foundations at the first-order level,
  - second-order dimensions as they were described and developed within this volume.

  Additionally, social science areas can be empowered along further dimensions (Hollingsworth/Müller, 2008, Müller, 2016), namely along
  - complexity dimensions,
  - first-order reflexivity dimensions outside second-order approaches.

Again, the reader[6] and not the authors will decide in the long run whether these three goals as well as the solutions were reached within the eight chapters of this book. For the future we hope to be able to include other European or global

6 A *Caveat lector* should be added in the end. One group of readers from the party of survey research fundamentalists already stated that this type of second-order investigation should be abandoned immediately and should be replaced instantly by true and hard and normal (first-order) survey research (Wegener/Liebig/Leuze/Motel-Klingebiel, 2013).

surveys and new types of comparative second-order survey analyses which move significantly and dramatically beyond the study we presented in this book.
In this way survey research will enter a new era of level diversity and of dense and frequent transfers of new insights from second-order survey analyses for the continuation or the discontinuation of first-order survey projects and studies.

What about communication about communication, communication for its own sake, communication in which it is not assumed that we pass messages unambiguously and with certain decoding to those who are to receive? What about communication as we often experience in our experiencing?

Ranulph Glanville, *The Black B∞x, Volume III*

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I now strongly believe that the ESS needs expansion and innovations in order to remain what Roger and I wanted it to be: a top-notch multidimensional infrastructure for the social sciences. In this context I find the book edited by Brina Malnar and Karl H. Müller of particular relevance … "Surveys and Reflexivity" presents many suggestions which should be discussed not only within the ESS-community, but also within and among European social science research infrastructures and presents even challenges for survey research in general.

Prof. Max Kaase, Founder and, together with Sir Roger Jowell, Promoter of the European Social Survey

Brina Malnar is a senior scientist at the Faculty of Social Sciences, University of Ljubljana. Since 1990 she is with Public Opinion and Mass Communication Research Centre which houses the Slovenian Public Opinion Survey, the the most comprehensive source of comparative survey data for social scientists in Slovenia. She has been involved with the European Social Survey since 2002, first as the National Coordinator for Slovenia, and then as a member of the ESS Core Scientific Team. In the ESS, her main area of work is academic outreach and bibliographic monitoring, which encompasses a comprehensive annual study of articles with ESS data usage. Her recent publications focus on research ethics, health inequalities and environment.

Karl H. Müller was head of the Wiener Institute for Social Science Documentation and Methodology (WISDOM) until 2014 and is currently director of the Steinbeis Transfer Centre New Cybernetics and senior researcher at the Faculty of Social Sciences of the University of Ljubljana. His main research interests range from the perspectives and horizons of second-order science and from problems of complex modelling or data-visualization to the frontiers of radical constructivism and of contemporary RISC-societies. As a parallel publication to this volume, a general outlook on second-order science is published by him as *Second-Order Science. The Revolution of Scientific Structures* (Wien, edition echoraum, 2015).