21st EGOS Colloquium, June 30 – July 2, 2005, Berlin, Germany

Subtheme 1: Path Dependence and Creation Processes in the Emergence of Markets, Technologies and Institutions
Convenors: Michel Callon, Raghu Garud and Peter Karnøe

Organizational Paths:
Path Dependency and Beyond

Jörg Sydow,

Georg Schreyögg

and

Jochen Koch

Free University of Berlin

Faculty of Economics and Business Administration

Berlin, Germany

Major parts of this paper were written during the sabbatical leave of the first author to the University of Arizona, USA. He thanks the Eller College of Management for providing access to its excellent facilities, the Deutsche Forschungsgemeinschaft (DFG) for a generous travel grant, and Ken Koput, Brint Milward, Keith Provan, as well as Udo Staber for their invaluable comments on an earlier version of this paper.

SECOND DRAFT, COMMENTS WELCOME

May 30, 2005

Abstract

Although path dependency has become a popular notion, most organization research refers to this concept only in a rather loose or metaphorical way without any clear-cut, theoretical framework. Path dependence often appears only as a new label for well-known phenomena like institutional inertia, resistance to change and so on. In sharp contrast, this paper advocates the case for building path-oriented organization research on a rigorous path theory. The aim is to contribute to the development of such a theoretical framework. In a first step we recapitulate the classical theory of path dependency, showing that the strict notion of path dependency has a very specific meaning that goes well beyond the mere insight that 'history matters' in and between organizations. In a second step, the paper suggests carrying this theory, which was originally developed to explain technological paths, on to the study of organizational and interorganizational arrangements. This requires some remodeling of the original theory. In contrast to classical path dependency theory, the modified model focuses on the micro level, i.e. on the question of how paths in general and path dependencies in particular emerge in organizations and organizational decision making, thereby acknowledging, firstly, the relevance and selectivity of social processes, even in the very early phase of path constitution, secondly, the potential of agents to perceive and interpret paths differently and, finally, to deviate from this path by acting otherwise. The proposed model of path dependency is expanded respectively, not only to include processes of unlocking and changing organizational path dependencies, but also to discuss the possibilities and limits of strategically creating (inter-) organizational paths.

1 Introduction

Organizational change and inertia have been on the agenda of organization research for decades. Even rather new organizational forms, like virtual organizations or interorganizational networks, are now investigated from perspectives that account for their dynamics (e.g., Arinõ and De La Torre 1998, Doz et al. 2000, Hite and Hesterley 2001, Powell et al. 2005). The issue of continuously changing organizations has come to the fore, and social systems have been characterized as fluid or chronically unfrozen (e.g., Weick 1995, Ciborra 1996, Brown and Eisenhardt 1998, Tsoukas and Chia 2002), thereby putting the question of organizational change into a different, even more central place in organization research. In sharp contrast to this picture of permanent fluidity, however, stands a different stream of research studying structural inertia as a ubiquitous (empirical) property of all social systems. The countervailing forces of stability and change are thus the issue at stake; no wonder that there is growing interest in paths and the path dependency of organizational processes.

A quick search for references to path dependency in papers published in three leading scholarly journals (*Administrative Science Quarterly, Organization Science, and Organization Studies*) over a period of ten years (1995-2004) reveals more than 60 papers referring to the concept; that is 6 per cent of the articles published in those journals over the years and averages 0.4 papers per issue. While only 19 papers appeared in the first five years, all others were published in the second five-year period. Reference to the notion of path dependency can particularly be found in connection with institutional and evolutionary accounts of organizational change (e.g., Whitley et al. 1996, Lewin and Volberda 1999, Carney and Gedajlovic 2002, Marquis 2003, Rodrigues and Child 2003, Volberda and Lewin 2003). Beyond that general interest in this theory, there seems to be a broad trend in organization theory towards recognizing the importance of inertia in general and path-dependent processes in particular. In the abundant literature on organizational knowledge and learning, to give an example, the "path dependence of knowledge" (Nooteboom 1997) has been acknowledged (see also Arthur 1994: 133-158; Coombs and Hull 1998). Organizational change following mergers and acquisitions has more recently been investigated with regard to path-dependent resource deepening (Karim and Mitchell 2000). And, just to give one more organizational example, tacit knowledge, cumulative learning and, in particular, path-dependent decision making and other routines seem to shape (inadvertently) strategies and organizational competences (e.g., Helfat 1994, Stimpert et al. 1998).

A similar interest can be found in approaches to interorganizational change. Walker et al. (1997), for instance, draw attention to a path dependency in a network of biotech organizations. Gulati and colleagues (Gulati 1995, Gulati and Gargiulo 1999) point not only to the idiosyncratic, but also path-dependent character of interorganizational networks, when they find that previous ties among organizations increase the probability of an alliance between them in the future. Later, Gulati et al. (2000) add that lock-ins are likely to arise in the course of the development of the network. More recently, Marquis (2003) identifies the pressure of the past when he documents network imprinting in intercorporate communities of large cities. Others even distinguish different types of "network trajectories" (Kilduff and Tsai 2003) based upon the very characteristics of their structural dynamics: goal-directed and serendipitous.

Although path dependency has doubtless become a popular notion, we should not deny the fact that most organization research, including many of the above-mentioned studies, refers to this concept only in a rather loose or simply metaphorical way. There are however more rigorous approaches pursued in other fields, such as the study of technological development (e.g., Dosi 1982, David 1985, 1986, Witt 1997, Rip and Kemp 1998) and research on the evolution of economic, legal or other social institutions (e.g, North 1990, Stark 1992, Bebchuk and Roe 1999, Pierson 2000, Beyer and Wielgohs 2001, Deeg 2001, Heine and Kerber 2002, Schmidt and Spindler 2002, Crouch and Farrell 2004, Ebbinghaus 2005). This dearth of attention to stricter forms of path thought is all the more surprising, given the high practical relevance of path-related phenomena in the corporate world. Take, for instance, the huge investments of firms and other types of organizations into strategic turnarounds, organizational change programs, the formation and maintenance of cooperative interorganizational relationships, and the development and adaptation of human resources that fit the new systems. Since a once entered path cannot be easily quit, the economic consequences in terms of commitment and sunk costs are striking.

As a reaction to this gap, this paper suggests building path-oriented organization research on an elaborated path theory. In pursuit of such theory, we start by recapitulating the classical theory of path dependency, thereby clarifying the notion of path dependency and its specific meaning; a meaning that goes well beyond the mere insight that 'history matters'. In a second step, the paper sets out to explore how far this theory – that was originally developed to explain technological paths – can be used in the study of organizational and interorganizational arrangements. This discussion reveals that the classical path theory has to be modified when applied to explain the

constitution of organizational and interorganizational paths. In contrast to classical path dependency theory, the modified model focuses on the micro level, i.e. on the question of how paths in general and path dependencies in particular emerge in organizations and organizational decision making, thereby acknowledging the relevance and selectivity of social processes, even in the very early phase of path constitution. It also considers that, if applied to the analysis of organizational and interorganizational processes, path dependency is not likely to mean full determination of path-related behavior. Rather, the model acknowledges the potential of agents to perceive and interpret paths differently and, at least to some extent, to deviate from this path or trajectory by acting otherwise. Consequently, the paper proceeds with an investigation into when and how path dependencies can be overcome. Finally, the paper does not only include processes of unlocking organizational and interorganizational path dependencies, but also explores the possibilities and limits of strategically creating organizational and interorganizational paths.

Starting from the assumption that it makes sense to use the concept of path dependency in organization research, not only as a metaphor, but as a distinct analytical concept, the main contribution of the paper is to present a theory-informed concept as well as a redefined and extended model of paths, path dependency, path unlocking and even path creation that can be productively applied to reach a better understanding of the possibilities and limitations of organizational and interorganizational change.

2 The Classical Theory of Path Dependency

The theory of path dependency has been developed in the field of critique of neoclassical economics. The development of the theory was advanced by Paul David's (1985, 1986) studies of the sustainability of a well-known technical standard: the QWERTY keyboard. Despite its inferiority in terms of technical efficiency, this standard has not only spread around the world, but has never seriously been challenged by technically more efficient alternatives. Explaining this inefficient monopoly by the path-dependent character of the process, as David suggests, breaks with two assumptions that are central to microeconomic thinking: first, that because of market pressures the most efficient solution will finally prevail, and second, that decisions are principally reversible – and will be reversed if better solutions are available. In sharp contrast to these two assumptions, the theory of path dependency highlights different dynamics, namely the imprinting

of present and future realities by former decisions and solutions, even by random events. Moreover, it points to the irreversibility or the lock-in of certain processes and their underlying decisions. The following two sections elaborate on both arguments in more detail.

2.1 History Matters!

The basic argument that history matters draws on the insight that social processes do not evolve in an unconditioned way, but are recursive (self-referential) in the sense that former decisions have an impact upon those that follow. Hence, "bygones are rarely bygones" (Teece et al. 1997: 522). The theory of path dependency assumes that initially decisions are open to revision, but from a certain point in time onwards, decisions taken increasingly restrain present and future choices. As a result, decisions that have been taken in the past may increasingly amount to an imperative for the future course of action. However, the full explanatory power path dependency theory has to offer only becomes clear when two concepts are introduced in addition to the "history matters" principle: increasing returns and lock-ins. Path dependence cannot be fully explained by "past-dependence" (Antonelli 1999).

2.2 Increasing Returns and Lock-ins

In its most general sense, the concept of increasing returns implies positive feedback, i.e. that the increase of a particular variable leads to a further increase of this very variable (Arthur 1989, 1994). More specifically, the notion of increasing returns refers to a self-reinforcing process with a spiral form of dynamics that is beyond the control of the individual actor and may eventually lead to a "lock-in" (David 1985) or "inflexibility" (Arthur 1989). When a lock-in occurs, other alternatives cease to be feasible.

In economic studies such cumulative and non-reversible dynamics are primarily documented in the development and diffusion of technologies. In these cases the explanation usually refers to, first, economies of scale and learning effects, second, direct and indirect network effects, and

third, learning by using (cf. Arthur 1994, Katz and Shapiro 1985).[1] Basically, these explanations emphasize the demand side, but include aspects of the supply side as well. For instance, a technology becomes more attractive the more it is applied and used and in turn offered. This holds particularly true for information and communication technology, where the value of a specific terminal and the whole network depends to a large extent upon the number of users that have subscribed to the system. These direct network externalities are complemented by indirect network effects when the system is compatible with others. Increasing returns result from economies of scale when the higher number of system users allow for a more efficient production and distribution of the system. These savings may be forwarded to the buyer – via lower prices – which increases the attractiveness of the system even further. The learning effect becomes manifest if the buyers using the system are satisfied and communicate their satisfaction to other potential buyers. Several of these explanations are often subsumed under the argument that high switching costs may prevent agents from leaving a technological path although it leads to inferior results. The top part of Table 1 summarizes the four different forms of explanations causing increasing returns with regard to the supply and demand of technologies.

