Evolutionary Theory and the Theory of World Society
Evolutionstheorie und die Theorie der Weltgesellschaft

Abstract: The paper looks at evolutionary theory in sociology and tries to explore its potential in conceiving a theory of world society. The migration history of mankind and the concept of the psychic unity of mankind are used as ways of looking at historical premises of world society. In theoretical terms the papers criticizes (based on arguments from E. Mayr) the sociological disjunction of evolutionary and differentiation theory. Evolution and differentiation can be seen as being part of one tradition but resulting from two different evolutionary mechanisms – selection and isolation. This distinction is an analogue to the biological difference of adaptation and speciation. Speciation can be reinterpreted as system formation in a more general perspective. This reformulation of the difference of evolution and differentiation has some advantages: it allows a better understanding of the micro/macro-distinction; it gives a more precise meaning to the sociological concept of function. The paper then focuses on the distinction of biological and sociocultural evolution and derives from this four questions for a general theory of sociocultural evolution: How does isolation as a mechanism work in social systems? Which is the system level on which evolution occurs? What does *evolution* mean if there is only one global system of society? How is the evolution of world society coupled to the evolution and distribution of other species on earth and are there globalization processes in the social systems of other species? The essay looks at the evolution of ants in which *supercolonies* arise based on mechanisms which one finds in the globalization of human social systems in a similar way.

Zusammenfassung: Der Text fragt nach dem Potential soziologischer Evolutionstheorien für die Arbeit an einer Theorie der Weltgesellschaft. Die Migrationsgeschichte des Menschen und das Konzept der *psychischen Einheit der Menschheit* erlauben uns, historische Prämissen der Herausbildung von Weltgesellschaft zu untersuchen. In theoretischer Hinsicht kritisiert der Text (in Anlehnung an Argumente von E. Mayr) die soziologische Disjunktion von Evolutions- und Differenzierungstheorie. Evolution und Differenzierung können demgegenüber als Teil einer (evolutionären) Tradition gesehen werden, die auf zwei verschiedene evolutionäre Mechanismen abstellt: Selektion vs. Isolation. Diese Unterscheidung ist ein Analogon der biologischen Differenz von Adaptation und Speziation. In einer verallgemeinernden Perspektive kann Speziation als Fall von Systembildung gedeutet werden. Diese Reformulierung der Differenz von Evolution und Differenzierung bietet Vorteile: sie erlaubt es, die Mikro/Makro-Unterscheidung besser zu verstehen; sie verleiht dem soziologischen Begriff der Funktion eine präzisere Bedeutung. Der Aufsatz konzentriert sich im weiteren auf die Unterscheidung von biologischer und soziokultureller Evolution und auf die Beantwortung von vier Fragen einer allgemeinen Theorie soziokultureller Evolution: Wie operiert Isolation als Mechanismus in sozialen Systemen? Auf welcher Systemebene vollzieht sich Evolution? Was bedeutet Evolution, wenn es nur noch ein einziges Gesellschaftssystem gibt? Wie ist die Evolution der Gesellschaft an die Evolution und globale Distribution von Pflanzen und Tieren gekoppelt und gibt es Globalisierungsprozesse in den Sozialsystemen anderer Spezies? Der Text diskutiert die Evolution von Ameisen, in der sich in jüngster Zeit *Superkolonien* herausbilden, die auf Mechanismen ruhen, die man ähnlich in der Evolution der Sozialsysteme des Menschen findet.

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Evolutionary Theory and the Theory of World Society

1. The Problem: „World Society“ and „Evolution“ in Niklas Luhmann’s „Die Gesellschaft der Gesellschaft“

If one is somehow familiar with Niklas Luhmann’s writings and teachings one should expect *Die Gesellschaft der Gesellschaft* to be a book about *World Society*. From the 1960s onwards Luhmann consistently presupposed and taught that present-day society is world society. But the attendant hypothesis is not born out in reading *Die Gesellschaft der Gesellschaft*. The book proves to be a more general book about *society*, the boundaries of this system not being entirely clear, although it is said several times that the boundaries of society are identical with the boundaries of communication. But then there is a separate subchapter on *World Society* and later on a subchapter on *Globalization and Regionalization* which suggests that these two are specific subjects in a more general book about *society.* From this observation one might deduce a need for correction, for a more consistent execution of the program Luhmann announced in the 1960s. This probably should be done; but it is not my primary aim here.

