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The challenge of the past for the future of the social sciences

The challenge
of the past

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Abstract

Purpose – To demonstrate that the past of the social sciences contains all the elements of sociocybernetics and that those elements combined with the logic of modern interdisciplinary simulation research will meet challenges modern society poses to those sciences.

Design/methodology/approach – A historical analysis, leading to an outline of advanced logic of social science research, shows the way to modern (computer) simulation research.

Findings – When the theoretical principles of sociocybernetics are put into practice by doing (empirically based) simulation research, it can handle in a scientifically valid way a number of research questions modern complex society poses, such as how processes of self-organization in individuals, groups and institutes can be described and understood; self-organization of autobiographic memory of individuals can be simulated in a computer; these individual memories are related to collective memories of generations; these different generations of social researchers can work together and balance in a creative synergy between the wisdom of the past and surprising hypotheses of the future.

Research limitations/implications – Social sciences researchers have to work with advanced logic of research such as is propagated in simulation research and by sociocybernetics.

Practical implications – Different generations of sociocyberneticians here to work together in (empirically based) simulation research to demonstrate the usefulness of sociocybernetical theory and logic.

Originality/value – Sociocybernetics is not an exotic field but a normal legitimate constituent of the social sciences.

Keywords Scientific management, Systems theory, Cybernetics, Feedback, Self assessment, Simulation

Paper type Research paper

1. A short history of the social sciences

1.1 From irrationality to rationality and back

In the history of science rationality has always been at the base of scientific attitude. In our past millennium the sciences were acknowledged as an enterprise that beat the feudal past of our society (Comte, 1842). Instead of systems of belief in which the destiny of an individual was in the unintelligible hands of God or rulers, scientific knowledge would make it possible for an individual to understand nature and society, and with this knowledge to determine in freedom their own future.

But to let rationality work, the rules of the game of science had to be established. To surpass feudal systems of belief one needs freedom of argumentation in which the rational language of science was followed and facts and logic were respected

Comments of anonymous reviewers are gratefully acknowledged.

(Wiener Kreis, 1929). This was the transparent rational base of the science of Schlick, Carnap and von Neurath and a starting point of a heroic effort to lay down a solid ground for rational scientific reasoning. However, a lifetime was too short for these pioneers to overcome the many obstacles. Carnap, for example, in developing scientific rationality struggled too much with inductive statistics. As a consequence a new generation of philosophers of science had to take over the torch of scientific rationality.

One of these philosophers of science was Popper (1959, 1967). Popper clearly approved the way the “Wiener Kreis” tried to give science a basis in logic and mathematics, but he thought that Carnap’s attempts to establish a logic of inductive probability had to be tailored. One should focus more on the rationality of deduction, than on the tricky logic of induction. Instead of trying to prove the correctness of a statement with induction (verification), one could better try to prove the incorrectness of a statement with the much simpler logic of deduction (falsification). Science has to be as simple as possible.

However, followers of Popper misunderstood his carefully balanced ideas of induction and deduction, verification and falsification. Too many simplifications found their way into the practice of social research. Instead of a sophisticated falsificationism, a naive and dogmatic use of ideas of falsification developed within the scientific community (Lakatos, 1970). In the social sciences (including economy) scarcely any other models than simple linear ones were used. The analysis of cause and effect relations was simplified to a one-way analysis of the linear dependency of the effect on the cause, expressed as a linear correlation (van Dijkum, 1997).

With such simplifications the logic of the sciences fell into regression. Kuhn (1962) identified this regression in suggesting that science is not a rational enterprise, but governed by different paradigms stemming from different world views. Feyerabend (1975) went one step further with his idea that no logic could be found in science, with the exception of the creativity of an individual. The analytical onset of the Vienna Circle to establish a rational logic of science was reversed into an irrational logic.

1.2 Blocking progress

With this degeneration important contributions to a rational logic of the social sciences were also blocked. In system theory (von Bertalanffy, 1942) it was argued that sometimes a phenomenon in the world can be viewed as a system. This system has its own identity by being more than the sum of its parts. Advocates of simple falsificationism advertised as critical rationalism (Albert, 1977) did not accept this “holistic” point of view because it could not be analytically grounded and could not be falsified[1].