1.	Economies of scale and economies of scope	technological path dependency
2.	Direct and indirect network externalities	
3.	Learning	
4.	Expectations and expectations of expectations (referring to psychological and/social dispositions of single and collective actors)	institutional path dependency
5.	Coordination effects (of rules or institutions)	
6.	Complementary effects (between different rules constituting an institution or between institutions)	

Table 1: Causes of technological and institutional path dependencies

In contrast to these explanations focusing on the development and diffusion of technologies, some *additional* arguments have been used to explain the evolution and spread of social institutions, one of the most fundamental "carriers of history" (David 1994). In particular, the

[1] For a critique see Liebowitz and Margolis (1994, 1995a, b), and for a discussion of this critique Regibeau (1995) and, more recently, David (2001).

notion of increasing returns and switching costs is complemented by coordination effects and compatibility arguments (e.g., North 1990, Mahoney 2000, Deeg 2001, Heine and Kerber 2002, Schmidt and Spindler 2002, Crouch and Farrell 2004, Greener 2005). In the case of legal institutions, for instance, the benefits of a law resulting from cost savings in the process of negotiation and settlement on the one hand and from compatibility with other legal rules that already exist on the other seem to build an equivalent dynamic to (to be significantly more influential than) demand effects. In this case, social expectations – including "expectations of expectations" (Luhmann 1995) – as well as a sequence of decisions based upon these expectations underlie the process of self-reinforcement in general and of increasing returns in particular. The reason for these self-reinforcing expectations can be ascribed to some extent to different psychological and/or social dispositions of actors in the field, based upon a common professional understanding, for example, with sometimes far-reaching consequences for organizational activities (Dietrich 1997). These dispositions are often grasped as 'cognitive maps', and related to collectively bounded patterns of reflecting and acting. For they are the starting point of learning processes which, at least in the case of "single-loop learning" (Argyris 1986), in which existing cognitive structures and/or behavioural patterns tend to be confirmed and, thereby, firmly anchored. Though the mechanism by which these processes gain momentum is not quite clear, one can distinguish three additional forms of social mechanisms underlying the emergence of a path-dependent process with regard to institutions (see, once again, Table 1).

2.3 The classical model

Path dependency is essentially a dynamic theory with different stages. Building on the theoretical explanations by Arthur and David, three phases of a path-dependence process can be distinguished: Phase I is characterized by an undirected search process. Choices are still unconstrained, decisions are seen as contingent events that cannot be explained by prior events or initial conditions (Mahoney 2000: 511). In other words, decision outcomes are contingent occurrences. Once these decisions have been made, dynamic self-reinforcing processes may be set into motion, which eventually lead to deterministic patterns. This moment of setting the path dependency into motion represents a "critical juncture" (Collier and Collier 1991). These "critical junctures" are characterized by the adoption of a particular institutional arrangement from among

two or more alternatives. These junctures are 'critical' because, once a particular option has been selected, it becomes progressively difficult to return to the initial point when multiple alternatives were still available (Mahoney 2000: 513)".

In Phase II options are increasingly narrowed to an extent that agents eventually do not seem to have a choice anymore. In this phase a causal pattern evolves that tracks a particular type of behavior building on social mechanisms by which the pattern is likely to be reproduced over a certain period of time. Or, to use a notion from complexity theory, the transition is marked by "bifurcation" (Kauffman 1993) - that is, the contingent or even random emergence of a small event that nonetheless has a significant and sustainable impact upon the development, diffusion and adoption of a technology or an institution. In this case it triggers a self-reinforcing process that is likely to become essentially governed by the regime of increasing returns (Arthur 1994). If such reinforcing events culminate in a critical mass, the momentum has built up. In other words, a path emerges and renders the whole process more and more irreversible.

The final transition from Phase II to Phase III is marked by a lock-in. The process in Phase II is still a contingent one – i.e. whilst essentially constrained, choices are still possible. Or as David (1985) put it, processes are non-ergodic, i.e. they do not yet converge to a fixed point distribution. By contrast, in Phase III, one particular technology or institution has been generally adopted and forcefully makes new entrants adopt it too. And processes continue to bring about this particular outcome. Viable alternatives are no longer at hand.

Figure 1 illustrates these three phases in the constitution of a path and path dependency.

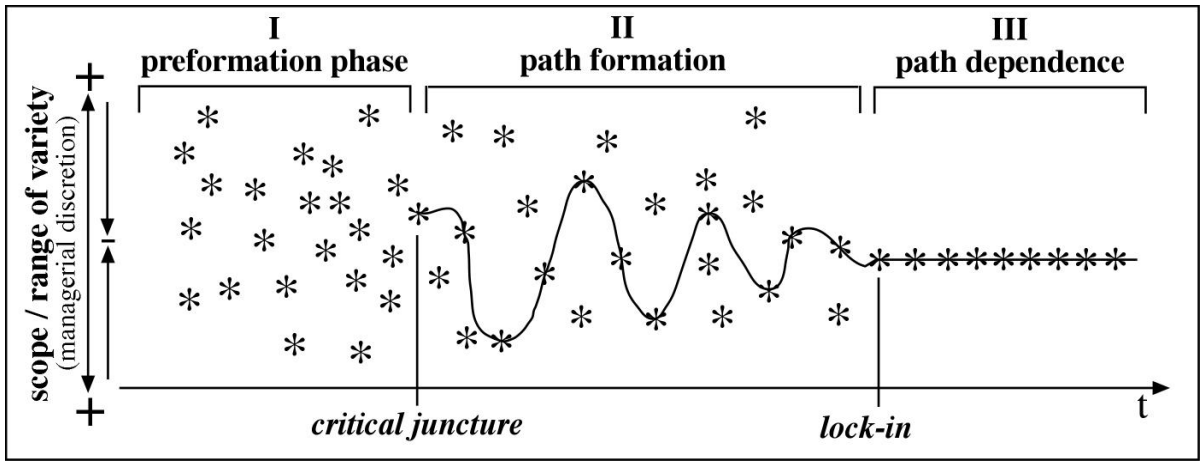

Figure 1: Constitution of a technological or institutional path – The classical model

The classical model of path dependency is based upon rational choices. Individuals take rational decisions, but these may have unintended and irrational consequences at a collective or system level. The lock-in of entire industries into a sub-optimal technology like the QWERTY keyboard is just one example of such real phenomena (cf. David 1985, 1986). Therefore the assertion of path dependence has provoked fundamental opposition in the field of (main stream) economics. From an economic stance, it is simply unthinkable that there could be both rational behavior of all actors and, nevertheless, sub-optimal results. Therefore, from the neoclassical perspective, path dependence has been considered a marginal anomaly or a theoretical misconception, or even both (Liebowitz/Margolis 1990, 1995). However, there are also other voices of economists:

"I do not think that there is the slightest question that path dependence is a real phenomenon in economic history and development, as it is in biological evolution and in the history of political and social institutions" (Arrow 2004: 24).

There is no place here, and not even the necessity, to discuss this paradigm contest in the field of economics, as management science and organization theory are embedded in quite different sets of premises.

Quite obviously, the model of path dependence provides very important insights and offers new and provocative explanations in organization studies. On the other hand, its premises of rational choice and its basically deterministic structure evoke objections and raise intriguing questions. First of all, the assumption of rational choice on the individual level as a starting point is problematic. Following Simon's (1945) seminal contribution, an empirical theory of path-dependent behavior cannot simply ignore the entire research on the boundedness of rationality. Closely related to this problematic assumption is the modeling of the starting point. The model suggests that the initial phase is characterized by unconstrained choice, i.e. everything seems feasible. As is well-known, however, history always matters – even in this early phase and even without increasing returns. By implication, Phase I should not be modeled as completely open in the neoclassical sense; the behavior occurs in a specific historical setting and is influenced by it. But Mahoney (2000) is also right when he notes that the early phase is contingent and that for this reason alone, the behavior cannot be fully anticipated. Contingency and not completely unrestricted choice is therefore at the heart of any path theory.

Another critical issue concerns the small event philosophy. The small event may actually be not so small and not so random and innocent after all (cf. Bassanini and Dosi 2001). For instance, in

the case of another technical standard that has been intensively studied from a path dependency perspective – that is, VHS – the strategic move of Matsushita to secure content delivery through an agreement with major Hollywood studios was, among others, decisive in determining the success of this standard over the technologically superior Beta standard (see Section 5 for a detailed discussion). As a consequence, a less randomized modeling including some more strategic intention and action may well be advisable when carrying the theory further.

Finally, it seems questionable whether path dependencies can actually be conceptualized in terms of deterministic causal patterns. It appears that determinism in social settings is better seen as a matter of degree and will vary depending on the type of pattern to be reproduced.

3 Path Dependencies in and between Organizations

Although the classical theory of path dependency has been known for almost two decades, organizational studies refer to it, as mentioned at the beginning (Section 1), only in a rather loose and metaphorical way (see, however, Dietrich 1997, Baum and Silverman 2001, Bruggeman 2002, for notable exceptions). This is less true of its weaker version saying that history matters, but very true with respect to the strict version building on small events, increasing returns, and lock-in. However, many modern and post-modern theories of organization seem to be in a way related to the idea of paths and path dependency. Some of these approaches will be discussed in the next section in order to highlight their similarities and differences to a theory of path dependency. This discussion informs the development of a modified and extended model of (organizational) path dependency.

3.1 Related Concepts in Theories of Organization

Related organization theories can be found either on the micro-level or the macro-level. On a micro-level, all those theories that point to practices or operational procedures in organizations, such as the behavioral theory of the firm (Cyert and March 1963) or the concept of "muddling through" (Lindblom 1965), are related to the idea of path dependency. These behavioral theories are sensitive towards the fact that history, as imprinted in existing routines and procedures for

example, matters a lot in organizational behavior. Modern cognitive organization theories put even more emphasis on prevailing cognitive schemes and interpretative frames that channel managerial actions (e.g., Gioia and Sims 1986, Barr 1998). Once underway, these routines and schemes shape decision-making processes in organizations and, eventually, cause organizational inertia (e.g. Tripsas and Gavetti 2003), and this well beyond the specific (initial) conditions of organizational founding (Stinchcombe 1965). There is, however, a significant difference between such forms of imprinting argument and a path dependency perspective: "a path-dependence perspective focuses on general persistence; in an imprinting argument, while persistence is important, equally important is how the founding social conditions influence the social form" (Marquis 2003: 659). Both perspectives are similar with respect to their assumption that history matters in social processes and that a certain degree of stability of form is likely to occur. Nevertheless, both approaches advance very different types of explanation. While a path-dependence perspective emphasizes continuous self-reinforcing processes, starting with contingency and small events leading to a critical juncture and, finally, to a lock-in, an imprinting argument posits that there are initial conditions (especially at the time of founding an organization) which matter most in explaining later behavior.[2] Actually, in contrast to the theory of path dependency, the imprinting argument is sensitive to initial conditions as carriers of history, but it basically lacks a profound theory to explain the process of generating momentum and persistence. This is all the more regrettable, since both momentum and persistence cannot be explained or predicted on the basis of the initial conditions. While initial conditions or choices are important from a path dependency point of view, intermediate actions and events between the initial ones and the outcome do, however, govern the process.

