

Ton Jörg

New Thinking in Complexity for the Social Sciences and Humanities

A Generative, Transdisciplinary Approach

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 Springer

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To Werner, original source of inspiration

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This book is about the problem of complexity and how this can be tackled from a scientific perspective.

The inspiration for this book has a long history, of almost forty years, and the path of creation was a tortuous path indeed. Many traps, such as blind spots, blinding paradigms and learned ignorance had to be circumvented before finally arriving to the writing of this book. Many others were involved, but Werner Holländer was the unexpected, generating source of inspiration for this book, which was as much a surprise for him as it was for me myself. Since my membership of the special interest group “Chaos and Complexity Theory” of the yearly educational conference AERA in 1998, I have been inspired by the conversations in this particular group of educational thinkers about complexity. These people and conversations made me more and more aware that the concept of complexity in use could be considered as a deeply contested concept. The study of complexity showed to be a hardy perennial for thinking about complexity; not only for education but for all of our sciences. To deal with this problem of complexity new thinking in complexity seemed very much needed. I am very grateful to all people which have supported the proposal for this book, i.e. Klaus Mainzer, who is author of a book on thinking in complexity about complexity by Springer, and Dorothy Robbins, both of whom gave such a wonderful recommendation for the publisher, thereby enabling this book in Springer’s interdisciplinary program of “Springer: Complexity”.

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If this book may show to have didactic characteristics and to be of value for educational purposes, it may have found its inspiration from my background as educational researcher in a department of teacher education at the University of Utrecht in the Netherlands.

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The Netherlands

Houten

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Chapter 1

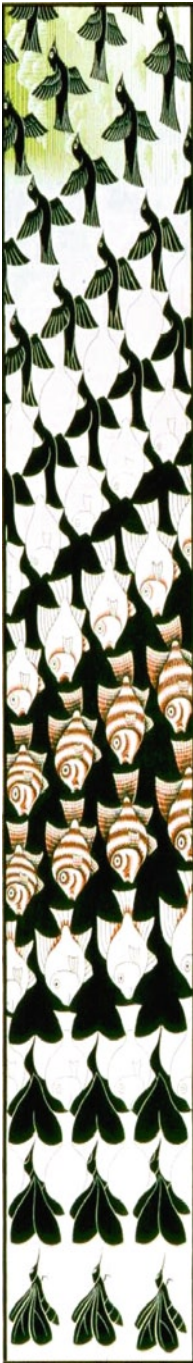
Mission of the Book



And the world's complexity means that there is, now and always, more to reality than our science is able to dream of

(Rescher 1998, p. 28; emphasis added)

In this book, the aim is to develop the foundation of a new science of complexity (ScoC), with a new focus on what we take as ‘the complexity of real-world complexity’. Inspired by the work of Niklas Luhmann, the aim is to re-describe the foundation of our Social Sciences and Humanities. We argue that this should be the new focus for a new science within the scientific realms of our sciences with their different disciplines, i.e., within the Social Sciences and Humanities. This new science of complexity can be taken as a kind of *complementary* science, born out of dissatisfaction with the way sciences are ‘normally’ operating in our society, showing their incapacity to deal with real complexity as a serious topic of study. We think it is time to open the social sciences and to go beyond the habitual, limiting views of these sciences (Wallerstein et al. 1996). These social sciences have become entrapped in a kind of cul-de-sac in their viewing and doing science, as a result of the dominance of linear thinking in these sciences. Some speak about this critical situation in terms of a real crisis (e.g., Morin 2001). We have come to the conclusion that we desperately need innovation in our dealing with the reality of real-world complexity, to put an end to this entrapped situation. With the new science, we may put an end to the common trivialization of complex phenomena in the field of these sciences, such as the unfathomably complex human being. This reduction of complexity is very common within the social sciences, such as in the field of learning and education (cf.

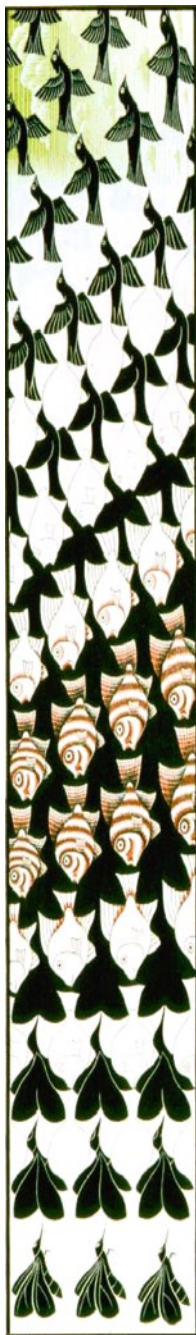


von Foerster 1993) but also in the field of brain research, with scientists being ‘prisoners of description’ (see, e.g., Edelman and Tononi 2000).