There is then, secondly, the subject of evolution which has a much more prominent place in the structure of *Die Gesellschaft der Gesellschaft*. *Evolution* is besides *Differentiation*, *Communication* and *Self-Observation* one of the four core components of the theoretical endeavour and it held this position ever since Luhmann announced the plan of this book more than twenty years before he finished the version of the book finally published. But again one might raise some doubts, once more related to concerns which Luhmann liked to call the *architectonics of theory*. There is not much use of evolutionary concepts for problems of historical explanation in Niklas Luhmann. The task of understanding historical change in social structures is mainly relegated to *differentiation theory* in Luhmann’s writings. And from this explanatory uselessness of evolutionary theory results a very restrictive – nonetheless very interesting – version of evolutionary theory. It is a theory mainly focussed on the three evolutionary mechanisms Luhmann took over from the earlier lifelong theorizing venture of Donald T. Campbell (Campbell 1988).

Evolutionary theory then is the theory which analyzes the interplay of these mechanisms variation, selection, stabilization, and from this derives a preference for a methodological understanding of evolutionary theory. Luhmann often uses evolutionary theory for demonstrating how social systems manage to build social structures by making use of accidental events.[1] This is an important insight but it is only a partial version of evolutionary thinking.

[1] „Verwendung von Zufällen für den Aufbau von Strukturen“ (Luhmann 1988, 17).

2. The Aim: Evolutionary Theory of World Society

The present paper proposes to improve on the two points just mentioned. It pleads for an evolutionary theory of world society which rests on some rearrangements in Luhmann's theory of society. The main shift regards the symmetrical position of the three theories constituting the intellectual core of the theory of society: Evolution, differentiation, communication. This symmetry will be dissolved.

Regarding evolution it will be the conceptual core of an evolutionary theory of world society; world society being considered as a social system which is a historical singularity, arising only once in the history of human social systems. This singular social system has to be embedded into its prehistory, the long-time trajectory of these social systems coupled to the history of one species ('Homo Sapiens') in the evolution of life on earth.

Differentiation theory then has to be understood as a theoretical technique for describing and explaining social structures in the evolution of world society. This means differentiation theory will somehow be integrated into evolutionary theory, as a part of it.

Thirdly, there is communication theory. Communication should, first of all, be treated as an evolutionary invention which only happens in one or in a few species. Then, this invention has to be studied in its consequences, and in looking at the sequence of communication media arising in the history of human societies.

3. What means "Evolutionary"?

There are at least two meaningful understandings of the term evolutionary and for the argument of this paper it is important that I intend to make use of both of them. In one respect *evolutionary* means any kind of extended argument which is based on an analogy to the conceptual apparatus of neodarwinistic theory which arose in biology and is used in many other sciences. The second, more extensive understanding of *evolutionary* does not only include conceptual borrowings (analogues, metaphors) from neodarwinistic theory but points to any academic endeavour which embeds the history of human societies into the longtime history of life on earth. In systems theory *structural coupling* is a term which points – often in a very vague understanding – to any intellectual undertaking of this type. And indeed one must look at structural couplings of biological systems to psychic systems and at structural couplings of psychic systems to social systems to analyze the long-time dynamics of social systems. On the more formal level of neodarwinistic theorizing one has to take into account biological evolution and sociocultural evolution. That is there are three levels for structural couplings but only two levels with evolutionary processes of their own. The reason is that there is no autonomous level of the evolution of psychic systems as this would presuppose a replicator in psychic systems who is able to produce copies of itself in other psychic systems and this simply is not possible as there exists no copying from one psychic system to another psychic system.

How did Luhmann opt in the two respects I just sketched in their elementary contours? He clearly chose, as I already said, one Darwinian analogy focussed on the three evolutionary mechanisms variation, selection, stabilization, although numerous aspects of Darwinism were not included in this version. But he did not do much work on *embedding* social systems in an evolutionary environment consisting from psychic and biological systems. *Structural coupling* even in Luhmann remains too much a vague metaphor.

4. The Starting Point: "Out of Africa"

The starting point of the story we will have to tell in an extensive version of the argument was around 150.000 years (at most 200.000 years) ago. Between 150.000 to 100.000 years before the present, archaeologists register the nascency of Homo Sapiens in a small region of East Africa (Mellars 2006; Forster and Matsumura 2005). For a long time this population was restricted to a small space in East Africa. Between 65.000 and 53.000 years ago small groups migrate (via the Bab-el-Mandeb-Strait or alternatively the Sinai) from East Africa to South Asia and afterwards Australasia. 45.000 years ago a divergence to the North leads to the colonization of the Near East and finally Europe. And finally between 40.000 and 12.000 years before our time the settlement of North and South America via the Bering Straits happened. The whole present population of the world is derived from these small founder populations and their migrations and from the successor populations regionally emerging from these founder populations.