Another related stream is neoinstitutionalist economics – transaction cost theory (Williamson 1985, 1993) and incomplete contract theory (Hart 1995) in particular. They share with path dependency the emphasis on individual decision-making and the acknowledgment that former decisions have an impact upon present structures. Transaction cost theory, for example, argues that high asset specificity (initial decision) leads to a high transactions cost, which in turn causes a fundamental transformation of exchange relationships. Williamson (1993) is right when stating that, in this regard, history matters in transactions cost reasoning. Nevertheless, he downplays the

[2] Being originally quite silent about the mechanisms that create persistence over time and whether this persistence may even come close to a situation that can be characterized as locked-in, more recent research shows that local search may play an important role in generating this persistence effect (Levinthal 1997).

relevance of path-dependent processes in the strict sense, in particular with regard to self-reinforcing dynamics and possible inefficiencies. In order to sustain competitive (cost) advantage and to protect these assets against exploitation from those one contracts with, more and more relation specific investments are likely to be made. As critics as well as more dynamic versions of this theory would argue (e.g., Lazonick 1991, Langlois and Robertson 1995, Nooteboom 2004), asset specificity may even trigger a process of escalating commitment of resources endowments to a particular relationship. Under these circumstances, momentum develops and a lock-in may result from the process dynamics. In consequence, Leiblein and Miller (2003: 842), investigating transaction- and capability-based influences on firm boundaries, are convinced that "a firm that chose to internalize an activity in the past, perhaps due to the need for high levels of transaction-specific investment, may be more likely to remain integrated in the present, even if the current levels of asset specificity and uncertainty suggests that market transaction are attractive." However, both components of the process – the development of momentum and the emergence of lock-in – have to our knowledge not yet been conceptualized, even in dynamic versions of the theory.

On a macro-level, sociological neoinstitutionalism (DiMaggio and Powell 1991, Scott 2001) sets out to explain the development of organizations and interorganizational relationships with regard to normative, mimetic and coercive forces that cause institutionalization (e.g., Tolbert and Zucker 1996, Hargadon and Douglas 2001, Lawrence et al. 2001). Though this approach, by focusing on the process of institutionalization in general and on the sedimentation of structure over a lengthy period of time in particular, considers path-related phenomena such as institutional inertia, persistence and stability, and explains them by adaptation in terms of legitimacy-seeking behavior in particular, it does not promote a concise understanding of path-building processes and path dependencies in any way. One reason for this is that its explanation refers basically to external imperatives and not to the internal process of self-referential (re-)production of persistent patterns (see, however, Holm 1995, Scott 2001). Moreover, if the stability of an institution is defined "as the length of time over which an institution remains highly diffused and legitimated" (Lawrence et al. 2001: 626), it is unclear whether this stability may end up in path dependency at all, and if so, when and to what extent.

A macro-level approach that obviously pays even more attention to persistence in organizational change is population ecology theory (Hannan and Freeman 1984, Carroll and Swaminathan 1992,

Gresov et al. 1993, Carroll and Harrison 1994, Levinthal 1997). As is well-known, a core concept of this stream of evolutionary research is "structural inertia" (Hannan and Freeman 1984, Hannan et al. 2004), which highlights the stability of organizational arrangements opposed to environmental change. A major source of structural inertia is the necessity of routinizing and institutionalizing organizational activities in order to secure reliability, accountability, and, finally, survival in basically competitive environments. Routines are reproduced, successful action-patterns built up in the course of time and extent in space. These patterns do not only influence internal and external selection, but also shape variation and retention processes. Structural inertia, often considered as being tied to organizational age and size (e.g. Kelly and Amburgey 1991, Sastry 1997), is seen as a necessary precondition for effective strategic acting but, paradoxically enough, eventually threatens the organization's survival because it is likely to bring about a mismatch with changing environmental conditions. Again, the phenomena are somewhat similar, but the explanations are at variance. Evolutionary theory focuses on efficiency rather than inefficient solutions. Inertia occurs via structural reproduction, but – again – we are not provided with a clear process theory that explains how the dynamics evolve beyond stabilization through routines. More recently, Carroll and Harrison (1994) at least point to the importance of positive feedback and self-reinforcement mechanisms in the ecological model of density dependence.

Other evolutionary and, more recently, co-evolutionary theories make explicit use of the notion of path dependency and tend to prefer it to other concepts (e.g., Nelson and Winter 1982, Witt 1997, Helfat 1994, Lewin and Volberda 1999, Lewin and Koza 2001, Rodrigues and Child 2003, Volberda and Lewin 2003).[3] Given its relatedness to economic evolutionary theory, one seedbed of path dependency research (e.g., Dosi 1982, Witt 1997), this certainly comes as no surprise. Nevertheless, the concept of path dependency has not yet been fully utilized in this stream of research either. One reason is that it is also referred to in a rather loose, more or less metaphorical manner. A similar deficiency, but for different reasons, characterizes theories of organizational learning and knowing, which also emphasize process. While the former have only recently recog-

[3] While Nelson and Winter (1982) do not explicitly refer to path dependencies (perhaps due to the later publication of Arthur's and David's most influential works) but only to "natural trajectories" (with regard to technological change), the basic idea is broadly compatible with their evolutionary approach. With regard to the development of an industry, for example, they state: "the condition of the industry in each period of time bears the seeds of its condition in the following period" (19). At the same time, when the authors clarify that this process is not deterministic, they refer to the feasibility to model it as a Markov process, and clarify that "what the industry condition of a particular period really *determines* is the probability distribution of its conditions in the following period" (19; their emphasis). For a discussion of modeling path dependency as Markov chains see David (2001: 19-22).

nized the importance of stability as more than the starting point of change (e.g., Kuwada 1998, Crossan and Berdrow 2003), the latter have emphasized functionalities of persistence right from the beginning, taking the widely cited concept of "absorptive capacity" (Cohen and Levinthal 1990) as the perhaps most prominent example (e.g., Nooteboom 1997, Lubatkin et al. 2001). This concept highlights the fact that the ability of an organization to learn is to a significant extent a function of what is already known, i.e. "the shadow of the past" (Larsson et al. 1998). In other words, the history-dependence of organizational learning points to the limits and limitations of this very learning process.

Taken together, there are very few studies that have rigorously applied path dependency theory to the study of organizations. One reason for this abstinence may be that the original economic model of path dependency does not really apply to organizational settings and does not suit the needs of an (inter-) organizational analysis. In the next section, we try to re-model the theory of path dependency in a way that makes it fit the needs of organizational analysis better.

3.2 The Constitution of Organizational Paths: Towards a Modified and Expanded Model

Following traditional economic theory, the principle of increasing returns builds upon maximizing individual utility. Paths, hence, develop only if the decision for a particular option is suggested by a calculus that emphasizes this kind of utility maximization. Without excluding this case, it seems too narrow an explanation of organizational and interorganizational rigidities and paths (see also Ortmann 1995).[4] The core problem is that all decisions based upon bounded rationality are excluded, not to mention the relevance of the emotional dimension, cognitive biases and political processes in and between organizations. It is hard to see how these types of decision-making can be excluded from an empirical theory of path dependency. But how can such behavioral patterns be included without losing the essence of path dependence theory? Our suggestion is to develop a modified version of the core concepts on which the idea of path dependency is essentially built (see Section 2).

[4] For a similar but nevertheless distinct approach with regard to institutional development see Crouch and Farrell (2004).

(1). With regard to *increasing returns*, we propose to substitute the utility-maximizing premise by less restrictive positive feedback dynamics that are driven by individual or organizational self-interest and based on mechanisms of self-reinforcement. Thus increasing returns are one specific form of self-reinforcement within a wider range of positive feedback mechanisms not all of which are necessarily based on utility maximizing behavior. One example of organizational constructs that specifically highlights this kind of self-reinforcement is the Theory X-loop. McGregor (1960) argues that an organization built around the assumption of managers that individuals are only interested in their income, hate to take on responsibility, and shirk wherever they can, will lead to behavioral and structural reaction patterns that are built exactly on that assumption, thereby unconsciously advancing a vicious circle. Another example comes from the theory of organizational learning, arguing that a focus on single-loop-learning may drive out double-loop-learning more and more, i.e. the questioning of improving organizational practices on the once chosen path (Argyris 1976). Or, as March and Simon (1958) put it: routine drives out thinking.

Though all these mechanisms point to problematic aspects of organizing and rationality, it should be stated clearly that this modification does not necessarily imply actual inefficiency or, more broadly, dysfunctionality. While inefficiency is of course a possible outcome, it is only that inefficient cases seem to be more interesting and constitute a more pressing managerial problem. In this sense, one can quote the opposite phenomenon of the Theory-X-loop, namely the Theory-Y-loop. It is also depicted as a process of self-reinforcement, however resulting in a reverse positive outcome. It may be a worthwhile research question to explore whether a lock-in situation induced by a Theory-Y-loop could also evoke negative organizational effects. One argument could be that a Theory-Y-lock-in excludes other, and in some cases possibly more adequate action alternatives. That is to say, a lock-in situation may lead to the *potentially* problematic situation in which the concerned organization or interorganizational network has lost (at least partly) its capability for coping with a complex and changing environment, even if the present situation generates positive returns. From a managerial point of view, a lock-in situation has for this reason to be investigated, not only with regard to current, but also to future returns.

(2). The second element of classical path dependence theory that needs reformulation is the notion of *small events*. As mentioned, this is conceptualised as a purely contingent or even random event; a more realistic path theory cannot, however, refrain from including intentions and

strategic manoeuvring. That is to say, a modified theory should pay more attention to the possibility of creating small events, of turning small events into bigger ones (by re-interpreting or re-enacting, for instance), or of setting out big events right from the start. Take for example the possible impact of a merger or acquisition on the developmental path of an organization. Therefore, the occurrence of small events should not only be conceived as random events, but also as the possible result of individual or collective action that is not only guided by the cognitive and normative rules of a social system, but also built upon the very resources of this system, which agents can draw upon in their interactions (Giddens 1984).

From this reasoning it follows that Phase I is not only dominated by undirected search and random selection, but also by deliberate initial decisions, investments or intended resource allocations. Therefore social processes, guided by rules and resources, are rather relevant here. Thus, even in this "pre-paradigmatic phase" (Dosi 1982), a path-dependent or local search is much more likely than an undirected and global search process, because, in this early process, agents already refer to the structures or structural properties of a social system (like the organization, the network or the field[5]) and more or less consciously select one or other of many alternatives. Depending not least upon the social positions of the agents in the field, they more or less powerfully narrow down the scope of choice available (see Figure 2). In the end, however, it is not power per se that constitutes the path, but the positive feedback process.

(3). A third element that needs modification is the *deterministic character* of Phase III. As already mentioned, if compared to technological solutions, organizational processes are often less restrictive and under no circumstances deterministic (Schreyögg 1980). Instead of a full-blown lock-in, a modified theory should conceive of a restricting corridor, evoked after the critical juncture (similarly Thelen 1999, Pierson 2000, and also Bruggeman 2002 for an illustrative example). A modified version should take into consideration that actors often have the scope to interpret a path differently and, at least to some extent, to even deviate from this path by acting otherwise.

At this juncture, an epistemological remark is due. There is an unfortunate tendency with path theory to reify paths and to attribute an objective quality to them. We should however not forget

[5] That regional fields can also be locked-in has convincingly been shown for the Ruhrgebiet in Germany by Grabher (1993), for example.

that organizational paths and lock-ins are, whatever the concrete conceptualization, basically a social construction, and that they thus never have, despite all experienced inertia and persistence, a final character. Recursive pattern reproduction should not be equated with natural laws. They are construed and therefore pliable.