Also the next step, from system theory to cybernetics made by Wiener (1948, 1954) was far beyond the dominating logic in the practice of the social sciences. The same could be said of the progress Aulin (1990) made by introducing the idea of feedback in the relation between cause and effect, coined in the concept of recursive causality, and operationalized in recursive differential equations (van Dijkum, 2001). Also system dynamics (Forrester, 1968; Meadows *et al.*, 1974; Hanneman, 1988; Richardson and Pugh, 1981) using recursive differential equations hardly found its way to social science research.

1.3 *The challenge of sociocybernetics*

This situation was one of the reasons why Geyer (1995) posed a challenge to the main stream of the social sciences. The social sciences do pretend that they have a function in our society. But our modern society is faced with a large number of complex social problems and the social sciences seem hardly prepared to handle these problems. Especially they do not have the knowledge and the attitude to tackle the dynamics of complex social problems. To analyze, explain and handle complex social problems such as – alienation, environment pollution, economic problems of underdeveloped countries, the (self)organization of groups, firms and societies – one needs advanced concepts from system theory and cybernetics. However, since Geyer and others (Buckley, 1967; Hornung, 1988, 1995; van Dijkum and van Mens-Verhulst, 2002) posed the challenge to the social sciences to do more advanced research, with the aid of systems theory and cybernetics, not much has happened and the challenge seems to be in vain.

1.4 *Back to the past*

Is the reason for that failure to be found in the mismatching of the social sciences with those advanced concepts? To answer this question one has to look at what the social sciences originally were striving for.

1.4.1 The past of sociology. Let us go back to the history of sociology. For example, at what was the sociological venture of Comte (1842) aimed at:

... sociology consists in the investigation of the laws of action and reaction of the different parts of the social system – apart, for the occasion, from the fundamental movement which is always gradually modifying them ... It studies the balance of mutual relations of elements within a social whole. There must always be a ... spontaneous harmony between the whole and the parts of the social system ... It is evident that not only must political institutions and social manners, on the one hand, and manners and ideas on the other, be always mutually connected; but further that this consolidated whole must always be connected, by its nature, with the corresponding state of the integral development of humanity ... (Cours de Philosophie Positiv, translated and condensed by Martineau H. as *The Positive Philosophy*, Vol. 2, New York: Appleton & Co).

Already Comte was writing about social systems. According to him the rational enterprise of science made it possible to support the integral development of humanity. Sociology was a kind of social physics, but the complexity of the human interaction with society was at a different level (from that of the natural sciences) and that was why sociology was aiming higher. Comte made it quite clear that one of the difficulties for sociology was to build up an adequate theoretical framework, because “observation of facts and experimentation were crucial for sociology”, but only when it was guided by carefully built theories. That was one of the reasons why Parsons (1951), viewing social situations as social systems, invented a systematic nomenclature to map the characteristics of those systems. Following the footsteps of Comte and Parsons, Zetterberg (1973) stated that the social scientist has to work together with researchers from disciplines such as demography, economics, science of history. Moreover, he stated that the dynamics of social systems, in particular the way causes influence effects, has to be expressed in differential equations[2].

1.4.2 The past of psychology. In the nineteenth century, and parallel to social dynamics, notions of mental dynamics also emerged in psychology. As early as

1824-1825 the German philosopher and mathematician Herbart introduced the concepts of mental statics and dynamics. He pointed out that ideas or *Vorstellungen* have three dimensions (variables): time, quality and intensity. Quality individualizes each idea and makes *a* different from *b*. Ideas may also vary in intensity or force (Kraft), which should be understood as a tendency to self-preservation. Each idea makes an effort to conserve itself as it enters into relation with others: the ideas are active, especially when there is opposition among them. Herbart thought of this tendency as the fundamental principle of mental dynamics, taking into account that every movement of the ideas is confined between two fixed points: their state of complete inhibition and their state of complete liberty (Boring, 1950, pp. 250-60).