In our effort of developing a new science of complexity, based on new thinking in complexity, we express the firm hope that this new science will open a new way of viewing and doing science within the social sciences. It may make an end to the limiting way of viewing and doing science within the traditional scientific realms of the real.¹ The opening may lead to the innovation of the social sciences and humanities and may improve their quality by showing the unexpected and hitherto unknown ‘*world of the possible*’ (Kauffman 1993, p. 375; emphasis added). This world is very much about the *enlarged* space of the possible (Osberg 2009); that is, about the hitherto unknown realms of possibilities. This world, we argue, *is* the world of real-world complexity. This complex world, we argue, is still to be explored. With Nicholas Rescher (1998), we fully support the notion that “complexity is self-potentiating”. Of course, this is not self-evident. It demands for explanation, in terms of how complexity may really ‘work’ in the scientific realms of the scientific enterprise. This is what this book is about: to build a new framework of complexity that is based on the reframing of complexity as a new concept and a new tool for use in our sciences. This demands for rethinking of our basic concepts in use in our doing science, like the concepts of ‘causality’ and that of ‘interaction’. It also demands for a different ontology and epistemology, in their fundamental connectedness.

By adopting the new science of complexity, we are ready for enlarging our capacity to deal with the complexity of real-world complexity. This may imply the enlarging of the space of the possible, in terms of a more true understanding of the complexity of real-world complexity. We also focus on a better understanding of the forces, structures and mechanisms that drive and sustain the dynamics of complexity of the vast and complex dynamical systems in our complex real world. It is our hope for the future that we can convince the reader that we need a more *practical* kind of science for being able to deal with the big questions and issues in the real world (cf. Scheffer 2009, p. 8, and p. 327). These are the questions and issues that are still unanswered and are still waiting for an answer. We support the challenging view of Marten Scheffer, that “we need good science to help

¹ cf. mission of European initiative of Institute Para Limes.



us shape the future” (Scheffer 2009, p. 8). Although it remains questionable what ‘good’ science will be, we may actually know what ‘bad’ science is.

Only by linking the fundamental with the practical we may be able to shape the future of our society and humanity at large. This may result in a *generative* approach that can be developed into a general transdisciplinary approach, for use in the different scientific realms of our sciences and their disciplines. This generative approach is about the fundamental, generative nature of complexity. This is the reason why the focus is on *generative complexity*. The new approach involves the acceptance of the (hitherto) unknown, the unexpected and the unforeseeable.²

The new science of complexity has the aim to become *explanatory* about this generative nature of complexity. Only then we may become explanatory about the generativity of complexity, which we view to be the key to an understanding of complexity as *self-potentiating* (Rescher 1998, p. 28; emphasis added). In explaining and understanding generativity as the key to a better understanding of real-world complexity, we may find an answer to the question “how we come to see things in new ways” (Schön 1987, p. 138).

In our analysis of the crisis in our sciences we come to the conclusion that we are still the captives of old thinking. Although we may know that “nothing in the social world actually happens mechanistically” (Bhaskar 2002, p. 249, fn. 39), we still seem to take “mapping mechanistic models to reality as the core of science” (Scheffer 2009, p. 274). The rejection of this stance, we argue, may be opening for a different view of reality: as a complex, nonlinear reality (cf. Mainzer 2004, p. 407). Although we may know that ‘the problem of causality’ is still an unsolved problem in our sciences, we are still operating on the basis of what Susan Oyama has described as “the Central Dogma of one-way flow of causality”, which is still our guiding metaphor in causal thinking about the real (see Oyama 1989, p. 29). This is why our new science of complexity, in its fundamental critique on viewing and doing science as usual within the social sciences, may open a new window upon reality and possibly even a ‘re-enchantment of reality’ (Bhaskar 2002, p. 242). We are also of the opinion that the new science offers a new opportunity “to humanize determinism”, in the words of the

² See ‘Charter of transdisciplinarity’, article 14, at <http://basarab.nicolescu.perso.sfr.fr/ciret/english/charten.htm>



Russian psychologist Lev Vygotsky (1997). We fully support Edgar Morin's statement that complexifying is a way of *humanizing* the sciences³ (Morin 2002, p. 9).