Figure 2 summarizes the suggested modifications.

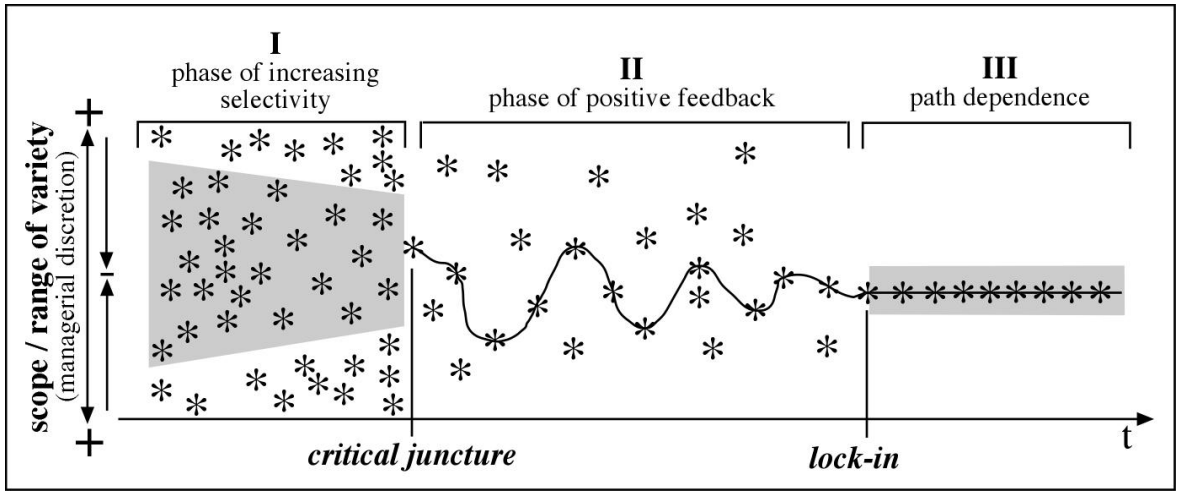

Figure 2: Constitution of an organizational path – A modified and expanded model

While aiming to overcome the deterministic character of classical path dependence theory, the proposed model of a "developmental view of path dependency" (Ebbinghaus 2005) still builds on a rather concise notion of path and path dependency. An alternative strategy would have been to enlarge the focus of the theory broadly. This is followed by the numerous studies that only loosely refer to the notion of path dependency. Among others, Teece et al. (1997) seem to apply this strategy when they already refer to strategic paths and path dependency when earlier decisions shape later ones, i.e. when the insight that history matters is acknowledged. Under these circumstances, paths or trajectories would be nothing other than evolutionary processes shaped by history and influencing the present and the future. The fatal consequence of this approach, however, would be that all organizational and interorganizational processes would constitute paths and be characterized by (at least some) path dependency. Then the notion of path dependency would not be much more than a metaphor highlighting nothing other than a social truism. This is also important from a managerial point of view, because if path dependence is considered a ubiquitous (side) effect of any decision making, then it does not draw a distinction for any decision taken.

To sum up, we define an organizational path as a social process that has been created by a small or bigger event, is governed by positive self-reinforcing feedback, setting a specific pattern of pattern into motion, and has gained momentum to an extent that, at least potentially, leads to a lock-in. Hence, organizational paths always imply some degree of path dependency.

4 Unlocking Path Dependencies

In order to render the model of path dependency more realistic – and more relevant for understanding managerial practices in and between organizations – a further deficiency has to be overcome. This deficiency also results from the fact that the original model does not pay attention to the plasticity of the action patterns in question and the possibility of agency beyond following the once chosen path. Reflexive agents with sufficient resource endowments may even engage in breaking paths, even if a lock-in has occurred. There are several reasons for this assertion. Let us first explore the epistemological dimension.

From an epistemological point of view, the idea of active and intentional path breaking constitutes a contradiction, if not a paradox, at least at first sight. If we define – as we have done above – path dependency as a situation in which an individual actor or a group of actors have lost (at least partly) their power to choose among alternatives because a path reproduces a certain pattern of decisional behavior, then the assumption that the same actor can unlock the path obviously represents a contradiction. In principle, one cannot assume both at once, path dependency and path breaking. It is quite obvious that the idea of unlocking paths implies a theory of path dependency of less deterministic nature than the classical one. The social forces of pattern reproduction have to be put into perspective.

One of the most appealing insights into the nature of social invariances stems from Johan Galtung (1978), who claims that the only reason in the social world for detecting social laws is to break them. By informing people about social invariance, we simultaneously provide a target for changing them, for making them disappear or preventing them. This idea is similar to the concept of "double hermeneutics" (Giddens 1984) that articulates the fact that, in the social realm, the formulation of any laws and of any propositional knowledge is not independent of the field in which these laws are presumed to be at work:

"Sociological knowledge spirals in and out of the universe of social life, reconstructing both itself and that universe as an integral part of that process" (Giddens 1990: 15-16).

Transferring these general statements to our specific problem of the double assumption of path dependence and path breaking means that, within a particular system, a certain situation may well amount to path dependency. But given the reflexivity of those who reproduce the path, at least the potential of unlocking the path is implied. The awareness of path dependence may trigger activities to loosen it. As already stated, organizational paths are social constructions even if they are subjectively experienced as deterministic forces.

4.1 Path Dissolution

The unlocking of paths may be brought about intentionally, but it can also simply occur, for organizational paths, even path dependencies, may simply dissolve. That is to say, paths do not only emerge, but may also stop being relevant for interaction. A case that nicely illustrates processes of such unplanned path dissolution on an organizational level refers to Intel's strategic moves in the memory business and has been presented by Burgelman (1994) and Burgelman and Grove (1996). Entering the chip market only in 1969/70, Intel became the market leader two years later and generated 90 per cent of its revenues from dynamic random access memory (DRAM) products. Soon becoming a mass market where Intel had to face fierce competition, especially from Japanese manufacturers, the emphasis of competition shifted increasingly from innovation to cost leadership. Nevertheless, Intel planned to stick with DRAM chips as a core technology and continued to dedicate a third of its research and development expenditures to this technology as late as 1985/84. Despite a dramatic downturn in this particular market, Intel stuck with its strategy – and its technology – for times to come. At the same time, Intel expanded its range of products to erasable programmable read-only memories (EPROM) that were an accidental spin-off from the DRAM research. Because of Intel's routine to allocate commissions to its then eight factories according to demand, more and more production capacity came to be used by what was originally considered a by-product: EPROMs. In 1984 only one of these factories continued to produce DRAMs, although the strategic plan that considered this as the firm's core technology had not been changed.

While the middle management of Intel proposed to outsource DRAM production to a specialized contract manufacturer two years earlier, the top management stuck with the firm's official strategy. Nevertheless, the middle management, using the normal routines of commission allocation, succeeded in extending the capacities for the new, higher margin EPROM business. Hence, the middle management was quite effective in influencing the course of the development by a little visible use of power. Later it was again the middle management that took over the responsibility for developing a new technology, in this case microprocessors, long before the firm's strategy acknowledged that Intel had turned away from the memory to the microcomputer business. The later CEO, Andy Grove, remembers:

"By mid-1984, some middle-level managers had made the decision to adapt a new process technology which inherently favored logic (microprocessor) rather than memory advances, thereby limiting the decision space within which top management could operate" (Burgelman 1994: 45).

Only at the end of 1984, when the decision was to be taken to invest in building an additional capacity for manufacturing DRAMs, in order to keep the costs per unit as low as possible, did the top management decide to quit the path followed so far and change strategy. But at that point in time, the path had practically already been quit. In October 1985 Intel finally and officially discontinued the DRAM production and converted to a pure manufacturer of EPROMs and, even more so, microprocessors. Quitting the manufacturing of this technology enabled Intel to adopt other major changes. Among others, the formal structure of the organization was changed, and production outsourcing received a higher priority.

This rather emergent process nicely demonstrates the inertia of a once chosen strategy and/or technology (see Mintzberg and Waters 1985 on emergent strategies). But at the same time it shows that rigidities are not as fixed as they may appear; Intel represents a case of 'silent' path dissolution. Such a dissolution of paths, however, raises the question whether unlocking simply occurs or can be deliberately set into motion, an important distinction that the notion of "deinstitutionalization" (Tolbert and Zucker 1996) does not take into account.

4.2 Unlocking Paths

The question of intentionally breaking, destructing or unlocking paths has first of all to address the epistemological nature of paths, which we have clarified above. If paths were considered law-

like effects resulting from an independent cause, ultimately unavoidable and therefore totally fixed in their course of events, then the idea of unlocking paths would be illogical and redundant. Only if paths are considered, as suggested before, essentially social constructions which become reality for actors in and by their very acting does the idea of unlocking paths gain plausibility. In this vein, we should not forget that organizational paths result from human activities, in particular from specific types of entrepreneurial decision making (not least about investments), where alternative ways of actions were always at hand. Path dependency in its classical version mis-characterizes "the fragility of any path as it is produced and reproduced through micro level practices where social rules and artifacts are enacted" (Garud and Karnøe 2001: 8, referring to Giddens 1984). If organizational paths are malleable, the question arises as to how this could be made to happen. Once again, related fields of organization research may be helpful in finding preliminary answers to this question. Approaches of potential interest are, for instance, research on "frame-breaking change" (Nadler and Tushman 1986), "organization development" (Cummings and Worley 2001), and "trans-organizational development" (Cummings 1984).

A first review of this kind of more applied organizational research reveals that at least three different approaches to changing organizations and interorganizational arrangements may be of salient importance: discursive, behavioral, and systemic. It should be emphasized that none of these approaches deals explicitly with issues of path dependencies, not to mention provides a theory of unlocking paths that builds upon a theory of path constitution and specifies the conditions under which a once chosen path may be unlocked. It is, however, not only possible to draw analogies, but to reformulate these approaches in terms of path breaking.

In detail, *discursive* approaches assume that surfacing hidden self-reinforcing patterns in organizational settings put the reflection of these patterns – including those that constitute paths or path dependencies – on the agenda of the organizational discourse. Reflecting on hidden dependencies helps to understand the underlying mechanisms and, thereby, to reflect on the possibilities of changing them. In some cases external consultants have proved helpful, not only in discovering patterns and overcoming "inertial self-perceptions" (Burgelman and Grove 1996), but also in unlocking organizational and interorganizational patterns by introducing an irritating new perspective.

Behavioral change approaches highlight the fact that inertial patterns are caused by and depend upon unconscious routines rather than reflexive action, and on emotions rather than on cognitions. In the analysis of the Intel case, Burgelman and Grove (1996: 15) in fact admit that "emotional attachment on the part of the top management to the business" was intertwined with inertial self-perceptions. The authors point to the efficacy of the "internal selection environment", others, in the tradition of the behavioral approach, would consider a broad catalogue of behavioral intervention techniques (cf. Cummings and Worley 2004) for unfreezing fixated patterns and routines. These techniques proved to be particularly effective if they not only simultaneously addressed managers at several hierarchical layers, but also acknowledged the path-dependent character of some, if not many organizational and interorganizational processes.