With Herbart's psychology as background, in particular his concept of the *limen* or threshold that an idea seems to jump in passing from a state of complete inhibition to a state of real idea, the German psychophysicist Fechner published in 1860 his book *Elemente der Psychophysik (Elements of Psychophysics)*, in which Weber's principle plays a central role. By comparing objects and observing the distinction between them, we perceive not the difference between objects, but the ratio of this difference to the magnitude of the objects compared. This principle was later called by Fechner "a law", and has become known since then as Weber-Fechner's law. It was expressed in mathematical terms, in the formula $\delta S/S = C$, in which *S* is the stimulus, δ is the just noticeable difference (*limen*), and *C* is the constant (Misiak and Sexton, 1966). It was in this way that differential calculus finally entered psychology and psychophysics and that the logarithm's graphs showed the mathematical solution of those differential equations[3].

2. An unifying model for the social sciences

Both in sociology and psychology the onsets to the precursors of the advanced concepts of system theory and cybernetics can be found in the past. There is no reason why the social sciences should not use those concepts, unless that it pays for researchers to stay with outdated ideas of simple falsificationism. But in that case the social sciences are only belief systems (or ideologies) of an ill functioning elite.

To continue with real science, or to let survive the social sciences in our modern complex world, one better explores the way the original onsets to the advanced concepts of system theory and cybernetics can be applied. Let us start with the idea of feedback.

2.1 An elementary model of feedback

Insight into behavior gives the possibility to modify behavior. How that happens is explained by Wiener, who, not by coincidence is also worrying about the question of how the behavior of animal and man could be controlled in a rational way. He introduced the idea that there is a feedback between behavior, an intended goal of behavior, an observed effect, the insight gained from the comparison between the observed effect and the goal, and again the behavior itself. It is a logic which psychologists can perhaps more easily adapt than sociologists, because it refers to the logical kernel of their discipline, which is to describe and explain behavior. But a sociologist who is keen at the historical roots of his discipline, and not trapped in the ill developed specialization of the social sciences in a multitude of subdisciplines, will acknowledge the importance of the logic of feedback (Figure 1).

Let us then, as social scientists, as a consequence use a feedback model for the systematic interaction between behavior, effect, goal, and insight, a model that is not only useful for psychology and sociology but also for other disciplines of the social sciences that are interested in human beings, who interact with themselves, with other human beings, or with nature- and men made environment.

2.2 Elementary mathematics

In this elementary model behavior leads to an effect (in or outside a human being), comparing that with the goal of the behavior leads to insight, and insight in its turn gives rise to (a change of) behavior producing a different effect. More exactly, at a time t , effect = function (behavior); at time $t + \Delta t$, insight = anotherfunction (effect of behavior, goal of behavior); and at a time $t + 2\Delta t$, behavior = againanotherfunction (insight).

Insight and effect, as can be noticed, are intermediary variables. As a consequence they are to be substituted by behavior and goal. In this way one comes to a differential equation, in which the temporal change of behavior is related to a goal and the temporal change of insight; and the temporal change of insight is related to temporal change of behavior (in a first approximation supposing that the goal is not changed):

$$\frac{\Delta \text{Behavior}}{\Delta \text{Time}} = \text{function}(\text{Behavior}, \text{Goal})$$

Simple linear feedback models are easily constructed and in the history of science aimed at phenomena such as exponential growth of capital and populations. It is expressed in a linear difference (or differential) equation such as:

$$\frac{\Delta \text{population}}{\Delta \text{time}} = (\text{birthrate} - \text{deathrate}) * \text{population}.$$

In a more recent history of the social sciences more sophisticated models have been developed, for example, in economy (Jevons, 1988), or concerning problems war and peace (Richardson, 1988).

Modern software such as STELLA, POWERSIM, MADONNA and MATLAB make it easy for social scientists to develop system dynamics models, so that a variety of phenomena can be investigated. The theory, which has to be modeled, needs only to

Figure 1.
A model of behavior
feedback

articulate some variables, which can be, quantified in a meaningful way, and has to make explicit linear feedback loops.

Promising are non-linear feedback models, especially because most of social systems are driven by non-linear feedback. Verhulst (1838) introduced in the past century a well-known model that simply supposes that the growth of population is limited by the scarcity of means for support. To realize this he launched, next to the normal rate of growth of population (birthrate – deathrate), a multiplier inversely (linear) related to the magnitude of the population. The more the population grows, the more a brake is set to the growth. That is expressed in a recursive difference equation:

$$\frac{\Delta p}{\Delta t} = \text{constant} * p * (1 - p).$$

These equations are used in disciplines such as demography, biology, and economy to study fascinating time dependant patterns of development.