We argue in this book that determinism can be viewed differently: as more dynamic and fluid than has always been done in our history of philosophy and the sciences. We introduce the complex notion of 'fluid determinism'. This fluid version of determinism is about the processes of causal influencing in interaction within interactive relationships, showing a fluid *interplay* of forces as a kind of *shaping* forces over time, with (causal) effects as "reciprocal effects of one on the other" (Follett 1924; emphasis added). These effects may cumulate over time: *both* in a linear *and* in a potential *non-linear* way! The shaping of one another in dyadic human interaction may happen by those impelling causal forces that *interpenetrate* each other's systems as complex systems (cf. van der Veer and Valsiner 1994, p. 213; Luhmann 2002, p. 182). The causal dynamics involved in this emergent kind of interaction, evolving over time, can be described as a kind of complex process of dynamic interweaving. This complexity of interweaving *can* and better *should* be linked to network thinking for new thinking in complexity in our sciences (cf. Barabási 2003). The complexity involved can be characterized by different individual *and* interpersonal parameters (see Smith and Stevens 1999, p. 408). From our new complexity perspective, this kind of fluid determinism through complex, dynamic interweaving is taking place within webbed networks with their webbed interactions within relational networks. It is the interweaving of the relationships within these dynamic loop networks that is generating potential nonlinear multiplier effects over time, such as Snowball Phenomenon, Butterfly Effect, as examples of bootstrapping effects. More specifically, we focus on complex, hypercyclic webs, with dynamic, web-like structures; that is, structures of dynamically interconnected loops with nonlinear, hypercyclic couplings and their hypercyclic organization (Kauffman 1993, p. 359, p. 361). These couplings of cycles itself, with their coupled activity as emerging from the causal dynamics of impelling forces and causal effects, exerted within the causal loops of interactive relationships, can be taken as dynamic unities of ensembles. The responses of the activities involved are complex responses to a reciprocal kind of relating (see Follett 1924; see also Follett, in Drucker et al.

³"complexifier, c'est humaniser les sciences" (Morin 2002, p. 9).



1995, pp. 42, 43). For the case of dyadic human interaction, with interaction within a context or environment being part of the functioning of a whole, this implies a kind of triangular model of a fundamental, complex unity, with reciprocal interdependence (cf. Mainzer 2004, pp. 115–117). The human development can be modelled as a kind of spiral development towards higher levels, potentially generating such a spiral of development for *both* partners. This is how human beings can *make* one another by shaping each other in their communicative human interaction (see Kauffman 1993, p. 371). This description of the complexity of human interaction is way beyond that of the machine metaphor, linked to the mechanistic version of determinism. We may conclude that the kind of new thinking in complexity is what humanizing such determinism is really about for the social sciences and humanities.

As we argue below, the new approach may also bring with it a humanizing of these sciences and humanities *themselves*. We believe this is of special importance for the study of the lived realities of human being in these fields of science, in terms of realizing themselves. This is especially of significance for the field of learning and education, by opening and enlarging the space of the possible within a *world of the possible* (Kauffman 1993; italics in original; see also Osberg 2009; Jörg 2009).

We are of the opinion that the new science of complexity may deliver the new tools of thinking needed for becoming descriptive and explanatory about the unfathomable complexity of human beings as part and parcel of real-world complexity within our social world. These tools are of relevance for *all* the disciplines of our social sciences. These tools of thinking include a reframing of complexity and a new framework for dealing with this *real* complexity. The new science is founded on a different ontology about real-world complexity and on new ways of knowing about this complexity. This epistemology is fundamentally an epistemology of the *possible*. With this epistemology about real-world complexity, we think we are able to open the *world of the possible*. This epistemology may offer the opening to address what Niklas Luhmann has described as the fundamental ‘*uncertainty of knowledge*’ (Luhmann 2002, p. 152). With Luhmann, we must realize that we cannot reach certainty of knowledge about the very complexity of complexity itself. We think, we may address this hitherto unknown complexity of real-world complexity, with this uncertainty *included*. This epistemology



new Science of Complexity (ScoC)

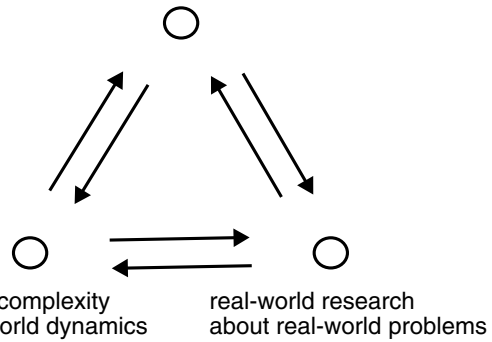


Fig. 1.1 Triangular, reciprocal interdependency between the new Science of Complexity (ScoC), real-world complexity and real-world research

of complexity, which is simultaneously an epistemology of the possible, is opening new spaces of the possible, within a new *world of the possible*. Consequently, the new science of complexity offers an enlarged worldview about a richer sort of reality.

The new thinking in complexity of the new science offers a new lens for viewing and doing science within the different disciplines: of viewing systems with new eyes. This can offer a *real* and *realistic* opening for a new kind of research. With Robson (2002), this kind of research may be described as ‘real world research’ about real-world problems within the real world, which is commonly related to real-world complexity: see Fig. 1.1, about the triangular, reciprocal interdependency between the new science and the problems at hand, with a ‘natural’ complexity involved. These problems are often about the so-called ‘big questions’ that are still unanswered in our sciences (Morin 2008). To find the answers, we need to become more inventive and creative in our way of thinking. This new real world research, with a focus on big questions and complex phenomena, may bring with it an opening of the social sciences. This can be the very opening as desired by different groups of various kinds of scientists all over the world (cf. Wallerstein et al. 1996; the Santa Fé group in the USA; the corresponding European initiative of Para Limes; the European Committee of Complex Systems; NWO 2008 and more local initiatives by universities).