Finally, *systemic* approaches start from a more macro-perspective and do not primarily focus on individual cognition, emotion or behavior, but on the structures of the social system and how they are reproduced. Modern social theories, such as systems theory (Luhmann 1995), structuration theory (Giddens 1984), or complexity theory (Kauffman 1993) are increasingly applied to the analysis of organizations and interorganizational networks (e.g., Brown and Eisenhardt 1998, McKelvey 1999, Baum and Silverman 2001, Staber and Sydow 2002, Feldman 2004, Hernes and Baaken 2003, Mingers 2003). Their application in these fields of analysis contributes much to the understanding that organizational and interorganizational arrangements are somewhat fluid social systems that, however, are strongly influenced by their own history, even in their patterns of change. They all emphasize that

(1.) the structures have to be continuously reproduced by the organizational actors, that

(2.) these very structures emerge to a large extent behind the backs of the individual agents (i.e. on a system level), and that

(3.) they not only guide and restrain, but also enable (inter-) actions in and of the very system.

According to this line of reasoning, any effective intervention designed to unlock routines and paths has to address the systems level and to include social, spatial, temporal and symbolic dimensions of change. Systemic intervention techniques focus on irritating the system by means of unexpected messages or paradoxical actions in order to break up hidden routines and patterns (Selvini-Palazzoli 1986, Königswieser and Hillebrand forthcoming).

In addition to these three approaches that have developed in the tradition of Organizational Development (OD) and have been extended to the interorganizational level more recently as

trans-organizational development (TD), a *resource-based* approach to change should also be considered. This would be very much in line with the evolutionary theory of path dependency, which now recognizes that path dependency is essentially an allocative process and that a (technological) lock-in may not be a final lock-in, but "by historical standards a transitory state of affairs" (Witt 1997: 763). Moreover, the role of resources is of particular importance in path dependency theory, given the likelihood of transaction specific investments and sunk costs, especially in the case of big events that cause lock-ins.

This is especially the case when agents have enough resources and/or are able to mobilize a critical mass to overcome persistence. The allocation or reallocation of resources is usually an important and effective means to initiate and implement organizational or interorganizational changes. Particularly relevant for change and learning may be slack resources as well as redundant and multiplex relationships inside and outside the organizations (e.g., Kuwada 1998, Staber and Sydow 2002, Crouch and Farrel 2004). Structuration theory, in particular, emphasizes that the change of social systems should always be discussed with reference to both rules *and* resources, and with regard to their recursive interplay, highlighted by Giddens' (1984) theorem of the duality of structure (see also Feldman 2004). Given the scarcity and stickiness of resources, rules of signification and legitimation may force agents to stay on course with their organizing routines, especially when sense-making routines and moral norms orient the actors' reference and usage of resources. Table 2 summarizes the four different foci of path-breaking concepts. Whether they should be addressed separately, simultaneously or consecutively is still one of the many questions to be explored.

	Focus	Source of path dependencies	Approach for path-breaking concepts
1.	Cognitive	self-reinforcing blind spots („we don't see that we don't see"); reflection trap	organizational discourse, supplemented by information from external consultants etc., new knowledge/ perspectives
2.	Emotional	self-reinforcing or escalating commitment ("this commitment *is* our identity and the more we are commited the stronger is our identity..."); commitment (or identity) trap	behavioural interventions, mainly on the group level
3.	Social	self-reinforcing norms, standards and basic assumptions ("what we are doing is right *because* we are doing it..."); normative (or cultural) trap	systematic interventions by irritating the social system in order to break systematic routines and patterns
4.	Resource	self-reinforcing resource allocation ("if we gave up this investment it would be wasted..."); sunk costs trap	reallocation of resources, taking into account prevailing cognitive and normative rules

Table 2: "Anchors" for applying path-breaking concepts

Karim and Mitchell (2000), focusing on resources allocation issues when analyzing the role of acquisitions in organizational change, argue that a path-breaking change following an acquisition may generally be less frequent, but may well occur "in cases where expansion incentives and competitive pressures outweigh path dependence" (Karim and Mitchell 2000: 1068). However, whether the acquisition of an organization allows a path-dependent resource deepening or a path-breaking resource extension, may not only depend upon the relative similarity of the acquiring and the acquired organization and, hence, on resources, but also on how this event is enacted, interpreted and communicated by the managements of the two firms. This may mark a critical juncture, whereby the managers, in their interpretations and communications, necessarily refer, not only to the resources, but also the rules of the participating organizations, the organizational field, and eventually even to the relationship the two organizations maintained before the acquisition took place.

Therefore, the emergence of path-dependent processes should be conceived as an outcome of individual or collective action that is not only guided by the cognitive and normative rules of a

social system, but is also built upon the very resources of this system that agents can draw upon in their interactions (Giddens 1984).

However, not every specific investment or sunk cost that implies some kind of 'dependency' indicates path dependency; for the latter, according to our re-conceptualization, assumes definitively positive feedback and, finally, lock-in. Moreover, human agency or entrepreneurship has to be taken into account in order to account for exactly how agents enact the allocative and authoritative resources (Giddens 1984, Feldman 2004). From this reasoning it follows that Phase I is not dominated by undirected search and random selection. Rather, social processes, guided by rules and resources, are relevant here, too. Thus, even in this "pre-paradigmatic phase" (Dosi 1982), a path-dependent or local search is much more likely than an undirected and global search process, because in this early process, agents already refer to the structures or structural properties of a social system (like the organization, the network or the field[6]) and more or less consciously select one or other of many alternatives. Depending not least upon the social positions of the agents in the field, they more or less powerfully narrow down the scope of choice available (see Figure 2). In the end, however, it is not power per se that constitutes the path, but the positive feedback process.

Despite these possibilities to break organizational paths, a caveat is due: there is not always a need for organizational actors to escape path dependencies, neither by emergent dissolution nor by strategic unlocking. For, as the classical model of path dependency has already taught us, some agents may just profit from staying on the path and, thereby, earn significant differential rates of return. In the following section we try to carry the expansion and modification of path dependency theory one step further and to explore whether it is even possible to deliberately create organizational paths that, by definition, always imply a certain degree of path dependency.

5 Creating Organizational and Interorganizational Paths

The discussion so far has assumed the historical existence of a technological, institutional or (inter-) organizational path. A challenging question is whether the emergence of paths does not simply occur, but can be deliberately brought about. The idea of (intentional) path creation was

[6] That regional fields can also be locked-in has convincingly been shown for the Ruhrgebiet in Germany by Grabher (1993), for example.

introduced by Garud and Karnøe (2001: 6), who refer to Schumpeter (1942) and define path creation as follows:

"Specifically, entrepreneurs may intentionally deviate from existing artifacts and relevance structures, fully aware they may be creating inefficiencies in the present, but also aware that such steps are required to create new futures. Such a process of mindful deviation lies at the heart of path creation."

By referring to the Schumpeterian entrepreneur, these authors emphasize the functional role of creative actors in and across organizations, but do not at all restrict the notion to entrepreneurs in an institutional sense.

Following this definition, mindful deviation from an existing path is essential, specifically with regard to the technical artifact and to social structures. Referring to structuration theory, Garud and Karnøe (2001) emphasize a second, more resource-related requirement that has to complement mindful deviation: collective entrepreneurship. That is, individual actors within an organization and, increasingly, corporate actors across several organizations join forces in order to coordinate their activities and develop a true chance to create a new technological, institutional or (inter-) organizational path strategically, because it is assumed to be economically attractive for them.

With regard to technological paths, research consortia and technical committees usually offer a quite effective organizational framework to coordinate collective action (e.g., Browning et al. 1995, Doz et al. 2000). The situation for the creation of institutional and (inter-) organizational paths is much less clear. Without considering the founding of an organization, can individuals and organizations, by working together in an intra- or interorganizational network for example, more easily overcome their structural inertia and create a new (inter-) organizational path? While the path-creating role customer relationships play with respect to the development of organizational competences is well-known (Danneels 2002), other conditions that are conducive to path creation have still to be explored. This is also the case on a network level, where the role of organizational path dependencies for the – eventually path-dependent – development of the collective entity needs to be investigated as, in turn, the impact of any path dependency of the network (e.g. Walker et al. 1997, Gulati and Gargiulo 1999) on the development of its member organizations.

The mere existence of relational and coordinative institutions (like consortia and other types of networks) is certainly not sufficient. Rather, one can assume that the agents have to develop

effective relational or coordinative practices, within these frameworks, that are based upon common understandings and norms and be able to draw on sufficient resources in order to "generate momentum" (Garud and Karnøe 2001). Even more than the necessity for mindful deviation, this generation of momentum makes clear that the intentional creation of a technological, institutional or (inter-) organizational path is likely to take time and to require valuable resources and sustainable actions on the part of the path creators.

It would appear that the momentum must be so great that a critical mass develops, attracting additional actors with their resources and, eventually, distracting them from an existing path. The idea of path creation, however, does not necessarily imply that an existing path dissolves or has to be unlocked. Rather, this path may continue to exist even though a new path is in the making. So it may take some time until it attracts followers. Up to now, it is also unclear how exactly such a momentum can develop and how it can overcome the attraction – e.g. the legitimizing force – of the existing path. While the classical theory of path dependency emphasizes the importance of increasing returns and the rational actions of isolated agents, our modified and expanded model argues for a chain of positive self-reinforcing feedback (not necessarily increasing returns) as well as for social interaction of more or less powerful agents that develops into the collective entrepreneurship delineated above. A necessary condition is the existence of structures that enable agents to act in this very way (Giddens 1984). The outcome of this process would be a recursive stabilization of behavior on a systems level of analysis, in an industry for example.

Some more insights into the process of deliberately generating momentum can be gained from a recent study by Jansen (2004) that not only differentiates between momentum (or pursuit) from negative and more static strategic persistence or inertia (Miller and Friesen 1980, Amburgey and Miner 1992, Amburgey et al. 1993, Sastry 1997), but also emphasizes the interplay between creating initial momentum and causing fluctuations in momentum over time. Studying momentum as an organization-level phenomenon that is based upon the perceptions of organizational members, Jansen defines these two types of momentum as follows: "*stasis-based momentum*, describing the energy associated with, persisting with or extending the current trajectory, and *change-based momentum*, describing the energy associated with pursuing a new trajectory. The proposed distinction is important, because if change is going to occur, the energy directed at maintaining the current trajectory must be redirected, replaced, or overcome by the momentum in the new direction" (Jansen 2004: 277). Like dialectical forces, these two types of

momentum may play an important role in creating a path – or, as in her study, a significant cultural change. While the former stabilizes path-dependent processes within and between organizations, the latter force is likely to outweigh these.

It is change-based momentum that needs to be generated in order to overcome inertia, to create a new path, and this to an extent that helps not only to overcome structural inertia and stasis-based momentum, but eventually to enable a kind of "quantum change" (Miller and Friesen 1980) that affects the organizational *gestalt* significantly and is likely to redirect an organization from a former path and to create a new one. Jansen (2004) identifies two possible sources for establishing change-based momentum: top-down and bottom-up sources. Additional sources, from our perspective at least, may be found beyond or outside the organizational hierarchy, in the course of a merger or an acquisition, for instance. Such external sources seem to be particularly decisive where change requires collective entrepreneurship in the form of interorganizational cooperation. Finally, Jansen (2004: 279) claims that "even if change-based momentum has been established, a tension between stasis- and changed-based momentum may remain", so that "the organization may have to contend with two potentially divergent paths. Stasis-based momentum may also return as events unfold, because of fluctuating commitment to the change or the introduction of a modified or altogether different change goal. A common example is that after an organization pursues a particular change path for some period of time, the goal itself may change, introducing yet another trajectory with a momentum of its own. In this case, there are once again two competing trajectories and a new tension to resolve."

