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Institutional Rigidity and the Lock-in Between Mental Models and Ideologies Michaela Haase / Marc Roedenbeck / Albrecht Söllner

1<sup>st</sup> Draft

# Introduction

Institutions are defined as the rules of the game (North 1990: 3). Their main purpose is often seen in the reduction of uncertainty. Because institutions are a source of reliable expectations concerning the behavior of others, they are a central foundation for human cooperation.

However, changing circumstances may require institutional change. Although our understanding of the comparative efficiency of different governance structures has increased during the last years, our knowledge about institutional change is still very limited. No wonder then that institutional inertia is widespread even in situations where change is urgently required (see also Hargadon & Douglas 2001).

In our paper we claim that there is a research gap with respect to the process and the drivers of institutional change, on the one hand, and to the barriers to change, to the other. Emphasizing the old saying that "it's all in the mind", we argue that ideologies and their effect on learning processes are a cause of institutional rigidity. Douglas North (1990: 103) as well as Denzau & North (1994) have emphasized the role of ideologies but have not

- 1 -

specified in detail the connection between mental models, ideologies and paths that lead to institutional inertia (e.g. Hargadon & Douglas 2001: 480). Therefore the task remains to explain institutional rigidity and to overcome it in practice.

Building on research results from the new institutional economics, constructivism and path dependence theory, we first introduce three classical views on institutions and institutional change. Then we discuss central understandings of the terms "ideology" and "knowledge" in order to provide definitions which are adequate for the analysis of mental models. Finally we suggest a theoretical framework that explains the emergence of self-enforcing (path) mechanisms behind institutional rigidity and, on the basis of that, analyses how rigidity or (inefficient) lock-in can be avoided.

# Institutions and Institutional Change – Three classical views

As mentioned in the introduction, institutions are the "rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction" (North 1990: 3).

Williamson extends this view and distinguishes among four different levels or aspects of institutions (Williamson 2000): The notion of *embeddedness* describes informal institutions like customs, traditions, and norms. The *institutional environment* consists of the formal rules of a society, e.g. property, polity, judiciary, and bureaucracy. *Governance* is the process of aligning governance structures with transactions. In doing so, the possibility of cooperation among market participants is increased, due to a reduced uncertainty. Finally, institutions align incentives for employees and others, defining rules for *resource allocation and employment* at the level of organizations.

If institutions are stable, they can reduce uncertainty. However, institutions may also be subject to change. This seems especially necessary, when changing circumstances require

- 2 -

institutional change. But due to their rigidity change is often not possible. Until now, a clear explanation of institutional rigidity and inefficiency can not be found in the neoinstitutionalist contributions on institutions and change. In economics, the contributions of Hayek, Williamson and North may serve as prominent examples for dealing with institutional change.

	Measure of Success	Impetus for institutional change	Search and evaluation of institutional designs	Implementation of institutional change
Theory of spontaneous order (Hayek)	Success for the individual, success for the group	The desire to experiment and the wish to improve ones well- being	Evolutionary trial and error	Diffusion within and among groups; elimination of errors
Transaction- cost theory (Williamson)	Transaction costs	Change in the relevant characteristics of transactions	Intended rational search and evaluation	Problem solution within organizational settings
Theory of institutional change (North)	Wealth, profit, growth	Situational changes and changes in the relative prices	Individual cost- benefit calculation	"Transactions" on the "Market for Institutions"

Table 1 - Institutional Change in the Work of Hayek, North and Williamson

According to Hayek institutional change is very much an evolutionary process in which the better solution survives (von Hayek 1981: 211). The selection and elimination of inferior solutions lead to the survival of institutions that bring wealth and success to individuals and groups (von Hayek 1971: 34, 69). The driving force behind institutional change, however, is not the well-planned new design of institutions but rather the human desire to experiment. The process can best be described as a trial and error process. This makes it hard to manage institutional change in any way and to overcome inefficient institutions.

Williamson argues that this process of the evolutionary elimination given by Hayek is rather the result of individual bounded rationality, foresight and the ability to solve transaction-cost related problems within an organizational setting (Williamson 1999). However, the process of change is not a mayor aspect of Williamson's approach. Thus, Williamson (2000) claims that change is possible, although changes at the different institutional levels need different amounts of time. Changes in the institutional environment may take more time than changes at the level of organizations or at the level of market transactions.