We are deeply convinced that we need a *reframing* of complexity to be able to generate a better understanding of real-world complexity and to deal with this natural complexity.



Only by reframing complexity, we are able to understand how we may turn complexity into effective complexity.

The ultimate challenge is to become more knowledgeable about how we may turn this effective complexity into a kind of *advantageous* complexity, for the benefit of humanity and society at large. So, we come to the conclusion that we need a true understanding of complexity to tackle the problems of complexity of real-world complexity.

Because of its deep connection with real-world complexity, we think we may present our theorizing about complexity in terms of a so-called ‘grounded theory’: a *grounded* theory of complexity, which is fundamentally grounded in the causal power of causal forces, exerted in causal interaction within interactive causal relations (cf. Craver 2007, p. 224). These causal relations are *reciprocal* causal relations in our modelling of the causal processes involved in causal interaction between the fluid entities of the new dynamic unit of the *ensemble*, as a kind of system.

The new science, with its grounded theory of complexity, is opening for a true understanding of the forces operating in the complexity of forces exerted in causal interaction within interactive relationships (cf. Scheffer et al. 2009, p. 8). The new science offers an explanatory framework of nonlinear causality about complex phenomena like those of bootstrapping, the known ‘Matthew effect’ and unknown ‘Jörg effect’ and other nonlinear effects, which may fuel transitions and transformations in the real world. These are complex phenomena that thrive on the shaping forces exerted through causal influences in interaction. The mechanisms at ‘work’ in this, are kind of causal, generative mechanisms within the extended causal framework, which are enabling for the driving forces that may enforce complex, nonlinear phenomena in our complex nonlinear reality.

The new science, with the grounded theory of complexity, can be taken as an *integrative* science, because the same tools of thinking may be of use for the tackling of complexity in the variety of scientific realms and disciplines. What helps for this integration, is the creation of a new language, with new metaphors, like generative mechanisms, generative spaces and generative power as examples of ‘the *generative* metaphor’ (Schön 1993). This new language, with a new vocabulary and new metaphors, is constitutive for how we view reality in our new science of complexity: see Fig. 1.2. We believe this language has the power of inducing a language-effected

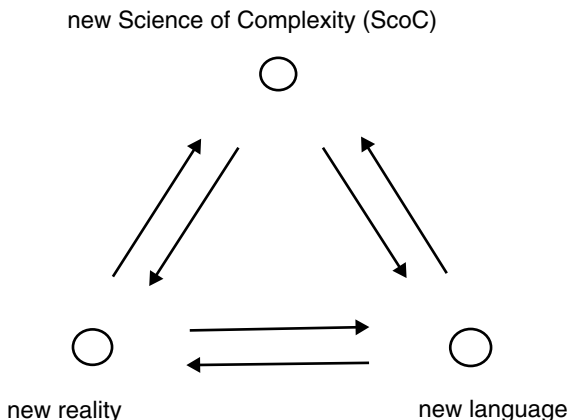


Fig. 1.2 Triangular, reciprocal interdependency between the new science of complexity (ScoC), the new reality and the new language

reality, which is very much about the richer sort of reality: that is, the nonlinear complex reality of real-world complexity (cf. Mainzer 2007).

Although we may speak about our new science as a shift of mind, we think it is of importance to stress that the new science of complexity should not be taken as a shift of paradigm, in terms of Thomas Kuhn. Our shift of mind, grounded in new thinking in complexity, has not the intention to replace the ‘normal’ science, as Kuhn viewed such a shift of paradigm. Although we do propose a shift of focus on complexity and a new thinking in complexity, resulting in a reframing of complexity, we would like to propose the new science of complexity as a complementary kind of science, which is a fundamental and foundational kind of science. The new science of complexity (ScoC) is fundamental, because of the new method, which is of relevance for all our scientific realms and disciplines and foundational because the new ScoC offers a new tool for deepening our view of doing science. It offers the perspective of a kind of retooling of our sciences by new ways of thinking about the complexity of real-world complexity (see Kuhn 1970). We do have the intention to present our new science of complexity as a keystone for the social sciences. We are of the opinion that this is the stone that has been disdained by the builders of these sciences. The new science presents not only complexity as a serious object of study for the different scientific realms of our



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sciences but also with a complementary method for constructing models of nonlinear complex systems in the natural and social sciences (cf. Mainzer 2004, p. 406). These complex models are the models we need for 'modelling collective behaviour' (Mainzer 2004, p. 407; see also Kauffman 1993, 1995a, b, 2008). We think all of this is i.e., of relevance for the social sciences, with their variety of disciplines. The new science of complexity, with its fundamental and foundational generative approach, can therefore be regarded as a transdisciplinary science. It will be a science with a generative, transdisciplinary approach of complexity as generative complexity.