The formula of path creation based upon mindful deviation and generating momentum points to a practice that may be of increasing economic, political and social relevance, especially in times characterized by network technologies, wide-reaching institutions, and intensive (inter-) organizational cooperation. Less clear is its contribution as a possibly powerful theoretical lens through which many cases investigated have been perhaps over-hastily interpreted as path-dependent processes in which agents' undirected search or small events triggered a process that evolved behind the backs of the agents. For instance, revisiting the 'war' between VHS and Beta over establishing a global video standard from this perspective might clarify whether the 'victory' of VHS over Beta was less an outcome of a path-dependent process, in which agents only had the chance to strategically join the one technological path or the other, than the outcome of intentional path creation.

In their study of this 'war' over technological standards, Cusumano et al. (1992) in fact emphasize agency, deliberate strategy, and strategic maneuvering on the part of the firms involved, in particular Japan Victor Company (JVC), the originator of the VHS system. Above all, these authors show how important was JVC's capability to partner with other firms strategically and to manage interorganizational relationships in order to win the war for this system. A first decisive step was to license this technology out to other players, not only in Japan, but also in Europe and the United States. At the same time, JVC made strategic use of the abundant capacities and competences of its parent, Matsushita, and, thereby, was not only able to realize significant economies of scale that – via lower prices – increased demand for VCRs based on this standard, but also to secure sufficient supplies for the US market. A second important strategic move was to engage in an alliance with Magnetic Video Corp. of America (with its MV Club). This relationship ensured that VHS became the standard system for rental videos which, in turn, was decisive for success on this US market. This triggered the interest of Hollywood studios to produce for this format. Overall, the authors conclude from their study:

> "The alliances that JVC formed for production and distribution and the timely strategic commitments of its ally, Matsushita, proved to be decisive factors in the triumph of VHS over Beta" (Cusumano et al. 1992: 88).

It is quite unlikely that the events described here should be classified as 'small'. More convincing is the argument that corporate actors have acted strategically and collectively in order to create a technological path that is not only profitable but sustainable. While the moves for generating momentum are obvious in this case, no 'mindful deviation', the second component of Garud and Karnøe's concept of path creation, has been documented. The reason for this is simply that no earlier technology for taping and playing films at home was in place when VHS and Beta were introduced to the market. Nevertheless, it has to be noted that these technologies did not emerge from nowhere. Rather, they had been derived from the U-Matic system that was exclusively used for professional purposes. Moreover, the public was already used to viewing films at home (via television) and some even had (consumption) experience in terms of playing rented super 8 movies at home. Hence, history also mattered in this case of the strategic creation of a (technological) path, indeed very early on in the process.

This case of standard setting, which is likely to regain attention in face of the present DVD permeation, not only illustrates the importance of path dependency and/or path creation in the case of technological revolutions, but also the relevance of organizational and interorganizational

paths. For instance with regard to Sony, the case demonstrates that this firm was not able to turn its technological competence into a market success of the Beta system. Precisely because of its very technological leadership in the field of consumer electronics, the company focused on the development and manufacturing ('making') of technologically complex and difficult to manufacture products (Cusumano et al. 1992: 68-69). Though Sony was principally ready to enter strategic alliances for manufacturing and marketing these products, it tended to wait with the implementation of these collective strategies until the technology was fully developed. Focusing on its own research and development capabilities had the unintended consequence that external manufacturers and marketers could not have any say in the development of the technology. In consequence, these were organizationally unprepared to take on further responsibilities or to commit themselves exclusively to the technology.

It is true that none of Sony's competitors had a more advanced capability for technological development alone. The network of alliances initiated and sustained by JVC, however, had a greater capacity for product differentiation and helped the VHS technology to catch up and finally to succeed in the battle over video standards. While Sony certainly had premier internal resources, JVC was more capable of mobilizing external resources via networking and had a much superior "alliance capability" (Kale et al. 2000).

Figure 3 adds to the modified and extended model of path constitution the idea of intentional path creation. By implication, Phase I would lose most aspects of undirected search and randomness. Instead, powerful agents ally in order to generate the momentum necessary to create a new technological, institutional or (inter-) organizational path. We should however emphasize that path creation is not assumed here to be the rule, but is just another possibility beyond the random effects. As a result, different types of path constitution may exist; random emergence and deliberate creation.

As the change-based momentum can hardly be achieved in a moment, Phase II, which again begins from a critical juncture, highlights the necessity of sustained effort by the network or any other collectivity of organizations or organizational members to shape the path-in-creation. Even more than the earlier phase of path creation, this phase of path shaping requires that the agents have access to the necessary resources, understand the rules of the game, organize collective action effectively, and gain legitimacy for their collective action (Aldrich and Fiol 1994, Human

and Provan 2000, Rao and Singh 2001). A mindful deviation, however, in these two phases is only necessary when another path already exists. Due to the path-creating and path-shaping activities, the process becomes – as intended and pictured in Phase III – locked-in and path-dependent in the classical way.

Whatever the creation process in detail, it is meant as an addition, as another possible case, not as a substitution of the random- small event-logic.

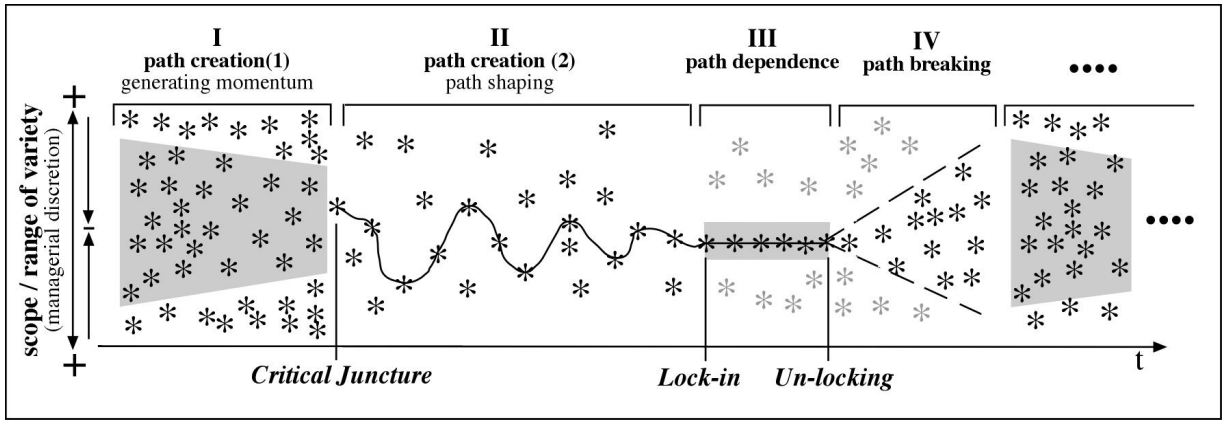

Figure 3: Breaking and creating organizational paths: Alternative route in face of path dependency

6 Conclusions for Organization Research and Managerial Practice

The concept of path dependency, if not only used as a metaphor, has much to offer, not only for a better, more rigorous understanding of the development and diffusion of technologies and institutions, but also for an explanation of the continuity and change of organizational and inter-organizational arrangements. Defined in a clear-cut manner, it goes beyond the truism that history matters, but it does not address all processes of change and stability. In addition, questions arise concerning the possibilities and limitations of unlocking, changing and even creating paths. Organization research focusing on such questions and events would nicely supplement, not only the present trend towards process studies with their inevitable historical component, but also towards studies of organizations and inter-organizational arrangements as fluid or even chronically unfrozen systems.

As may be concluded from the discussion so far, an organizational path is a constituted, recursively stabilized pattern, orientating and directing social action and reflection (on this action) in a more or less predictable way by excluding alternative forms of action and/or reflection. Such a path is initially either triggered by a contingent event or created intentionally. It relies, from then on, on repetitive organizational or interorganizational practices governed by positive self-reinforcing feedback, and is in any case reflected in the structures of a social system. Similar to technological trajectories (Dosi 1982) or technological regimes (Rip and Kemp 1998), it embodies strong prescriptions on the direction of the development. Emerging in the course of time and extending also in space, and characterized by a certain momentum and significant persistence, an organizational path will exclude or lock out formerly feasible alternatives and may, finally, lead to a lock-in.

The conditions that are conducive to path dependency, path unlocking, and path creating respectively, would also have to be explored in significantly more depth and could be related to different types of organizational paths. What, for example, is the actual role of incompatibilities and inconsistencies built in an organizational system on the one hand and of powerful vested interests in that system on the other, within a predominantly path-dependent process (Greener 2005)? What is the impact of "initial disturbances" (Pierson 2000) that trigger a possibly powerful response from one side or the other, on the constitution of the positive feedback mechanism? Such questions should preferably be explored in in-depth longitudinal case studies, using qualitative as well as quantitative methodologies. In contrast to the VHS case delineated above, these substantive studies should not only focus on path dependency, -breaking and/or -creating issues with respect to technology, but with regard to organizational and interorganizational arrangements. Moreover, and by contrast to the present predominance of inquiries from the outside in current path dependency research, such studies should rather aim at opening the 'black box' and looking inside into the path constitution processes.

Although this paper marks the beginning and not the end of organization research that takes the concept of paths seriously, some first implications for *managerial practice* can be outlined. For managers, as well as for some other stakeholders (e.g. regulators), it is increasingly important to identify actions and events that may actually trigger a path-dependent process in and across organizations as early as possible. As stated before, this is a very tricky endeavor in the case of small events, but easier if bigger events constitute a critical juncture. In the analysis of the Intel

case referred to earlier, the detection of strategic dissonance signals at "strategic inflection points" (Burgelman and Grove 1996) was proposed in order to describe when one type of industry dynamics gives way to another and/or when, on the firm- or business unit-level, one strategy changes into another, no matter whether deliberate or emergent. Once identified, management should not give up, but join in the process of path-shaping, even of path-breaking and creating. The problem, however, is that all of them may be path-dependent, at least to some extent. In case a path-dependent development has emerged, management may choose between following the path rigidly and deviating mindfully from the path; if the competences and resources to mindfully deviate from the present path and to generate momentum by organizing for collective entrepreneurship are available.

Both strategies – breaking and creating a path as well as staying on a certain path – may well be profitable for those who establish and/or follow a certain path. This means that, in general, a more reflexive approach to path issues seems advisable. In addition to reflexive attention, path-breaking and path-creating strategies are likely to require not only competent reference to rules and norms, but also significant amounts of allocative and authoritative resources – and a prolonged energy investment on the part of those who strive for organizational or interorganizational change. This has to be taken into account by managers and others interesting in breaking and creating a path. This requirement also implies that the creation of organizational and interorganizational paths will not be possible for every individual, every organization or interorganizational network. In any case, taking path-dependent processes into account will give managers and others a more realistic understanding about the possibilities and limitations of organizational and, eventually, interorganizational change.