Quite in contrast to Williamson and Hayek, Douglas North looks explicitly at the process of institutional change in his work. He deals with the question why institutions remain unchanged for a long time although they do not benefit the society. His answer is that goals of individuals and societies are not necessarily congruent. If something that might be advantageous for society is not beneficial for an individual, the individual will not spend time or effort on implementing new rules. Individual cost-benefit calculations of human actors are thus a starting-point for analysing institutional inertia.

However, a closer look at the cost-benefit approach makes clear that it is both too general and too specific for an explanation of institutional inertia: It is too general because an individual cost-benefit calculation means all and nothing if there is no theoretical frame that classifies costs and benefits in relation to institutional change. It is very specific, because North discusses very interesting cases with examples for determinants of individual costs and benefits of institutional change. These cases and cost- as well as benefit-drivers are hard to generalize and can therefore not easily be applied to other cases. That is why North comes to the conclusion that his approach is "far from providing for the kind of hypothesis testing that must ultimately be done" (North 1990: vii).

However, an interesting aspect in the work of North seems extremely promising for understanding the logic behind institutional inertia and rigidity. The main driver towards rigidity, increasing returns or self reinforcement (Beyer 2005), is strongly influenced by mental models and ideologies as claimed in institutional economics (North 1990: 76, 96).

- 4 -

Ideologies are there defined as (parts of) shared mental models (Denzau & North 1994: 4). This proposal leads into a promising direction but does not explain the interconnectedness of mental models and ideologies in detail. Extending Denzau und North's (1994) approach on ideologies as a framework of shared mental models, we want to elaborate on the interconnectedness of ideologies and mental models as well as their effects on learning processes.

#### On the Interconnectedness of Ideologies and Mental Models

The term "ideology" appeared relatively late on the stage of the history of philosophical concepts. In any case, throughout the history of ideas, the terms "science" and "ideology" have been interpreted with mutual reference to each other. The term "ideology" appeared during a historical period which can be characterized by the success of the natural sciences and the emergence of British empiricism which tried to explain the rise of natural sciences (Bacon, Locke, Hume). It can be traced back to Francis Bacon's lessons on idols (Novum Organon I; Schlette 1973: 720). For him, knowledge can only be based on empirical evidence. Because "true" knowledge is empirically tested knowledge, untestable beliefs, convictions, metaphysics, a. s. o., can never achieve the status of knowledge. Socially, politically, philosophically fundamentally wrong convictions often emerged from tradition and societal prejudices.

A. Destutt de Tracy, the French philosopher of enlightenment, coined the term ideology. On the one hand he argued like Bacon against a legitimation of knowledge with reference to religion, metaphysics, or authority. On the other, for him, the term "ideology" was positively connotated and stands for empirically tested knowledge. He defined ideology as "science about the emergence of ideas which have their origin in sensation and empirical evidence" (Schlette 1973: 720). Interpreted in that manner, "ideology" is synonym for the concept of knowledge based on those strands of epistemology which see sensation and empirical evidence as main or only sources of knowledge. Nowadays, however, "ideology" carries the negative image of non-science (e.g. Popper 1945).

Empiricism, critical rationalism, or positivism maintained the idea of a demarcation between science and non-science (metaphysics) or between knowledge and wrong convictions. It has been argued in that context that the demarcation line must be marked by the use of particular methods legitimated by a scientific community (Feyerabend 1975).

What we want to keep in mind from the characterization above is: First, "ideology" has a negative connotation and stands for not sufficiently legitimated or "wrong" convictions. Second, as emphasized by Bacon, "wrong" convictions are a societal phenomenon. They cannot be kept "alive" or "survive" without reference to groups or society. Third, knowledge is generated by particular methods which are accepted by scientific communities, as claimed (and criticized) by Feyerabend.

What is still open is the connection of social phenomena like ideology and knowledge to individual mental models. For that reason we refer to the discussion of mental models and socially shared knowledge in the management literature (Klimoski & Mohammed 1994). The term "mental model" is there a synonym for expressions like "belief structure", "cognitive map", or "schema". Mental models are the source of interpretations leading to information selection processes which can prevent information overload but also cause ignorance of discrepant information (Klimoski & Mohammed 1994: 405). In any case, knowledge and ideology are interwoven in mental models; the individual creates meaning out of both of them without being able to clearly separate them in each case. For example, managers interpret competitor's strategies or group competitive environments in their mental models (Klimoski & Mohammed 1994: 405).