We hope the new science of complexity may expand the viewing and doing of science within the various fields and disciplines of our sciences, by taking into account the very complexity of various subjects of study in these scientific realms. Of course, by taking the complexity of real-world complexity as a serious subject of study, it may have consequences for the agenda of our sciences. Although our focus has been very much on the social sciences and humanities, we think it may bring with it unexpected openings to the natural sciences as well. Our modelling of the complexity of complex systems can be of use for the functioning of complex systems as wholes, in their interaction with one another, with the potential of transitory, transactional processes and patterns of development, generated through the (causal) power of bootstrapping (Kauffman 1993, 1995a, b; Scheffer 2009; Scheffer et al. 2009). Although our modelling diverges from the main roads of modelling in biology, this modelling, based on the modelling of nonlinear causality within the extended causal framework (ECF), shows an unexpected explanatory power. As such, the new science may be the foundation for "good science that is needed to shape the future in the best way" (Scheffer 2009, p. 8). By the use of the generative power of generative complexity, for the use of shaping the future of our social sciences and humanities, it may become 'a science of hope'.

The fact is that complexity is self-potentiating

(Rescher 1998, p. 28; emphasis added)

Chapter 2

Introduction

*There is a new set of metaphors
to describe ourselves, our minds, the universe,
and all of the things we know in it*

(Brockman 1995, p. 21)

This book may be viewed as a complex book about the topic of complexity. It is both critical of the present state of art in the social sciences and constructive in its view about the possibility of building a new science for the future. A science that takes the complexity of reality as *real*. A science that is based on a new framework: a framework that does not yet exist. The new framework, therefore, will be a framework that has to be *invented*.

The underlying idea and motive for the book is that the notion of complexity may humanize the social sciences, by opposing what may be called ‘the common trivialization’ of our worldview and of its inhabitants living in this world. As a consequence we really need to rethink our view, both in theory and in or *for* practice. The focus is on “bringing real people back in”¹ in our doing and viewing science: through a new way of thinking in complexity. The new thinking may lead to a new science with a focus on the inherent complexity of human beings: the very complexity that has been denied so often. This perspective entails a broader view of reality as well: not a reality to be taken as a ‘delivered’ reality but a reality that is to be taken as less fixed and more fluid.

Thinking about reality, we may turn reality as assumed, as fixed in our doing social science, into a more complex, that is: a *richer* reality for all. Thinking in complexity may therefore imply a kind of *re-enchantment of reality*, of a re-enchanted world (Bhaskar 2002, pp. 242–243). But not only for the sake of reality and how we may experience the world as such! The terrain of new thinking in complexity, as a way of complexifying reality, may also be viewed as a *new terrain for social theorizing*: as a terrain to be discovered for “the discovery of the enchantment of humankind.” (Archer 2000, p. 306) The field of social sciences may be regarded as

¹See Margaret Archer [2000], p. 306.

an unmined research field. A field that might as well show up to be a terrain that still has to be *invented*, or *re-invented* in a certain way (Jörg 2004b). For this purpose, the field of social sciences may be taken as profoundly ‘known’ to be the field of the *still unknown*. Consequently, for scholars of social sciences, this field of science is the field of *learning within the unknowable*. This is the field to be entered, the field of a new potential: the potential of creating a new language, with new set of metaphors. These are the very metaphors that have to be *invented*, for a new kind of “description of ourselves, our minds, the universe, and all of the things we know in it.” (Brockman 2006, p. 21)

The main focus of this book is on new *thinking* in complexity, with complexity to be taken as derived from the Latin word ‘complexus’: ‘*that which is interwoven.*’ (Morin 2001, p. 31) It may be stated right from the start that the new discourse of thinking in complexity “is not a ready-made discourse.” (Davis and Sumara 2006) This is not only true for education but for the social sciences in general as well. That makes the view presented a programmatic view, delineating a new path to be taken: a path to “learning within the unknowable” (see Flood 1999).

The book starts with the notion that the complexity of reality should not be taken for granted but as reflecting the real. The new thinking wants to escape the greatest danger of our time: of linear thinking about a reality that is fundamentally a complex, nonlinear reality (Mainzer 2004). It is for instance the danger of a science fragmented in different disciplines and the danger of thinking in terms of linear causality. The focus will be on a trans-disciplinary approach, with different tools of thinking. Tools that may be valid for *all* of the different disciplines. So, the new thinking means a kind of rethinking too. It is because of such rethinking that a new framework may be built. It will be one of the main goals of the book to show how such a new framework will look like. So, it keeps a distance to the complexity theories that are around in the field of science such as the chaos theory, catastrophe theory and computational complexity theory, which are all based on mathematics. New thinking in complexity starts from the recognition of the role of the dynamics of complexity in reality.