Before any specification of these rather general managerial implications, *organization research* needs to find answers to numerous questions. Among them are:

1. Which theoretical perspective should be used to ground and to further specify the modified and expanded model of path constitution? More specifically, should it be based upon abstract social theories like structuration theory or upon more concrete, middle-range theories of organization or a mixture of both?

2. How should the relationship of unlocking and creating organizational paths in face of path dependency be precisely conceptualized? To what extent and under what exact circumstances, for

instance, can a path dependency not only be unlocked, but intentionally created? These questions require much more conceptual and empirical analysis, as do the following:

3. Which forces beyond the organizational and the interorganizational level of analysis should be taken into account? Which should be conceptualized as endogenous to the feedback process, which as contextual or situational factors influencing the dynamics? And should the interplay between multi-levels of analysis really be conceptualized as co-evolution – as suggested by Lewin and colleagues (Lewin and Koza 1999, Volberda and Lewin 2003) and several authors in Garud and Karnøe (2001), for example? – Especially given that "being aware of path dependence" (Volberda and Lewin 2003) seems to be an essential requirement for empirical research that takes the idea of co-evolution seriously.

4. Which qualitative and quantitative methods are adequate to inquire into paths and path dependencies in general and to disentangle path dependencies and the effects of a more general social embeddedness in particular? What, then, are the relative contributions of qualitative inquiries from the inside and quantitative analysis from the outside? What about the relevance of historical inquiry in organization studies in general (Kieser 1994) and the reconstruction of "organizational biographies" (Kimberley and Bouchikhi 1995) in particular? Where should they start and where should they end?

5. What are the implications of an increased scholarly attention to paths and path dependencies for organizational and interorganizational research in general? Is it more likely to complement or to modify present theories of organization?

Even without having answered these questions in this paper, we believe research on paths in general and on organizational paths in particular should and will continue to be on the agenda of organization research.

References

Aldrich, H.E., Fiol, C.M. 1994. Fools rush in? The institutional context of new industry creation. *Academy of Management Review* **19** 645-670.

Amburgey, T.L. and Miner, A.S. 1992. Strategic momentum: The effects of repetitive, positional, and contextual momentum on merger activity. *Strategic Management Journal* **13** 335-348.

Amburgey, T.L., Kelly, D., Barnett, W.P. 1993. Resetting the clock: The dynamics of organizational change and failure. *Administrative Science Quarterly* **38** (1) 51-73.

Antonelli, C. 1999. The economics of path-dependence in industrial organization. *International Journal of Industrial Organization* **15** 643-675.

Argyris, C. 1976. Single-loop and double-loop models in research on decision making. *Administrative Science Quarterly* **21** 363-375.

Arinõ, A., De La Torre, J. 1998. Learning from failure: Towards an evolutionary model of collaborative ventures. *Organization Science* **9** (3) 306-325.

Arrow, K.J. 2004. Path dependence and competitive equilibrium. In: Guinnane, T.W., Sundstrom, W.A., Whatley, W.C. History matters. Essays on economic growth, technology, and demographic change. Stanford, Cal.: Stanford University Press, 23-35.

Arthur, W.B. 1989. Competing technologies, increasing returns, and lock-in by historical events. *Economic Journal* **99** 116-131.

Arthur, W.B. 1994 Ed. *Increasing returns and path dependency in the economy*. University of Michigan Press, Ann Arbor.

Barr, P.S. 1998. Adapting to unfamiliar environmental events: A look at the evolution of interpretation and its role in strategic change. *Organization Science* **9** (6) 644-670.

Bassanini, A.P., Dosi, G. 2001. When and how chance and human will can twist the arms of clio: An essay on path dependence in a world of irreversibilities. Garud, R., Karnøe, P. Eds. *Path dependence and creation*. Earlbaum, Mahwah, N.J.: 41-68.

Baum, J.A.C., Silverman, B.S. 2001. Complexity, attractors, and path dependence and creation in technological evolution. Garud, R., Karnøe, P. Eds. *Path dependence and creation*. Earlbaum, Mahwah, N.J.: 169-209.

Bebchuk, L.A., Roe, M.J. 1999. A theory of path dependence in corporate ownership and governance. *Stanford Law Review* **52** (1) 127-170.

Beyer, J., Wielgohs, J. 2001. On the limits of path dependency approaches for explaining postsocialist institution building: In critical response to David Stark. *East European Politics and Societies* **15** (2) 356-388.

Brown, S.L., Eisenhardt, K.M. 1998. *Competing on the edge: Strategy as structured chaos*. Harvard Business School Press, Boston.

Browning, L.D., Beyer, J.M., Shelter, J.C. 1995. Building cooperation in a competitive industry: SEMATECH and the semiconductor industry. *Academy of Management Journal* **38** (1) 113-151.

Bruggeman, D. 2002. NASA: A path dependent organization. *Technology in Society* **24** 415-431.

Burgelman, R.A. 1994. Fading memories: A process theory of strategic business exit in dynamic environments. *Administrative Science Quarterly* **39** 24-56.

Burgelman, R.A., Grove, A.S. 1996. Strategic dissonance. *California Management Review* **38** 8-25.

Carney, M., Gedajlovic, E. 2002. The co-evolution of institutional environments and organizational strategies: The rice of family business groups in ASEAN regions. *Organization Studies* **23** (1) 1-29.

Carroll, G.R., Harrison, J.R. 1994. On the historical efficiency of competition between organizational populations. *American Journal of Sociology* **100** (3) 720-749.

Carroll, G.R., Swaminathan, A. 1992. The organizational ecology of strategic groups in the American brewing industry from 1995-1990. *Industrial and Corporate Change* **1** 65-97.

Ciborra, C. 1996. The platform organization: Recombining strategies, structures and surprises. *Organization Science* **7** 103-118.

Cohen, W.M., Levinthal, D.A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly* **35** (1) 128-152.

Collier, R.B., Collier, D. 1991. *Shaping the political arena: Critical junctures, the labor movement, and regime dynamics in Latin America*. Princeton University Press, Princeton, Penn.

Coombs, R. and Hull, R. 1998. Knowledge management practices' and path-dependency in innovation. *Research Policy* **27** 237-253.

Crossan, M.M., Berdrow, I. 2003. Organizational learning and strategic renewal. *Strategic Management Journal* **24** 1087-1105.

Crouch, C., Farrell, H. 2004. Breaking the path of institutional development? Alternatives to the new determinism. *Rationality and Society* **16** (1): 5-43.

Cummings, T. G. 1984. Transorganizational development. Staw, B. M., Cummings, L. L. Eds. *Research in organizational behavior 6*. JAI-Press, Greenwich, Conn.: 367-422.

Cummings, T.G., Worley, C.G. 2004. *Organization development and change*. 8th Edition. Martin, St. Paul.

Cusumano, M.A., Mylonadis, Y., Rosenbloom, R.S. 1992. Strategic maneuvering and mass-market dynamics: The triumph of VHS over Beta. *Business History Review* **66** 51-94.

Cyert, R.M., March, J.G. 1963. *A behavioral theory of the firm.* Prentice-Hall, Englewood Cliffs, N.J.

Danneels, E. 2002. The dynamics of product innovation and firm competencies. *Strategic Management Journal* **23** 1095-1121.

David, P.A. 1985. Clio and the economics of QWERTY. *American Economic Review* **75** (2) 332-337.

David, P.A. 1986. Understanding the economics of QWERTY: The necessity of history. Parker, W.N. Eds. *Economic history and the modern economist*. Blackwell, Oxford: 30-49.

David, P.A. 1994. Why are institutions the „carriers of history"? Path dependence and the evolution of conventions, organizations and institutions. *Structural Change and Economic Dynamics* **5** 205-220.

David, P.A. 2001. Path dependence, its critics and the quest for „historical economics". Garrouste, P. Ed. *Evolution and path dependence in economic ideas: Past and present*. Elgar, Cheltenham, UK: 15-40.

Deeg, R. 2001. *Institutional change and the uses and limits of path dependency: The case of German finance*. MPIfG Discussion Paper 01/06. Cologne, Germany.

Dietrich, M. 1997. Strategic lock-in as a human issue: The role of professional orientation. Magnusson, L., Ottosson, J. Eds. *Evolutionary economics and path dependence*. Elgar, Cheltenham: 79-97.

DiMaggio, P., Powell, W.W. 1983. The iron cage revisited: Institutional isomorphism and collective rationalities in organizational fields. *American Sociological Review* **48** 147-160.

Dosi, G.1982. Technological paradigms and technological trajectories. *Research Policy* **11** 147-162.

Doz, Y.L., Olk, P.M., Ring, P.S. 2000. Formation processes of R&D consortia: Which path to take? Where does it lead? *Strategic Management Journal* **21** 239-266.

Ebbinghaus, B. 2005. *Can path dependence explain institutional change? Two approaches applied to welfare state reform.* MPIfG Discussion Paper 05/2. Max Planck Institute for the Study of Societies, Cologne.

Feldman, M.S. 2004. Resources in emerging structures and processes of change. *Organization Science* **15** (3) 295-309.

Garud, R., Karnøe, P. 2001. Path creation as a process of mindful deviation. Garud, R., Karnøe, P. Eds. *Path dependence and creation.* Earlbaum, Mahwah, N.J.: 1-38.

Garud, R., Karnøe, P. 2003. Bricolage vs. breakthrough: Distributed and embedded agency in technology entrepreneurship. *Research Policy* **32** (2) 277-300.

Giddens, A. 1984. *The constitution of society*. Polity, Cambridge.

Giddens, A. 1990. The consequences of modernity. Polity, Cambridge.

Gioia, D., Sims, H. 1986. Social cognition in organizations. Sims, H. Gioia, D. Eds. *The thinking organization*. Jossey-Bass, San Francisco, Calif.: 1-19.

Grabher, G. 1993. The weakness of strong ties: The lock-in of regional development in the Ruhr area. Grabher, G. Ed.. *The embedded firm*. Routledge, London: 253-277.

Greener, I. 2005. Sate of the art – The potential of path dependence in political studies. *Politics* **25** (1) 62-72.

Gresov, C., Haveman, H.A., Olivia, T.A. 1993. Organizational design, inertia and the dynamics of competitive response. *Organization Science* **4** (2) 181-208.

Gulati, R. 1995. Social structure and alliance formation: A longitudinal analysis. *Administrative Science Quarterly* **40** 619-652.

Gulati, R., Gargiulo, M.. 1999. Where do interorganizational networks come from? *American Journal of Sociology* **104** (5) 1439-1493.

Gulati, R., Nohria, N., Zaheer, A. 2000. Strategic networks. *Strategic Management Journal* **21** 203-215.

Hannan, M.T., Freeman, J. 1984. Structural inertia and organizational change. *American Sociological Review* **49** 149-164.

Hannan, M.T., Plos, L., Carroll, G.R. 2004. The evolution of inertia. *Industrial and Corporate Change* **13** 213-242.

Hargadon, A.B., Douglas, Y. 2001. When innovations meet institutions: Edison and the design of the electric light. *Administrative Science Quarterly* **46** 476-501.

Hart, O. 1995. *Firms, contracts, and financial structure*. Oxford University Press, New York.