For authors like Prigogine and Nicolis (1977) and Haken (1982) recursive equations were the starting point for the investigation of patterns of chaos and order in nature and in living systems. They developed models in which, out of chaos, order evolved. These recursive models appear to be adequate metaphors to study processes of self-organization in the social sciences (van Dijkum, 1997).

3. Simulation as a modern instrument of research

3.1 *Simulation as a starting point*

For social scientists dynamic systems theory (with simulation models built by user-friendly software)[4] is an adequate starting point for research into the dynamics of social systems. Although a number of adequate starting points for research into feedbackmodels can be found in the social sciences, empirical research as a follow-up and validation of these models is rare. The reason for this could be that most of the empirical research of the social sciences is guided by the paradigm of (linear) uni-directional causality. As a consequence there is a gap between dynamic theories and static methods of empirical research and analyses of data. The use of advanced, sometimes called non-linear multivariate, statistics does not really help. Also this does not take into account the principle of recursive causality and the mathematics of recursive linear and non-linear differential equations.

However, some pioneering work is also done. Van der Zouwen (1997) describes some of that research in the field of education (Norlén, 1975), and two studies about emigration (Diamantides, 1994; Jacobsen and Bronson, 1995). Inspired by those studies van Dijkum *et al.* (2001) did a simulation study on the dynamics of educational expansion. A rather simple dynamic model could describe and explain a dataset covering surveys of achieved education in the Netherlands over a period of more than 70 years. More empirical studies can also be found in the field of aids prevention (Ahlemeyer, 1997), analysis of events of war and peace (Byron, 1997), and concerning the psychology of self-fulfilling prophecies (Henshel, 1997). A rather interesting sociological study into the logic of spatio-temporal systems has been done by Leydesdorff (2000). He tries to model the self-organization of technological change. He models the way new technologies appear, compete with each other, lock in, dominate for a period of time the marketplace, and after another period of time, by a process of self-organization, are surpassed by new technologies. The study shows how spatio-temporal feedback systems can be operationalized and studied in an empirical

way with the help of computer simulation of cellular automata. In the domain of psychology (van Mens-Verhulst *et al.*, 2003; van Dijkum *et al.*, 2002) demonstrated that a dynamic simulation model was very useful to understand the self-organizing behavior of patients with complaints of fatigue.

All this work showed that the challenge of sociocybernetics can be taken. Complex behavior of individuals, groups or societies can be scientifically examined by operationalizing the advanced principles of systems theory and cybernetics in computer simulation studies. Self-organizing processes are then fascinating objects of modern scientific study.

3.2 An example worked out in detail

In the research program *Life-course Dynamics* (Schroots, 2003a), the self-organization of behavior is studied over the course of life at different levels of theorizing on the basis of a longitudinal data set, generated by means of the lifeline interview method (LIM). Part of this program relates to the study of autobiographical memory, which is commonly examined by asking individuals to freely recall events from their own lives and plot the events according to age at encoding. For young adults the distribution of past events (PEs) follows a power function, similar to the classic forgetting or retention curve (Section 1.4.2). For middle-aged and older adults, however, the retention curve turns unexpectedly into an event distribution with a “bump”, i.e. a concentration of memories between 10 and 30 years of age. As will be described below, the mysterious problem of the autobiographical memory bump has been solved by means of computer simulation (Schroots and van Dijkum, 2004).

From a static perspective, autobiographical memory consists of two modules, a prospective and a retrospective memory module. Prospective memory includes all future events (FE) or expectations of the individual; retrospective memory, on the other hand, stores all PEs or memories. Autobiographical memory, however, is not a static but a dynamic system, subject to continuous changes. From a dynamical perspective, then, autobiographical memory consists of a flow of events which undergo a change of state over the course of time, from FE (expectation) to PE (memory).