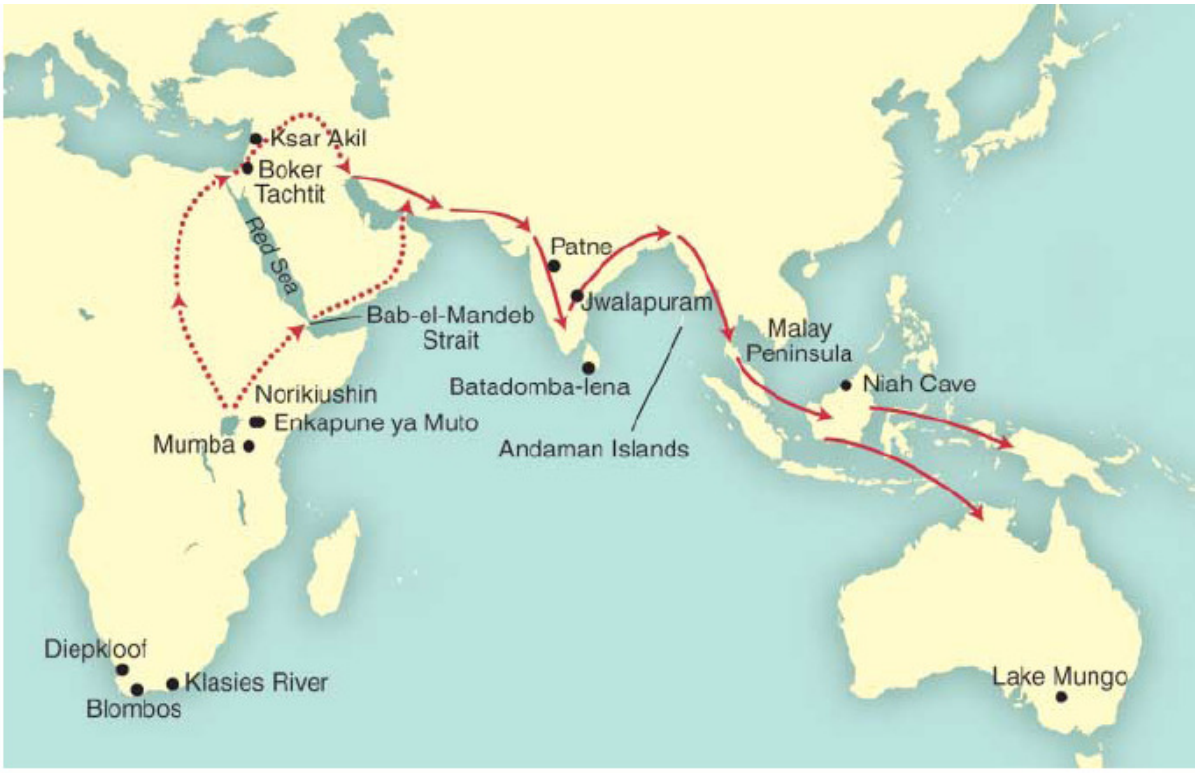

Fig. 1. Map of possible dispersal routes of anatomically and genetically modern human populations from Africa to Asia and Australia according to Forster and Matsumura (*12*). The models assume an origin in eastern Africa, and dispersal either via the Nile Valley and Sinai Peninsula (the "northern" route) or via the mouth of the Red Sea to Arabia and Australia (the "southern" route).

(Source, Science, Vol. 313, 11.08.06, p. 797)

5. The Conclusion: "Psychic Unity of Mankind": Cultural Diversification instead of "Speciation"

From the migration history of mankind one can derive the hypothesis of a relatively small genetic diversity of the human species and this is one of the reasons why many psychologists

and biologists and some sociologists (Talcott Parsons among them) make use of the concept of the *psychic unity of mankind*. This concept deduces from the reduction of genetic diversity a tendency towards a reduction of the behavioral diversity of mankind (cf. Stichweh 2008). If this diagnosis is relevant for the later realization of world society is an open question. But there can be no doubt that the negative stereotyping of strangers and any historical form of racism are variants of negating the *fact* of the psychic unity of mankind. If the history of the last few hundred years can be seen as the *universalization of otherhood* (Nelson 1969) and as a longterm semantic decline of the institutions of slavery and other institutionalized forms of negating the (psychic) unity of mankind, one may conclude from this that there is a correlation of the hypothesis of psychic unity and the progressive realization of world society.

One can reformulate the same diagnosis in other terms. From the migration of founder populations and the geographical spread of mankind over the whole earth never did arise new speciation events as one might have supposed from a biological, naturalistic point of view. Instead only an enormous *cultural diversification* of different regions of the world arose and this is the precondition for the later emergence of world society as based on the possibility of integrating the cultural diversity of the world into one human communication system.

6. The Two Biologies as Philosophies of History: Differentiation and Evolution

How can one conceive the longterm development of human societies in sociological terms? There are two variants: Sociological differentiation theory and secondly sociological and anthropological theories of sociocultural evolution. Both of these variants take a prominent place in Luhmann's theory of society; both of them are based in a biological paradigm.