The rethinking may offer the opportunity of building a new science: of a more promising science for the future of the social sciences and humanities. It is the linking of science with a more complex, nonlinear notion of reality that offers the perspective of a new science. This may demand quite a bit of rethinking: a rethinking of the basic assumptions of our doing science as usual. The promise is not only a new science about a richer reality but also the promise of a new, richer culture. The new thinking in complexity has the potential of dealing with the apparently unsolvable problems with which human society is beset (see Bohm 1996, p. 77). These are the very problems and questions in our sciences whose best answers may have remained *unknowable* (Simon 1996). So, the new science will operate within the field of the unknowable. But how can one know what one does not know yet? It may look like an impossible mission. The question, then, is how this mission of solving these problems for our society, may have its course in the near future? Clearly *not* by ‘simply’ applying complexity sciences to human action. A better idea is to start with the recognition of the ‘real’ complexity, of ‘that which is interwoven’ and the dynamics of such complexity. By taking complexity seriously

and not for granted, we may be able to humanize the sciences, i.e., the sciences related to the study of the human being. To do so, the human being should not be taken as an isolated individual, as a closed system, stripped of attributes that may be called ‘social’ but as a human being, being radically interwoven with his/her social environment. Instead of reducing the human being to an isolated individual, to generate predictable citizens, one may complexify the individual into a complex human being. This path of complexifying of the individual as subject of study may seem a paradoxical way of liberating the individual as an inherently limited subject of study in the social sciences. It is this path, which however, may turn out to be the path of cultivating humanity by humanizing the subject of study: the complex non-linear human being (Stanley 2005, p. 143). To overcome the crisis of our time, by recognizing the lacuna of our thinking, we may ultimately find an opening for new thinking and find ways to realize “the possibility of the cultivation of humility, of real humanity.” (Jardine et al. 2006, p. 135; cf. Biesta 2006; Archer 2000)

In this book a link will be made with the so-called ‘deprivation of our culture’: a deprivation fostered by the separation of the two cultures present in our Western culture, the so-called first and second culture, the famous distinction made by C. P. Snow (1959). Each one of these cultures seems to ‘deliver’ a reality being not only very different but also without having a connection. For now and in the future of our sciences it may be not only be desirable but even urgent to leave the jargon of each of these cultures behind; of cultures with their characteristic imprisonment of meaning and a separate scientific mentality, with their provincial limitations. The concomitant effects, like the effects on education, may be regarded as disastrous for our culture. Consequently, the question how to overcome the signalled deprivation of our culture will be an important topic in this book. It may be stated that a richer culture will be a culture in which Snow’s two distinct cultures are to be linked, comprising a kind of so-called ‘third culture.’ (Brockman 1995) A third culture that has benefits of the joint ‘production’ from these sources for a better future of *both* cultures and for society at large. Philosophy may be regarded as the *key* for both the invention and elaboration of the third culture. It may open our eyes for a new framework of viewing the world: “a conceptual framework that does not yet exist.” (Kauffman 1995b, p. 185)

Of course art, with its continual renewal and innovation, maybe and should be part of that third culture as well. Both art and science may be conceived as a kind of rebellion against reality: of reality as usual (see e.g., Schama 2006; Gohr 2000; cf. Gilbert & George, in the Tate Gallery in London). It is this very similarity that makes it possible to draw parallels between the development of art and science, as will be illustrated in the drawings and figures of various artists in this book.

The trans-disciplinary approach advocated here will be trans-disciplinary in two ways: firstly, by going beyond the separate disciplines within the fields of both natural sciences and social sciences and, secondly, by going beyond the separate cultures of the natural sciences and of the social sciences and humanities.

The book is strongly inspired by the work of the Russian psychologist Lev Vygotsky.² In his day, at the beginning of the twentieth century, he tried to build

²He lived from 1896–1934.

a new science of psychology. He did so by starting from the notion of a scientific crisis in psychology; a crisis that was primarily a methodological crisis to him (see Vygotsky 1987b, p. 54). Building a new science meant for him that you had to *invent* such a new science (Vygotsky 1987b).

He may be regarded as one of the first thinkers in complexity, by taking the very complexity of the subject of his study of psychology very seriously. He made clear that describing the complexity of human development is not enough; you need to become *explanatory* about the dynamics of complexity involved. The notions of qualitative change and transformation were central in his theorizing. His way of thinking, in terms of recognizing the potential nonlinear complex reality, was clearly a way of *humanizing* the subject of study of psychology. It is for this very reason that we may celebrate the new thinking in complexity: both for our doing science and for our society in the near future.