A significant outcome of research with the LIM is the finding that the overall number of memories and expectations does not differ by age. Schroots and Assink (1998) expressed the relative capacity of autobiographical memory in the so-called “Principle of the Constant Life Perspective”, i.e. the sum of past and future autobiographical events is constant across the lifespan. This principle refers basically to the changing ratio of past (or future) events and the sum of PE and FE over the course of life during which young adults, in comparison with middle-aged and older adults, nourish relatively more expectations (FEs) than memories (PEs), and conversely, older adults nourish more memories than expectations, while the sum of their memories and expectations is constant over the lifespan. In a later study Schroots *et al.* (2004) suggested that the changing ratio with age follows a power curve in which there is a limit to growth or decline, i.e. the S-shaped, logistic growth or decline curve. Summarizing, a dynamic (proto)theory of autobiographical memory has been developed and the question is how to construct a simulation model on the basis of this theory.

The first step in constructing a dynamic model includes the identification of variables and their connections, as specified in the above prototheory of autobiographical memory. From these variables and their dynamic relations, a causal diagram can be

constructed which expresses graphically how causes are related to effects and vice versa. The result of this mapping is shown in Figure 2.

The Figure 2 describes that there is a negative relationship between FE and PEs, which for their part have positive relations with *E*(events) as the outcome variable of the dynamic flow of FE and PE, which in turn is maintained by the negative feedback loop of *E* and PE. Mathematically, the flow (*E*) from FE to PE, supposing that the sum of FE and PE is constant, and speeded up or slowed down by a parameter (Schroots *et al.*, 2004), can be expressed in a differential equation[5], as articulated, for instance, in population dynamics for processes of limited growth (Zill and Cullen, 1997).

$$\frac{dE}{dt} = \frac{\text{parameter} * E * (\text{Constant} - E)}{\text{Constant}}$$

Computer simulation (STELLA, 2000) of this simple model over a period of 100 years shows that the relative distributions of PE and FE events follow two crossing patterns of a limited growth and decline curve, respectively , and produce a small, bell-shaped distribution of *E* at the beginning of the life course, which explains in principle – as we will see the mysterious autobiographical memory bump (Figure 3).

Simulation of a more complex model the so-called *Janus* model, over a period of 100 years, shows for three sets of parameters:

- (1) a distinct unimodal distribution of events around the age of 20 years;
- (2) a weak bimodal distribution around age 25 and 35; and
- (3) a strong bimodal distribution around the ages of 30 and 60 years (Figure 4, solid line).

The three simulated event distributions (solid line) of the Janus model, called after the Roman god with two faces – one face looking into the future and one into the past – have been interpreted as follows:

- (1) The retention and encoding curves of young adults show complete overlap, there is only one peak in the curve;
- (2) As people reach middle age, the retention and encoding curves seem to dissociate, a small bump emerges slowly from the original bump;
- (3) When people grow older, the dissociation of retention and encoding comes to an end in the form of two peaks, one for encoding, i.e. the sought-after autobiographical memory bump, and one for retention of PE and FE.

Note: FE = Future Events; PE = Past Events; E = Events

Figure 2.
Causal diagram of a
dynamic model

Note: 1 = Future Events; 2 = Past Events; 3 = Events

Figure 3.
Basic model of the
distribution of events
(percents)

Finally, the crucial question arises as to the fit between the Janus model and the LIM data set. To answer this question an advanced simulation program was used (Macey *et al.*, 2000) that finds those parameter values in the Janus model that minimize the deviation between the model's output and the LIM data set (Figure 4).

In concluding this detailed example, we can state that the dynamic Janus model reproduces the emerging unimodal and bimodal patterns of events across the lifespan quite satisfactorily, i.e. the model's maxima are a close fit to the modus of the observed peaks and bumps in the LIM data set.

4. Collective memory and the conflict of generations in science

4.1 A socio-psychological view

Apart from the epistemological question how knowledge can be built up in science according to rational principles – a subject which is dealt with in the sociology of knowledge (Swidler and Arditi, 1994, but see also our earlier discussion from a systems-theoretical perspective) – the interesting problem can be posed how individual researchers develop their scientific knowledge. The basic question is what kind of information and knowledge researchers remember, forget and use in practice, in particular, what kind of theoretical framework guides their research? Starting from the concept of autobiographical memory, two closely related concepts should be introduced, i.e. “collective memory” and “generations”.