Regarding prior work of Denzau & North (1994) and North (1990), "ideologies" can be characterized as "shared framework of mental models". These shared frameworks are the convictions which, according to our frame-tale, are untested or untestable (often wrong) positions. Within mental models, the socially shared frameworks (ideologies), the socially approved knowledge, the institutions (as rules of the game) as well as personal experience are interwoven in a manner that may lead to paths and institutional rigidity. The next chapter will focus especially on this aspect.

#### Path dependency of Mental Models and Ideologies leading to rigid Institutions

The concept of path dependency addresses the question why change processes often do not take place where they seem necessary (e.g. North 1990: 90ff.). North (1990: 94) as well as Denzau and North (1994) have opened the lid of the black box which stands for mental processes of the individual in economic analysis a little bit. But, as mentioned above, they did not relate mental considerations to their cost-benefit analyses. As means to overcome this shortcomings, we suggest to implement path dependency as a phenomenon on the individual level of analysis. Compared to that, institutional rigidity is a societal phenomenon which, from our paper's point of view, has its source in (multiple) individual path dependencies and the consequences thereof on individual and societal learning processes with respect to institutions.

Consider for example the perception of a problem by an individual manager: a new competitor steps into in the market (e.g. Porac, *et al.* 1989; Daniels, *et al.* 1994; Hodgkinson & Johnson 1994). At the first glance, this problem has its source in an event external to the individual. From the point of view of radical constructivism however, on which the paper dwells, any "external to the mind" event is simply information recognized

- 7 -

by the individual (von Foerster 1981: 43; von Foerster 1973: 214f; von Foerster 1994 [1987]: 138; von Foerster 1995a: 41).

As Holland et al (1986: 12) have pointed out, individuals construct mental models related to particular problem spaces (Denzau & North 1994: 3). Accordingly, information that is recognized can only be selective depending on the prerequisites of the observer (von Foerster 1995b: 3). These prerequisites develop in interaction with the structure constituted by knowledge, ideologies, and institutions.

In order to be understood as a problem, it has been emphasized that information (e.g. based on a market process) needs to be evaluated as inconsistent with the previously intended information (e.g. the alleged importance of competitors) (Morse 1953; North 1990: 104). As mentioned above, which information is intended depends mainly on the individual presuppositions. A possible difference between intended or expected information exerts influence on the evaluation of a problem or of its significance (e.g. the risk caused by the new competitor) as it has been proposed in literature on job satisfaction (Porter 1961).

Therefore, from our paper's perspective, individuals construct mental models from information processing (based on observation and prior mental models). They evaluate situations, or events, or circumstances internally as a problem (p) if they are inconsistent with previously intended information historically dependent on mental models. This analysis results in a *mental model of a problem space* (MM<sub>p</sub>). Observations or information processing which are consistent with intentions or expectations do not lead to the construction of a problem space. Instead of that, they justify the operating mental models according to the principle of assimilation (Piaget 2003 [1926]; Piaget 2003 [1981]).

In order to proceed with our example, after the individual has constructed a problem space the search for a solution starts: How to deal with the new competitor? The prerequisites of the individual, the previous mental models, are its internal sources for the construction of a

- 8 -

solution for the problem (MM<sub>s</sub>). In the case of dealing with the new competitor one source for a solution could be the past experience of dealing with other market entrants. If the individual is not able to construct a solution based on its individual model, the only source to find a solution is a redirection of search towards the social dimension<sup>1</sup> by means of institutions, knowledge, or ideologies. Therefore, institutions, ideologies, and knowledge which are all "external to the mind" entities run through a process of internal legitimation and are then or by that used to create an individual mental model of a problem solution (or what is thought as such); compared to knowledge and ideology, *available* institutions possess the "comparative advantage" that they can take immediately effects on behavior.

This first half of the detailed model is shown in Figure 1. We make a distinction between an individual dimension (lower half) and a social dimension (upper half). The internal processes which create either a problem  $(MM_p)$  or its solution  $(MM_s)$  base on individual mental modelling procedures (dotted line around the blue boxes). If the available internal mental models turn out as not being sufficient for an adequate problem solution (arrows directing from the upper half to the individual mental models), the social and especially economic dimension of ideologies, institutions, and knowledge (grey boxes) gains influence.

<sup>&</sup>lt;sup>1</sup> This is the first half of the recursive pattern in the theory of structuration between structure and actors (Giddens 1995 [1984]).