In the case of sociological differentiation theory the biological background consists of nineteenth century embryology (cf. Gould 1977). That is differentiation theory is derived from theories for which the present biological term is *development*. German researchers such as J.F. Meckel and K.E. v. Baer demonstrated in the early 19th century from embryological studies that development proceeds from the general to the special. In a biological organism there are first very general structures which are loosely coupled among one another. Development diversifies these structures which means each of these structures specializes on functions of its own. Parallel to the diversification of structures the interrelations and exchanges between these structures become ever more relevant. Herbert Spencer who was an eager reader of Karl Ernst von Baer transferred this theorem to the nascent discipline of sociology. The paradigm which this tradition established may be called a *decomposition paradigm*. Very general structures are diversified by decomposing them into ever more specialized structures and then the integration processes for heterogeneous and specialized structures become important and become a focus of the emerging sociological discipline in Spencer, Durkheim and many others.

The second variant – evolutionary theory - gets its paradigmatic focus not from looking at embryos and their developmental history but from studying historical sequences of forms and variants of plants and animals in a longterm trajectory of changing forms. Among the variants arising in such sequences most variants do not reproduce and multiply. But some of them succeed in producing ever more numerous copies of themselves and this selectivity of reproductive success is the conceptual core of all darwinistic, evolutionary theories of change. Therefore a selection paradigm substitutes for the decomposition paradigm characteristic of differentiation theories. One main difference between these two types of theories may be that there is more conceptual space for novelty and discontinuity in evolutionary theories.

7. The Neodarwinistic Synthesis (ca. 1940) (Ernst Mayr)

For many decades after 1859 Darwinism was weakened by a number of deficits. The most consequential among them probably was the lack of compatibility between Darwinism and genetics. Geneticists in the Mendelian tradition around 1900 believed in major mutation events and derived from this an evolutionary saltationism (big jumps) which was clearly incompatible with natural selection and therefore with the conceptual core of Darwinism. On the other hand the naturalists who were occupied with the observational study of plants and animals clearly registered a gradual accumulation of minor changes for which they knew no genetical basis. Most of them in the early 20th centure therefore opted for Lamarckism that is the inheritability of acquired characteristics for which no biological basis was known. These two problems were solved by a number of eminent researchers and books in the early fourties which among them brought about that event which today is called the *neodarwinistic synthesis* and which still defines the form in which we use Darwinism today.

For our interests the most important of these researchers and books is Ernst Mayr and his 1942 book "Systematics and the Origin of Species from the Viewpoint of a Zoologist" (Mayr 1942). What is innovative in this book is that Mayr distinguishes two evolutionary core processes which are to be seen as independent from one another (see esp. Mayr 1999). The first of these two processes is *adaptation* which means the continuous refashioning and remodelling of organisms guided by the adaptive "demands" of those environments relevant for these organisms. The second core process is *speciation* (that is the irreversible separation of one new species of animals or plants from the species with which it originally formed a unity) something for which Darwinism did not have a convincing explanation up to this point. In Mayr speciation is no longer a discontinuity arriving on the basis of ongoing processes of adaptive remodelling of organisms; it is something different – and it is based on mechanisms of its own. Whereas adaptations always have to be related to selection processes as their mechanism and to selectively relevant environments, speciation is based on a completely different mechanism which may be called *isolation*. The *geographical/spatial separation* of groups is probably the most important cause of isolation.

These arguments are coupled to a new species concept in biology and therefore to new ideas on the origin of new species. A species is no longer a biological type, identified on the basis of properties constitutive of this type (cf. in this volume Wortmann 2007). On the basis of geographical separation and other forms of isolation a divergence between two communities arises which finally brings about a new species as a *reproductive community* closed in on itself.

8. What Does this Mean in Terms of Sociology?

What we observe in the arguments just presented taken from the neodarwinistic synthesis in biology is a reformulation of the sociological distinction of evolution and differentiation in terms internal to the theory of evolution. There is on the one hand adaptation as the core process of (micro-)evolution. And there is on the other hand isolation as the mechanism of the genesis of new species which qualify as new species as soon as they are closed as reproductive communities. This analysis of speciation formulates an obvious parallel to system formation (i.e. the genesis of new systems via a new system/environment-distinction)

as the paradigmatic concept of sociological differentiation theory.[2] From this comparison of two theoretical trajectories (evolutionary theory vs. sociological theory) one may derive the proposal that the separation of evolution and differentiation as two theoretical strands which is characteristic of the sociological tradition and even dominates in Niklas Luhmann's theory of society is unfortunate and should not be continued.[3]

9. The Immediate Intellectual Benefit: Micro-/Macroproblems

If one distinguishes selection and isolation as two evolutionary mechanisms always running parallel towards and independent from one another this allows to get an interesting perspective on the distinction of micro- and macro-processes in systems. They are not reducible towards one another, and *macro* does not mean a kind of summation or aggregation of many micro events. Instead *micro* and *macro* are somehow independent levels of systemic reality which are interconnected and autonomous at the same time. Speciation events take place in an environment of continuous and ongoing adaptive processes. On the other hand one will never be able to say that speciation events *result* from adaptive processes as they are based in macro-mechanisms specific to the macro level on which speciation occurs. It seems to be a useful analytic strategy to transfer this kind of relation of interconnectedness and autonomy of micro- and macro-levels to the analysis of social systems.[4]