The term “collective memory” has been advanced by Halbwachs in 1950 to describe memories of a shared past that are retained by members of a group, large or small, that experienced it (Schuman and Scott, 1989). The concept is both suggestive and difficult to specify clearly, but Pennebaker *et al.* (1997, p. 4) re-introduced and circumscribed the concept as follows:

Notes: Fit between Janus model (solid line) and LIM (Life-line Interview Method) event distributions (percents) (dotted line) per 5 year interval for three age groups. Fixed values for parameters a (decline of encoding) and q (retention future events); varying values for parameters r (growth of encoding) and p (retention past events) per age group. Top panel: Young age group ($n = 34$; mean age = 23.5 yrs; age range = 18 – 30 yrs). Middle panel: Middle age group ($n = 35$; mean age = 43.3 yrs; age range = 31 – 55 yrs). Bottom panel: Old age group ($n = 29$; mean age = 67.3 yrs; age range = 56 – 84 yrs). The graphic symbol for the mean age of each age group, as marked in the LIM event distribution, refers also to the mean transition from past to future events

Figure 4.

The creation and maintenance of a collective or historical memory is a dynamic social and psychological process. It involves the ongoing talking and thinking about the event by the affected members of the society or culture. This interaction process is critical to the organization and assimilation of the event in the form of a collective narrative.

In explanation of collective memories Pennebaker and colleagues refer to the work of Mannheim (1968), who already in 1928 observed that each generation receives a distinctive imprint from the social and political events of its youth.

Research dealing with autobiographical memories suggests that certain events have more impact for people at certain ages than others. In fact, personal events that occur between ages 10 and 30 – the so-called (autobiographical memory) bump period – are some of the most long lasting and significant events of a person's life (Rubin, 1986). In 2005 the world-view of a 60-year old scientist or scholar was formed in the historical period between 1955 and 1975. It is the task of cultural historians and sociologists to characterize that period, but one may safely say that the majority of today's 60-year old social scientists not only experienced or witnessed the student revolution at the end of the sixties while studying, but also saturated their minds with the research methodology and paradigms of the sixties. In the words of Schroots (2003b, p. 447):

In the bump period of their life people start dating, have their first relationships, are educated, look for their first job, feel physically strongest, become politically aware, go the best movies of their life, read the most memorable books, listen to their most loved music, and experience their most intensive learning. In brief, the *bump period* is the *cognitive-affective frame of reference* from which middle-aged and older people view life in general, and relations, work, health and education in particular.

The concept of generation often denotes successive groups in time. Generations occur within lineages or descent lines – but not necessarily so. The individual and his/her parents and children comprise three distinct (biological) generations. Similarly, the scientist and his/her mentor and students could be conceived as three generations in science. Both from a biological and historical perspective the temporal distance between two generations will generally represent a time frame between 20 and 30 years (Pennebaker and Banasik, 1997). With the formula for the bump period in mind, it is conceivable that science generations are also 20-30 years apart. In other words, at one point in time one could distinguish approximately two generations of scientists who are active in their field, either as a student or junior scientist at the start of his/her career, or as a professor or senior scientist. For the sake of simplicity they are called the young and old generation. The question arises what this cultural and biological distinction between young and old generations in the social sciences means for the production of scientific knowledge.

In principle there are two perspectives, a junior and a senior perspective, rooted in the lifespan patterns of mental abilities with both age-positive and age-negative (or ageist) components (Nelson, 2002). To start with the lifespan patterns, general intelligence can be divided into two types of mental abilities, i.e. "fluid" or spatial-analytical abilities, which refer to basic processes of abstract reasoning and information processing, and "crystallized" abilities, which refer to cultural knowledge and experience. The pattern of mental abilities is that of differential decline over the lifespan with a peak for fluid abilities (abstract reasoning) in the bump period between the tenth and thirtieth year, while the crystallized abilities of cultural knowledge and learning experiences continue

to increase over time. From the perspective of mental abilities there is no generational equity, i.e. young scientists are inquisitive, flexible, creative and at the peak of their fluid abilities, while older scientists hold on to their formal position and the accumulated knowledge from the bump period of their lives. On the other hand, older scientists have much to offer in terms of experience, knowledge, mentorship and even wisdom for the benefit of the student's education and career. The potential conflict between the young and older generations of social scientists lies, therefore, in the impotence of both parties to recognize the mutual possibilities for amassing scientific knowledge, i.e. continuity and tradition from the side of older scientists and discontinuity and paradigm changes from the side of younger generations. A possible solution of this conflict needs by definition a dynamic approach, as science generations are not static, but dynamic entities which change over time, not only according to calendar age, but also to their residual lifespan (Principle of the Constant Life Perspective).