Vygotsky's view about building a new science will be linked to the view of Thomas Kuhn on the role of crises in the innovation of sciences, or the so-called "scientific revolutions". (Kuhn 1970) It may be stated that Vygotsky was one of the first to recognize the role of crisis for a radical innovation of the science of concern: in this case that of psychology. In his writings he made clear that you cannot *find* a science; you have to *invent* it. The work of Kuhn convinced me both of the possibility and of the power of inventing a new science, to be based on a different worldview: about a world of being through becoming. Although the world itself may not change with a change in worldview, the scientist afterward may work in a different world, by seeing the world of their research-engagement differently (see Kuhn 1970, Ch. X).

Ultimately, it may be shown that an innovated trans-disciplinary form of science can be developed, with a concomitant worldview of scientists. An innovated form that is fully able to deal with a richer reality. That is, a reality that is a more elaborated version of reality as taken for granted. In short: a fluid, potentially nonlinear version of reality. It will be a form that enables the possibility to view the human being as a complex human being, to be understood as a radical social being, with the potential of becoming a nonlinear being.

In the end a new science with a new language may be developed for the future of the social sciences and humanities; a new science that is really promising for our society. A science that is liberating the human sciences from their conceptual blindness, i.e., from "the 'learned incapacities' and 'disciplinary pathologies' that restrict the horizons of modern academic discourse." (Wertsch 1998, p. 4, p. 11)

It may be hoped for that this book may contribute to a science in the twenty-first century that will be really different from that of the twentieth century. In its rebellion against simplicity and the inherent trivialization of the subject of study, the new science may become the building stone for a better society. Recognizing that the core of all the troubles we face today is "our very ignorance of knowing," (Maturana and Varela 1987; cf. Simon 1996) and a concomitant lack of understanding our

understanding (see von Foerster 1993), the new science may offer some promising answers to questions that have only *seemed* unknowable for so long. It is time to enter the space of the seemingly unknowable.

Die 'meist einfache' Sachen sind sehr compliciert – man kann sich darüber nicht genug erwundern!

(Nietzsche, in his work “Morgenröte”)³

³The ‘most simple’ cases are *very complex*, – one cannot be surprised enough about that!

Chapter 3

The Crisis in the Social Sciences

*There is a new set of metaphors
to describe ourselves, our minds, the universe,
and all of the things we know in it*

(Brockman 1995, p. 21)

Introduction

In this chapter the basic position of the book will be delineated. This is very much about the crisis of our social sciences and about a concomitant distorted worldview. Actually it is about the wrong foundation of our social sciences. History has shown how these sciences have evolved as a wrong kind of copy of the natural sciences, with a concomitant degeneration of the social sciences; a degeneration which has ultimately led to a contemporary crisis of our sciences and humanities and in society at large (cf. Sandywell 1996, p. xv). So, the topic of concern to be dealt with will be nothing less than *The Future of the Sciences and Humanities* (cf. Tindemans et al. 2002). The basic problem of the contemporary crisis seems to be that the system we are in as participating scientists is not able to reflect on itself (Sandywell 1996, p. xv). The functioning of us as scientists doing our science is comparable with the metaphor of the functioning of the eye which Giambattista Vico (1744/1984) used, in his book about *The New Science*: of the eye which is not able to see the eye itself (proposition 331). In direct relation to that inability, he described the need for the use of a mirror to see itself. This is also what we, as social scientists, need today for reflection on our doing science (Sandywell 1996, p. xv). As was the case for Vico, this reflection on the man-made construction of our world may be regarded as a turning point for our 'wo/man-made' view of the world. We may become aware that reality, as we perceive it, is not a given reality but an invented, 'man-made' reality (see e.g. Watzlawick 1984, p. 9; and Sandywell 1999, p. x). Just because it is a kind of *invented* reality, this reality cannot be the true reality (Watzlawick 1984, p. 9). This moment of reflection, of looking in the mirror, may make us aware that science itself, like reality, is not an independent

variable! Both kinds of invention may be considered to be a kind of choice made in our history of science: a choice which could have been a different choice, made by men (see e.g. Vico 1744/1968; Whitehead 1925/1967, p. 200).

The real challenge for our viewing and doing science will be to recognize the crisis we are in, and the need to start reflecting on the crisis. Only then, it may be possible to develop a theory of the very crisis we are in, and how this crisis has led to degeneration of the social sciences and of our system of education. This may be illustrated by the notion of ‘trivialization’: of the trivialization of our children in the field of learning and education (von Foerster 1993).