10. A Second Intellectual Benefit: Selection, Adaptation and Functionality

A second advantage deriving from a more clear-cut distinction of micro- and macro-levels in biological and sociocultural evolution is a better understanding of what the concept of *function* means. There is first of all the mechanism of (natural, social, cultural) selection which in a concrete system produces adaptations in historical time. One can then say that organisms or institutions are somehow adapted to their respective biological or sociocultural environments – and this *adaptedness* of biological or social systems and the continuously occurring readaptations of these systems to changing environments are what the (biological, sociological) concept of *function* is about. *Function* then refers to the history of something (an item, a system) in its environment, it refers to the somehow stable reproduction of this *something* and its effects in temporarily stable environments and to the evolutionary history of its remodelling in changing environments (cf. Millikan 1989, 288-89).

Besides selection there is the mechanism of isolation which generates self-reproducing communities. These communities have to be understood in their historical contingencies. But there seem to be no possibilities to understand them in their origin as adaptations to their environments. They have to be adapted at any point in time. But differences in adaptation do not explain speciation events. That is the language of functions does not seem to make any

[2] As much as I see Niklas Luhmann is the first author who really made this argument of differentiation theory as *theory of system formation,* Luhmann 1977.

[3] In Luhmann there is a formal integration of evolutionary theory and differentiation theory as differentiation is identified as one of the three mechanisms (stabilization) in evolution. But in his empirical and conceptual work with differentiation theory this integration does not play a significant role.

[4] Ernst Mayr calls this *holism*: "… the explanation of macroevolution starts the process at the low level of microevolution and then tests whether the separate processes are compatible with macroevolution and able to account for the processes and phenomena of macroevolution. There is no reductionist step involved. This is why holists … never have any difficulty in adopting the unity of micro- and macroevolution" (Mayr 1999, XVI-XVII).

sense in looking at this macroevolutionary level of speciation or system formation if one formulates it in the language of the social sciences.

11. Which is the Place of "Communication" in this Conceptual Structure

Among the concepts explained in this text there was not yet a prominent place for the concept of communication. But this concept is of decisive relevance for the demarcation of the domain of the social sciences. First of all communication can be looked at as an improbable invention in the evolutionary history of the social systems of the human species. This does not necessarily mean that one postulates that communication is restricted to the social systems of the human species. But the social systems of the human species probably are the case in which sociality is completely transformed on the basis of communications as elementary acts. To get a more precise knowledge of this status of *communication* one needs comparative studies of the abilities of observation and communication to be registered in the social systems of other species (primates, crows, even fish; cf. for interesting examples Emery and Clayton 2004; Bshary and Grutter 2006). In many species we have mutual observations of behaviour and information transferred via observations in (communication) networks. But only rarely we will find the intentionality of the communication of meaning characteristic of human communication networks (Luhmann 1984, Ch. 4). This intentionality includes the improbable achievement of intentional deception, that is the communication of information one knows to be wrong (cf. Cheney and Seyfarth 1990, Ch. 7).

From the point of view of globalization theory one further important question is if already the invention of communication as a very effective mechanism of communication established a significant probability of globalization processes and finally of a world system characterized by the potential of worldwide interconnectedness via those communication systems called *small worlds* (cf. for a collection of important papers Newman, Barabási, and Watts (eds.) 2006).

12. The Distinction of Biological and Sociocultural Evolution

If communication and symbolic language are both available in a communication system they can function as catalysts of the separation of two types of evolutionary processes which are analogous but operate completely separate: biological and sociocultural evolution. Today the models which describe this type of evolutionary separation are normally called *dual inheritance theories* (Boyd and Richerson 1985;Cavalli-Sforza and Feldman 1981;Richerson and Boyd 2005; Durham 1991). This name points to two separate ways for the transmission of information: information is transmitted via genes or via symbolically mediated communication. From this kind of thinking arose theories of sociocultural evolution among which we can count the theory presented by Niklas Luhmann.

But for such a theory one needs an elementary unit which is the elementary unit of variation and of which copies can be made. Richard Dawkins has well described such a unit: "The real unit of natural selection [is] any kind of r*eplicator*, any unit of which copies are made, with occasional errors, and with some influence or power over their own probability of replication" (Dawkins 1999, XVI; cf. on sociocultural replicators Bühler 2007). It is not yet very clear which is the most plausible and fruitful candidate for being a replicator in sociocultural evolution. But there are several candidates which have been nominated explicitly or implicitly: *Symbols* (Parsons 1971, 280-1); *Memes* (Dawkins 1999); *Expectations* (Luhmann

1984, Ch. 8); *Routines* (Nelson and Winter 1982); *Rules* (Buchanan 1990; Vanberg 1994). A more general theory will probably relate these candidates among one another. Besides these *replicators* a theory of sociocultural evolution needs *interactors*, more complex units which typically integrate a plurality of replicators and which function as the units of selection.