Heine, K., Kerber, W. 2002. European corporate laws, regulatory competition and path dependency. *European Journal of Law and Economics* **13** 47-71.

Helfat, C. 1994. Evolutionary trajectories in petroleum firm R&D. *Management Science* **40** (12) 1720-1747.

Hernes, T., Bakken, T. 2003. Implications of self-reference: Niklas Luhmann´s autopoiesis and organization theory. *Organization Studies* **24** 1511-1553.

Hirsch, P.M., Gillespie, J.J. 2001. Unpacking path dependence: Differential valuations accorded history across disciplines. Garud, R., Karnøe, P. Eds. *Path dependence and creation.* Earlbaum, Mahwah, N.J.: 69-90.

Hite, J.M., Hesterley, W.S. 2001. The evolution of firm networks: From emergence to early growth of the firm. *Strategic Management Journal* **22** (3) 275-286.

Holm, P. 1995. The dynamics of institutionalization: Transformation processes in Norwegian fisheries. *Administrative Science Quarterly* **40** 398-422.

Human, S.E., Provan, K.G. 2000. Legitimacy building in the evolution of small-firm networks: A comparative study of success and demise. *Administrative Science Quarterly* **45** 327-365.

Jansen, K.J. 2004. From persistence to pursuit: A longitudinal examination of momentum during the early stages of strategic change. *Organization Science* **15** (3) 276-294.

Kale, P., Singh, H., Perlmutter, H. 2000: Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal* **21** (3) 217-237.

Karim, S., Mitchell, W. 2000. Path-dependent and path-breaking change: Reconfiguring business resources following acquisitions in the U.S. medical sector, 1978-1995. *Strategic Management Journal* **21** 1061-1081.

Katz, M.L., Shapiro, C. 1985. Network externalities, competition and compatibility. *American Economic Review* **75** 424-440.

Kauffman, S.A. 1993. *The origin of order. Self-organization and selection in evolution*. Oxford University Press, Oxford.

Kelly, D., Amburgey, T.L. 1991. Organizational inertia and momentum: A dynamic model of strategic change. *Academy of Management Journal* **34** (4) 591-612.

Kieser, A. 1994. Why organization theory needs historical analysis – And how this should be performed. *Organization Science* **5** (4) 608-620.

Kilduff, M., Tsai, W. 2003. *Social networks and organizations*. Sage, London.

Kimberly, J.R., Bouchikhi, H. 1995. The dynamics of organizational development and change: How the past shapes the present and constraints the future. *Organization Science* **6** (1): 9-18.

Königswieser, R. and Hillebrand, M. Forthcoming. *Introduction to systemic consulting*. Carl-Auer, Heidelberg.

Kuwada, K. 1998. Strategic learning: The continuous side of discontinuous strategic change. *Organization Science* **9** (6) 719-736.

Langlois, R.N., Robertson, P.L. 1995. *Firms, markets, and economic change: A dynamic theory of business institutions*. Routledge, London.

Larsson, R., Bengtsson, L., Henriksson, K., Sparks, J. 1998. The interorganizational learning dilemma: Collective knowledge development in strategic alliances. *Organization Science* **9** (3) 285-306.

Laurila, J., Lilja, K. 2002. The dominance of firm-level competitive pressures over functional institutional pressures: The case of Finnish-based forest industry. *Organization Studies* **23** (4) 251-257.

Lawrence, T.B., Winn, M.I., Jennings, P.D. 2001. The temporal dynamics of institutionalization. *Academy of Management Review* **26** (4) 624-644.

Lazonick, W. 1991. *Business organization and the myth of the market economy*. Cambridge University Press, Cambridge.

Leiblein, M.J., Miller, D.J. 2003. An empirical examination of transaction- and firm-level influences on the vertical boundaries of the firm. *Strategic Management Journal* **24** (9) 839-859.

Levinthal, D.A. 1997. Adaptation of rugged landscapes. *Management Science* **43** (7) 934-950.

Lewin, A.Y., Volberda, H.W. 1999. Prolegomena on coevolution: A framework for research on strategy and new organizational forms. *Organization Science* **10** (5) 519-535.

Liebowitz, S.J., Margolis, S.E. 1994. Network externality: An uncommon tragedy. *Journal of Economic Perspectives* **8** 133-150.

Liebowitz, S.J., Margolis, S.E. 1995a. Are network externalities a new source of market failure? *Research in Law and Economics* **17** 1-22.

Liebowitz, S.J., Margolis, S.E. 1995b. Path dependence, lock-in, and history. *Journal of Law, Economics, and Organization* **11** 205-226.

Lubatkin, M., Florin, J., Lane, P. 2001. Learning together and apart: A model of reciprocal interfirm learning. *Human Relations* **54** (1) 1353-1382.

Lindblom, C.E. 1965. *The intelligence of democracy*. Free Press, New York.

Luhmann, N. 1995. *Social systems.* Stanford University Press. Stanford, Calif.

Mahoney, J. 2000. Path dependence in historical sociology. *Theory and Society* **29** 507-548.

March, J.G. 1991. Exploration and exploitation in organizational learning. *Organization Science* **2** 71-87.

March, J.G., Simon, H.A. 1958. *Organizations*. Wiley, New York and London.

Marquis, C. 2003. The pressure of the past: Network imprinting in intercorporate communities. *Administrative Science Quarterly* **48** 655-689.

McGregor, D. 1960. *The human side of enterprise*. McGraw-Hill, New York.

McKelvey, B. 1999. Avoiding complexity catastrophe in coevolutionary pockets: Strategies for rugged landscapes. *Organization Science* **10** (3) 294-321.

Miller, D., Friesen, P.H. 1980. Momentum and revolution in organizational adaptation. *Academy of Management Journal* **23** (4) 116-138.

Mingers, J. 2003. Observing organizations: An evaluation of Luhmann´s organization theory. Hernes, T., Bakken, T. Eds. *Autopoietic organization theory.* Copenhagen Business School Press, Copenhagen: 103-122.

Mintzberg, H., Waters, J.A. 1985. Of strategies, deliberate and emergent. *Strategic Management Journal* **6** 257-272.

Nadler, D.A., Tushman, M. 1986. *Managing strategic organizational change: Frame bending and frame breaking*. Free Press, New York.

Nelson, R.R., Winter, S.G. 1982. *An evolutionary theory of economic change*. Harvard University Press, Cambridge, Mass.

Nooteboom, B. 1997. Path dependence of knowledge: Implications for the theory of the firm. Magnusson, L., Ottosson, J. Eds. *Evolutionary economics and path dependence*. Elgar, Cheltenham: 57-78.

Nooteboom, B. 2004. *Inter-firm collaboration, learning and networks*. Routledge, London.

North, D.C. 1990. *Institutions, institutional change and economic performance.* Cambridge University Press, Cambridge.

Ortmann, G. 1995. *Formen der Produktion*. Westdeutscher Verlag, Opaden.

Pierson, P. 2000. Increasing returns, path dependence, and the study of politics. *American Political Science Review* **94** 251-267.

Powell, W.W., Koput, K.W., While, D.R., Owen-Smith, J. 2005. Network dynamics and field evolution: The growth of interorganizational collaboration in the Life Sciences. *American Journal of Sociology* **110** (4) 1132-1205.

Rao, H., Singh, J.V. 2001. The construction of new paths: Institution-building activity in the early automobile and biotechnology industries. Garud, R., Karnøe, P. Eds. *Path dependence and creation*. Earlbaum, Mahwah, N.J.: 243-267.

Regibeau, P. 1995. Defending the concept of network externalities: A discussion of Liebowitz and Margolis. *Research in Law and Economics* **17** 33-39.

Rip, A., Kemp, R. 1998. Technological change. Rayner, S. Malone, E.L. Eds. *Human choice and climate change: An international assessment*. Vol. 2. Columbus, Ohio: Batelle Press: 327-399.

Rodrigues, S., Child, J. 2003. Co-evolution in an institutionalized environment. *Journal of Management Studies* **40** (8) 2131-2156.

Sastry, M.A. 1997. Problems and paradoxes in a model of punctuated organizational change. *Administrative Science Quarterly* **42** 237-275.

Schmidt, R.H., Spindler, G. Path dependency, corporate governance and complementarity. *International Finance* **5** (3) 311-333.

Schreyögg, G. 1980. Contingency and choice in organization theory. *Organization Studies* **1** (4) 305-326.

Schumpeter, J.A. 1942. *Capitalism, socialism and democracy*. Harper & Row, New York.

Scott, R. 2001. *Organizations and institutions.* 2nd Ed. Sage, Thousand Oaks, Calif.

Selvini-Palazzoli, M. 1986. *The hidden games of organizations*. Random House, New York.

Simon, H.A. 1945. *Administrative behavior*. Macmillan, New York.

Staber, U., Sydow, J. 2002. Organizational adaptive capacity: A structuration perspective. *Journal of Management Inquiry* **11** (4) 408-424.

Stark, D. 1992. Path dependence and privatization strategies in East Central Europe. *East European Politics and Societies* **6** (1) 17-54.

Stimpert, J.L., Wasserman, M.E., Jayaran, M. 1998. Strategic trajectories and patterns of innovation. Hamel, G., Prahalad, C.K., Thomas, H., O'Neal, D. (eds.) *Strategic flexibility: Managing in turbulent environments*. Wiley, New York: 51-73.

Stinchcombe, A. 1965. Social structures and organizations. March, J.G. Ed. *Handbook of organizations*. Rand McNally, Chicago, Ill.: 142-193.

Teece, D.J., Pisano, G., Shuen, A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* **18** 509-533.

Thelen, K. 1999. Historical institutionalism and comparative politics. *Annual Review of Political Science* **2** 369-404.

Tolbert, P.S., Zucker, L. 1996. The institutionalization of institutional theory. Clegg, S.R., Hardy, C., North, W.R. Eds. *Handbook of organization studies.* Sage, London: 175-190.

Tripsas, M. and Gavetti, G. 2003. Capabilities, cognitions, and inertia: Evidence from digital imaging. Helfat, C.E. (ed.) *The SMS Blackwell Handbook of organizational capabilities*. Blackwell, Malden: 393-412.

Tsoukas, H., Chia, R. 2002. On organizational becoming: Rethinking organizational change. *Organzation Studies* **13** (5) 567-582.

Volberda, H.W., Lewin, A.Y. 2003. Co-evolutionary dynamics within and between firms: From evolution to co-evolution. *Journal of Management Studies* **40** (8) 2111-2136.

Walker, G., Kogut, B., Shan, W. 1997. Social capital, structural holes and the formation of an industry network. *Organization Science* **8** 109-125.

Weick, K.E. 1995. *Sensemaking in organizations*. Sage, Thousand Oaks.

Whitley, R., Henderson, J., Czaban, L., Lengyel, G. 1996. Trust and contractual relations in an emerging capitalist economy: The changing trading relationships of ten large Hungarian enterprises. *Organization Studies* **17** (3) 397-421.

Williamson, O.E. 1985. *The economic institutions of capitalism*. Free Press, New York.

Williamson, O.E. 1993. Transaction cost economics and organization theory. *Industrial and Corporate Change* **2** (2) 107-156.

Witt, U. 1997. ‚Lock-ins' vs. ‚critical masses' – Industrial change under network externalities. *International Journal of Industrial Organization* **15** (6) 753-773.