In general it seems that science itself has become a closed system: “objective science finds its measure only in itself” (Jardine et al. 2006, p. 133). For this reason the system, not being able to reflect on the crisis it is in, may lose its very foundation of humanity. This may imply a danger of turning the system’s worldview into a dehumanized view of the world. By losing contact with the complexity of reality the system, as a closed system, loses contact with the complexly human of the human subject, and its view of the real may turn into a perverse version of reality (cf. Nock 1931). There is a real danger that we may not be able to escape this situation. The French pedagogue and philosopher Edgar Morin has warned us of this possibility in his recent book for UNESCO about *Seven Complex Lessons in Education for the Future*, by putting it this way: “the crisis worsens as fast as the incapacity to reflect on the crisis increases” (Morin 2001, p. 35). A condition like this can turn the system of education into a *perverted* system (Morin 2001).

So the challenge is to reflect on the crisis for good reasons: to formulate a theory of the crisis we are in, and see how new thinking in complexity may be the foundation stone for the building of a new science. We think it is possible to develop an adequate theory of change which can be derived from the theory of the crisis. The challenge, then, is to formulate a theory of change, based on a new kind of thinking.

It is on the shoulders of the psychologist Lev Vygotsky that it will be possible to find the line of thinking and reflection needed for the scientific enterprise of a real innovation in doing science, to escape the more traditional way of doing science. We may become aware that, to have a kind of scientific revolution in our sciences, we really need a corresponding kind of rebellion against ‘the system’. Einstein, for instance, has been described as such, in terms of “creator and rebel” (Hoffman and Dukas 1984). This kind of rebellion is similar to what happened in our history of art (see e.g. Gohr 2000, about René Magritte).

The basic idea is that it may be possible to start new thinking in the social sciences: a new kind of thinking in complexity about a reality which is taken as fundamentally complex. It is this very complexity of reality which is real! We need to escape the very notion of reduction of that complexity. So, the kind of reductionism, which is so characteristic of the traditional, ‘normal science’ (Kuhn 1970), has to be rejected as a ‘black hole’ in its operation at its centre (Reid 2007, p. 11; cf. Archer 2003, p. 15). It is of importance to see what kind of regularities in our doing and viewing of the social sciences are responsible for the inherent closure of operation of these sciences in our society at large. By looking in the

mirror it may be possible to enforce a different kind of science for our times. It will be a science based on the notion of complexity, of thinking *in* complexity *about* the complexity of reality, with the aim to *harness* the very complexity of real-world complexity.

The new science will involve a new framework about the hidden complexity of reality. Consequently, the new science will be about “a framework that does not yet exist” (Kauffman 1995b). So, it may be concluded that a new kind of thinking in complexity is needed to develop such a framework (see also Archer 1995, p. 5). The new science will be able to describe and explain complexity as *self-potentiating*; not only as a possibility but as a *fact*, according to the American philosopher Nicholas Rescher (1998): “The fact is that complexity is self-potentiating” (p. 28). He continues (on the same page) that “the world’s complexity means that there is, now and always, more to reality than our science is able to dream of” (Rescher 1998, p. 28). Consequently, we believe that the new science in the twenty-first century may become really different, in many ways, and “not be like science-as-we-know-it” (Rip 2002). The *complexifying* of reality may not only turn science into a new kind of science but also foster the *humanizing* of the social sciences (see Morin 2002, p. 9). This will be part and parcel of our mission in this book. Ultimately it is the cultivating and *enchantment of humanity* that is the ultimate goal of this book. It will be a goal that is made possible by the celebration of complexity as a ‘real’ part of reality, i.e. the thinking in complexity about reality. To be more specific: of new thinking in complexity about a *different* kind of reality. The focus will be new thinking about the complexity of reality; that is, of the real world we live in. The possibility of enchantment of humanity and of humankind is therefore also based on the *re-enchantment of reality* (Bhaskar 2002). The new reality may, in the end, be a *greater reality* (Vico 1744/1968, par. 349). The new thinking in complexity is fundamentally about *enlarging* the spaces of the possible (Osberg 2009), with expanded spaces of *explosive* possibilities and potentialities (see Barab and Kirshner 2002). Reality, then, may be considered as an unexpected *outcome*, of complex processes of thinking, and *not* as a *given* reality (cf. Andreas Roepstorff 2007¹). The new reality goes beyond what Margaret Archer, for good reasons, described as “the provisional nature of known reality” (see Archer 2003, p. 36). In the end, we may think about realities as potentially plural: as essentially *fluid* instead of a single static reality. Even more importantly, we may think about realities as *delivered* realities: delivered by us as scientists, based on a common framework and a common view of the world we live in.

It is along this line of complexifying reality itself, through a more open attitude, and by thinking in complexity, that we may oppose the tendencies of repression of the intrinsically reflexive, temporal, and dialogical dimensions of human experience (Sandywell 1996, p. xv). Tendencies that are contributing to the degeneration and perversion of a deprived culture, as manifestations of the very crisis we are in. A crisis which is both a scientific crisis and a crisis of the society we live in.

¹In the journal *Nexus*, nr. 48, pp. 191–192.