13. Which are the Mechanisms of Isolation in Sociocultural Evolution?

The dynamics of replicators and interactors in sociocultural evolution can be understood as adaptive. It brings about a continuous adaptation of the units of social systems to changing environments. Once more one has to point to the difference of selection/adaptation and isolation/system formation and one therefore has to ask for the mechanisms of isolation in sociocultural evolution.

In a longterm historical perspective migration and the establishment of local cultures following migration events may have been the major mechanism of isolation (cf. Stichweh 2005, 145-159). If one looks at the migration history of mankind this is especially true in periods in which migration meant the occupation of geographical spaces which were not inhabited before and which were settled by a group coming from elsewhere. Especially if migration was a one-time event and the contact between geographical spaces was not continued after the migration event this resulted in the establishment of local cultures closed off towards one another.

These conditions are no longer given in present-day world society. This is still a system in which the transfer of informations and the transfer of institutions sometimes is furthered by the shorttime or longtime migration of persons. But primarily world society is based in communicative interrelations which can be continued via telecommunication and organizations and networks without necessarily being dependent on the migration of persons. Isolation, separation and boundaries then arise in social, communicative spaces. Concepts such as autopoiesis and the operational closure of autopoietic systems are meant to describe and to analyze these new realities in which one can no longer say that systems are separated by boundaries in space (Maturana 1985). Instead social spaces are constituted by the emergence of systems and these social spaces do not penetrate one another. Social boundaries are not *in* space but *between* spaces.

14. Which is the Place of Evolution: World Society or the Function Systems of Society?

Regarding the theory of sociocultural evolution one very important question is how we locate the level on which sociocultural evolution is supposed to play. Probably it is the case that one has to look to two levels at least.

In historical terms there always existed a great number of mostly autonomous societies on earth. Sociocultural evolution then meant the selective survival of whole human societies and of the ways of living and norms and values incorporated into successful societies. Parallel to this sociocultural evolution could operate on the level of the individual society and its institutions and habits. And then there are diffusion processes between societies which are specific to sociocultural evolution, and diffusion in some way always unified sociocultural evolution.

In our time there does no longer exist a plurality of societies on earth. There is only world society (and some very small tribal societies in Peru, Brazil, Malaysia and some other countries which are mainly isolated from world society, cf. Angelo 2007). Sociocultural evolution then happens as the evolution of world society. But a second level did arise since the European Middle Ages. This consists in the autonomous function systems of world society as the primary structure of internal differentiation of this world system (Stichweh 2007). All the function systems are world systems in their own right. And for all of them one can postulate an evolutionary dynamics internal to these function systems. At the present moment there are tentative or established evolutionary models only for some of them: Religion (Wilson 2002), the Economy (Schumpeter 1964), Science (Hull 1988), Politics (Wimmer 1996), and Law (Luhmann 1993, Ch. 6). But one can obviously try evolutionary models for the other function systems, too. And then one has to analyze the structural coupling of function systems to world society which seems to be a case of coevolution of two system levels.

15. What does the Singularity of World Society Mean in Evolutionary Terms?

From the point of view of an evolutionary theorist one will immediately register that the non-existence of other societies besides world society can be a significant problem. In such a situation there are not only no possibilities of comparing society to other societies and to the institutional alternatives realized in other societies. There is furthermore no risk diversification. If something goes wrong in world society these failures can not be compensated or corrected by things going right in other and competing societies.

And then there is the evolutionary catastrophe embodied by world society. This is a unified social system coupled to a single species on earth which irreversibly changes the conditions of life of most other species and which thereby reduces diversity. Life on earth then to a certain extent becomes *intelligent design*, and as it always is the case one can with good reason doubt the intelligence of this designer.

16. Are There Processes of Globalization in the Social Systems of Other Species? Coupled Migration Processes (of Humans, Animals and Plants), the Emergence of *Supercolonies* (in Ants), and the *Eigenstructures* of World Society

The immense influence of the global system of human society on the fate of many or most other species in the world may imply that these other species participate in the globalization processes of human society and this again has enormous effects on the history of world society.