We suggest that the social sciences solve the conflict of generations, intrinsic to the psychological and social processes of scientific knowledge accumulation, by creating a permanent space – both in terms of finances and media – for experiments in research methodology, content and design under the circulating leadership of both young and older scientists.

4.2 Science as a modern powerplay

We live in a society with social networks that because of globalization and other strong social forces (modernization, for example) become more and more entangled. Social problems that are inevitable arise, – for example, between minority groups; or because of social inequality between different classes; or as a result of conflicts in interest between different countries and cultures; or because of egoistic mismanagement of nature by the established elite – are complicated and hard to understand by the social sciences. It is just because of that situation that sociocyberneticians, and not only them, make a plea for a more adequate logic of science in which the concept of complexity plays an important role. In defining that concept the principle of recursive causality and the related cybernetic frame work of feedback logic is crucial. Complexity in a mathematical view has to do with non-linear differential equations, and those equations become evident when one wants to model, describe and understand non-linear feedback in social systems that always show up in the real world (van Dijkum, 1997). It is an insight that freshmen in the social sciences can easily understand and handle, using the mentioned modern software. So far young scientist, inspired by the will of the grand old men of sciences to understand social problems, can fluidly enter the domain of sociocybernetics and realize some of the ambitions of those distinguished scientist.

However, there is an obstacle between the wisdom of the past of the social sciences and the use of this knowledge in the modern social sciences, that is the powerful elites that dominate the established social sciences. It is described by sociologists, it seems unavoidable in our society: there are always groups that try to dominate, going so far that they come into conflict with (goal) rationality and even their own human interest (Habermas, 1968, 1973). Despite this insight also in the social sciences elites, imprisoned in the narrow logical framework of simple falsificationism, play their bureaucratic games: with peer reviewed journals, by excluding unfamiliar paradigms from financial support, and alas above all by disciplining (and boring) freshmen into their own narrow minded ideological train of thoughts.

5. The sociocybernetic project: recovering the past and heading for the future

Thus are the social sciences that sociocyberneticians have to live with. But be optimistic: as is learned by experimenting with non-linear models of social learning processes (Scott, 2002; Campbell *et al.*, 2003) the domination is not 100 percent, there are always niches left. Those can be used to make the (scientific) play between knowledge acquiring generations a more fair play, and to overcome the alienation young enthusiastic researchers experience when they enter the practice of social science research. It is, as is learned by the “science of complexity”, a process of self-organization and self-regulation. A process society has to learn to handle (and survive) its severe social problems, also in the domain of education and science.

An essential obstacle is the powerplay of established elites. Realizing that it is a play in which all kinds of tricks are used, sociocyberneticians can be more clever than their opponents and deconstruct old inadequate rules, reconstruct old adequate rules, and construct new constructive rules for the scientific game.

Deconstruction of established rules and knowledge is a practice that regularly shows up in the history of the social sciences. One can refer to the opposition against quantitative oriented sociology by members of the Chicago School (Blumer, Glaser and Strauss), the opposition of action researchers against research without societal relevance (Lewin, Clark, Holzkamp, Berger), the deconstruction activity of marxist oriented French social scientists (Foucault, DeLeuze, Derrida, Lacan, Irigaray), and so on. Most remarkable in those deconstruction practices were the number of students that were inspired and activated. But also remarkable is that, after all, little is left of that spirit, according to critics, because the opponents became themselves an established elite. Anyway, those successes in deconstruction show that it is possible to destabilize the dominant paradigm. It opens also the possibility to be a constructivist in the game of science in which destabilizing and stabilizing scientific objects (theories, models, measurement instruments, empirical facts) seems to be the real issue (de Zeeuw, 1998).