First of all the global migration of man and - in the last few hundred years - the accessibility of any place of earth from nearly any other place on earth induces a migration of animals and plants many of which are no longer local or regional species but become by accident or by intentional transfer global animals and plants. This changes the environmental conditions for the ongoing evolution of animals and plants and it increases the influence of intentional changes induced in the properties of animals and plants by breeders. Long before the ascent of genetics and biotechnology the migration and the breeding of plants and animals became an important factor in the evolution of life on earth. The retroactive effect on the evolution of human society is enormous. I only want to mention two aspects, both of them related to the global distribution of plants and animals. The global availability of domesticated plants and

animals which were previously restricted to specific regions of the world is probably one of the most important factors in the demographic history of the world and in the genesis of a world economy and in the shifting fates of different regions of the world economy (Diamond 1997). On the other hand the global distribution of microbes and pathogens often decides over the stability of human populations and regional cultures in world society. Perhaps the most dramatic case is the 16th-century depopulation of North and South America caused by microbes and pathogens of Europe (Mann 2006; Diamond 1997).

All these interrelations of globalization in human social systems and the globalization of plants and animals are based on a strong coupling of human migrations and plant and animal migrations. One interesting question is if there are globalization tendencies and mechanisms endogenous to animal social systems. For finding an answer to this one can search in the literature on *biological invasions*. For example in studies about ant societies there exists some evidence that invading ant populations do succeed by reducing internal genetic diversity to establish so-called *supercolonies* in which there exists a free exchange of non-kin members between colonies over significant distances which gives these invaders an advantage over local populations which are segregated from one another on the basis of kinship relations (Tsutsui et al. 2000; Queller 2000). In Europe there are now two supercolonies of Argentine ants and one of these reaches over 6000 km from Italy to the Spanish Atlantic coast (Giraud, Pedersen, and Keller 2002), and these supercolonies progressively overwhelm local, much smaller, kinship-based colonies. These two supercolonies are internally pacified but the members of these two colonies fight with one another.

In observations of this kind there seem to be intriguing parallels to globalization processes in human societies which deserve further study. At the starting point of these supercolonies in ants we nearly observe the same phenomenon we registered in looking at the beginning of the migration history of Homo Sapiens. A very small population of the species Homo Sapiens with reduced genetic diversity (which could be called a population bottleneck) succeeded to survive and to colonize the whole earth. The mechanism of globalization is in one relevant respect the same mechanism we observe among ants: It is the ability to cooperate over long distances among non-kin which gives supercolonies an evolutionary advantage over smaller locally based, kin-related colonies. From this we may derive the very tentative conclusion that *world society, too, is a kind of supercolony*. But its primary mechanism of domination is not cooperation among non-kin with reduced genetic diversity (although this mechanism is an important historical premise of World Society, too; cf. interesting Seabright 2004). But *still more important for the genesis of world society is the cooperation over enormous cultural distances under the premise of Eigenstructures germane to world society* (Stichweh 2007). These *Eigenstructures* (for example functional differentiation) offer a kind of reduced internal cultural diversity in global social systems which allows for cooperation and contact over significant social and cultural distances.

References

Angelo, Claudio. 2007. Prime Directive for the Last Americans. *Scientific American* 296, no. 5: 40-41.

Boyd, Robert and Peter J. Richerson. 1985. *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.

Bshary, Redouan and Alexandra S. Grutter. 2006. Image Scoring and Cooperation in a Cleaner Fish Mutualism. *Nature* 441: 975-978.

Buchanan, James M. 1990. The Domain of Constitutional Economics. *Constitutional Political Economy* 1, no. 1: 1-18.

Bühler, Martin B. 2007. *Die Replikatoren der soziokulturellen Evolution. Eine Betrachtung der soziokulturellen Evolutionstheorie unter Berücksichtigung der evolutionären Einheiten*. Lizentiatsarbeit: Universität Luzern.

Campbell, Donald T. 1988. *Methodology and Epistemology for Social Science*. Chicago: University of Chicago Press.

Cavalli-Sforza, Luigi L. and Marcus W. Feldman. 1981. *Cultural Transmission and Evolution*. Princeton/N.J: Princeton University Press.

Cheney, Dorothy L. and Robert M. Seyfarth. 1990. *How Monkeys see the World. Inside the Mind of Another Species*. Chicago: University of Chicago Press.

Dawkins, Richard. 1999: Foreword. Pp. VII-XVII in *Susan Blackmore, The Meme Machine*, (Oxford: Oxford U.P.).

Diamond, Jared. 1997. *Guns, Germs, and Steel. The Fates of Human Societies*. New York: W.W. Norton.

Durham, William H. 1991. *Coevolution. Genes, Culture, and Human Diversity*. Stanford: Stanford University Press.

Emery, Nathan J. and Nicola S. Clayton. 2004. The Mentality of Crows: Convergent Evolution of Intelligence in Corvids and Apes. *Science* 306: 1903-1907.

Forster, Peter and Shuichi Matsumura. 2005. Did Early Humans Go North or South? *Science* 308, no. 5724: 965-966.

Giraud, Tatiana, Jes S. Pedersen, and Laurent Keller. 2002. Evolution of Supercolonies: The Argentine Ants of Southern Europe. *Proceedings of the National Academy of Sciences of the United States of America* 99, no. 9: 6075-6079.

Gould, Stephen Jay. 1977. *Ontogeny and Phylogeny*. Cambridge/Mass.: Harvard University Press.

Hull, David L. 1988. *Science as a Process: An Evolutionary Account of the Social and Conceptual Development of Science*. Chicago: University of Chicago Press.

Luhmann, Niklas. 1977. The Differentiation of Society. *Canadian Journal of Sociology* 2: 29-53.

Luhmann, Niklas. 1984. *Soziale Systeme: Grundriß einer allgemeinen Theorie*. Frankfurt a.M.: Suhrkamp.

Luhmann, Niklas. 1988: Über 'Kreativität'. Pp. 13-19 in *Kreativität - Ein verbrauchter Begriff?*, edited by Gumbrecht, Hans Ulrich (München: Wilhelm Fink).

Luhmann, Niklas. 1993. *Das Recht der Gesellschaft*. Frankfurt a.M.: Suhrkamp.

Mann, Charles C. 2006. *1491. New Revelations of the Americas Before Columbus*. New York: Vintage Books.

Maturana, Humberto R. 1985. *Erkennen: Die Organisation und Verkörperung von Wirklichkeit*. 2. ed. Braunschweig: Vieweg.

Mayr, Ernst. 1942. *Systematics and the Origin of Species from the Viewpoint of a Zoologist*. Cambridge, Mass.: Harvard U.P. (Paperback ed. 1999).

Mayr, Ernst. 1999: Introduction, 1999. Pp. XIII-XXXV in *Systematics and the Origin of Species from the Viewpoint of a Zoologist (1942)*, (Cambridge, Mass: Harvard U.P., Reprint).

Mellars, Paul. 2006. Going East: New Genetic and Archaeological Perspectives on the Modern Human Colonization of Eurasia. *Science* 313: 796-800.

Millikan, Ruth Garrett. 1989. In Defense of Proper Functions. *Philosophy of Science* 56: 288-302.

Nelson, Benjamin. 1969. *The Idea of Usury. From Tribal Brotherhood to Universal Otherhood*. Second enlarged ed. Chicago: University of Chicago Press.

Nelson, Richard R. and Sidney G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, Mass.: The Belknap Press of Harvard University Press.

Newman, Mark, Albert-László Barabási, and Duncan J. Watts (eds.). 2006. *The Structure and Dynamics of Networks*. Princeton: Princeton,U.P.

Parsons, Talcott. 1971: Comparative Studies and Evolutionary Change. Pp. 279-320 in *Ders., Social Systems and the Evolution of Action Theory*, (New York: The Free Press 1977).

Queller, David C. 2000. Pax Argentinica. *Nature* 205: 519-520.

Richerson, Peter J. and Robert Boyd. 2005. *Not by Genes Alone. How Culture Transformed Human Evolution*. Chicago: University of Chicago Press.

Schumpeter, Joseph A. 1964. *Theorie der wirtschaftlichen Entwicklung*. 6. ed. Berlin: Duncker & Humblot.

Seabright, Paul. 2004. *The Company of Strangers. A Natural History of Economic Life*. Princeton: Princeton U.P.

Stichweh, Rudolf. 2005. *Inklusion und Exklusion. Studien zur Gesellschaftstheorie*. Bielefeld: Transcript.

Stichweh, Rudolf. 2007: The Eigenstructures of World Society and the Regional Cultures of the World. Pp. 133-149 in *Frontiers of Globalization Research: Theoretical and Methodological Approaches*, edited by Rossi, Ino (New York: Springer).

Stichweh, Rudolf. 2008: Homo Sapiens in der Umwelt sozialer Systeme. in *Was ist der Mensch?*, edited by Ganten, Detlev, Volker Gerhardt, Jan-Christoph Heilinger, and Julian Nida-Rümelin (Berlin: Gruyter).

Tsutsui, Neil D., Andrew V. Suarez, David A. Holway, and Ted J. Case. 2000. Reduced Genetic Variation and the Success of an Invasive Species. *Proceedings of the National Academy of Sciences of the United States of America* 97, no. 11: 5948-5953.

Vanberg, Viktor J. 1994. *Rules and Choice in Economics*. London: Routledge.

Wilson, David Sloan. 2002. *Darwin's Cathedral. Evolution, Religion, and the Nature of Society*. Chicago: University of Chicago Press.

Wimmer, Hannes. 1996. *Evolution der Politik: Von der Stammesgesellschaft zur modernen Demokratie*. Wien: WUV-Univ.-Verlag.

Wortmann, Hendrik. 2007. Divergenzen und Konvergenzen in der Trias von Evolutions-, System- und Differenzierungstheorie. *Soziale Systeme* 13.