The ISA research committee RC51 certainly has members and ideas that were influenced by those oppositions, but it is historically more correct to locate the start of sociocybernetical deconstruction activity by the way Luhmann used systems theory (and later on the theory of autopoiesis) to criticize and confuse established sociology (including the marxist opposition)[6]. After some confusion in the sociocybernetic society this deconstruction activity turned out well, and was the starting point for some inspiring (re)construction activity (Ahlemeyer, 1997; Hornung, 1995; in this issue: Buchinger). In this way innovative knowledge generating activities were started, and established in articles, books and newsletters.

With this activity of publishing, another obstacle in the powerplay of established social science can be tackled, that is the vicious circle of domination of conventional journals. At first deviant journals such as the *Journal of Sociocybernetics* will not get much recognition. According to the (social) science citation index (an instrument of control of the dominant elite) the reward (or better said, the punishment for wasting time) is very low. However, as is demonstrated by two innovative journals, i.e. the *Journal of Artificial Societies and Social Simulation* (JASSS) and *Non linear Dynamics, Psychology, and Life Sciences* (NDPLS), the efforts are not in vain. After a period of time one can enter “the hall of fame of the social science citation index” (JASSS), and even score a higher impact factor than most of the already established journals (NDPLS).

The challenge
of the past

Authors who want to participate in this power citation play are wise to publish in established journals, as well as in innovative journals. But what is sure, only inspiration and the enthusiastic support of sociocybernetic fellow travelers can motivate social researchers to do so.

Another strong device for deconstruction and (re)construction is to use the imagination of Art and Literature, as is demonstrated by several members of RC51 (Misheva, 2002; Wood, 2002). The scientific status of social sciences can be discussed. Do we deal with already well developed disciplines, or with domains that still have to ripe (Böhm *et al.*, 1978)? In this situation artistic imagination can be of a stronger scientific value than bureaucratic knowledge.

Anyway, the powerplay of established social sciences can be (re)constructed with sociological, psychological and artistic imagination in an interplay between generations that are inspired by the delights of sociocybernetic ideas. However, one lesson is still to learned, that is to be able to demarcate between science and common knowledge and above all, between science and ideological reasoning. Essential for this is falsification and verification of scientific knowledge. To prevent the traps and regression of simple falsificationism, modern social scientists have to train themselves in logic, systems theory, and cybernetics. Interdisciplinary cooperation is thereby a must and the universal language of mathematics has to be mastered. One has learned arithmetic in primary school and in secondary school to be capable in algebra and geometry. In modern secondary schools the differential calculus is in the program of education. In the near future the language of non-linear differential equations has to be understood by each scientist to be able to describe and explain nature, human beings and society. Only in this way can scientific imagination support our complex society to solve severe social problems. With simulations – i.e. making transparent all the bold thoughts, descriptions and explanations of evolving complex social systems – one can keep the right track (with falsifying and verifying) of scientific intuition guided by useful and tested knowledge.

Notes

1. They did not accept that, for example, the meta-theory of Gödel a.o. became a solid element of advanced logic and mathematics (Kleene, 1971).
2. Earlier, Comte introduced in his monumental work on the development of all sciences (in ten volumes) in the framework of positive philosophy, the delights of the differential calculus.
3. In this context also the experimental work of the German psychologist Ebbinghaus should be mentioned, who published in 1885 his epoch-making book on the higher mental processes of memory (Ueber das Gedächtnis). Based among others on the new experimental methodology, Ebbinghaus adapted Fechner's psychophysical methods to the problem of the measurement of human memory and was the first to publish the experimental results of measuring forgetting as a function of time, represented in the famous "forgetting curve" (Boring, 1950).
4. There are of course more methods of simulation that are relevant for the social sciences, for example, such as are incorporated in expert systems.
5. It should be noted that the differential equation is similar to the equation as developed by Herbart (footnote in Section 1.4.2).
6. Also this powerplay seems to be effective, considering the number of students that tried to read all the books and articles Luhmann published. But also here the problem showed up that the opposition gradually established their own powerplay and started to exclude oppononents by declaring that they did not read Luhmann well.

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