Figure 1 - Individual Mental Modelling of a Problem and a Solution

By means of the creation of a problem space and a problem solving behavior, the individual chooses how to act in the environment (North 1990: 104). There are two general possibilities of action. First, because the problem space is always a construction of an individual, it can internally deconstruct the problem (Festinger 1957). With respect to the example of the new competitor this could mean to internally 'argue' that the new competitor does not really belong to the market and therefore does not need to be observed or acquisitioned. Second, the individual can act according to the available mental model for problem solving (MM<sub>s</sub>) created out of legitimized ideologies, institutions, and knowledge. Because the decisions or choices made by the individual can be externally observed in a social system (Luhmann 1988: 166), the decisions also have a recursive influence in the social dimension. Informal institutions, formal institutions, as well as knowledge are supported and distributed by their usage; within the social system, the individual or its

behaviour is a carrier of specific information of which is made use by other members of the social system<sup>2</sup>.

Finally, as in the creation of the problem space, the individual again compares intended to actual outcomes (a circle is closed to the perception of the problem). In dependence on the result, the individual will reflect on its experience based on both problem perception ( $MM_p$ ) and problem solution ( $MM_s$ ) which recursively support the individual's mental model. The result may be in favour of reuse, or modification, or withdrawing of all (Denzau & North 1994: 9).

The first half of the model of individual action in an institutional environment facing ideological backgrounds can now be extended as to be seen in Figure 2. The mental solution ( $MM_s$ ) leads to a specific action. This action exerts influence on the social level (arrows directing from action to the social level) because the action is observable as following specific formal or informal institutions, knowledge, as well as being a carrier of a specific ideology. As a result, the observing and evaluation of the action by the individual executes recursive influence on the individual level (arrows directing from the result to the mental models).

 $<sup>^{2}</sup>$  This is the second half of the recursive pattern in the theory of structuration, this time between actors and structure (Giddens 1995 [1984]).



**Figure 2- Recursive Individual Framework of Action** 

This recursive model as depicted in Figure 2 helps us to lift up the lid of the black box of the individual mental processes a little bit more. But with reference to recursivity alone it can not be explained why paths do emerge and why it can be so difficult to overcome rigid institutions. From our paper's point of view, this model needs to be reframed by the explicit consideration of time.

In historical analyses (David 1985; David 1994; David 2000) or economics (Arthur 1989; Arthur 1994; Arthur 1996) there are three indicators of a path dependency: an initial small event which starts the process; some aspects that increasingly reinforce themselves (or "positive feedback" as organization scholars have labelled the reinforcing effects to cover a broader range of effects; Schreyögg, *et al.* 2003: 269) as well as a (often inefficient) lock-in. In order to extend the model given in Figure 2, we discuss these aspects in more detail below:

*Small Event* – Initial conditions starting a process are required for the statistical simulation of path dependent processes (Arthur 1989). But the initial conditions of highly complex systems – like economics systems – are hardly determinable (Lorenz 1963). The analysis of individual path processes with their interdependencies between individual mental models, knowledge, institutions, and ideologies starts with the appearance of a problem. Within the model, past action which took place before the problem has occurred, is treated by means of resource allocation of past experience over time. As already discussed above, the past mental models consist of prior used ideologies, institutions, and knowledge and the experience with them.

*Increasing Reinforcement* – As emphasized in historical analysis (David 1985), some factors are needed that perpetuate the process and even accelerate it. What has been named "learning effects" (David 1985; Arthur 1994) can now be analysed in more detail. The process of problem creation ( $MM_p$ ) and evaluation of the results ( $MM_r$ ) is based on the resource allocation which has its origin in past mental models, where the creation of a solution ( $MM_s$ ) can also be linked to present ideologies, knowledge, or institutions.

In principle, the legitimation of these external formal and informal institutions, knowledge, or ideologies should lead to the creation of new mental models for problem solution behavior. But an effect of reinforcement in searching these 'new' ideologies, institutions, or knowledge is at hand: that is complementarity (David 1985).

The creation of new mental models tends to be close to existing mental models (Holland, *et al.* 1986: 345). This does further narrow down the subjective variety of scope and the possibility of explorative activities (Danneels 2002; March 1991). The present and observed institutions, ideology, or knowledge are related to the present resource allocation. When a decision is made and transformed into action (in t+1) it will then lead to a rise in

the resource allocation for the next period no matter what the actual result of this decision will be. Accordingly, learning costs are reduced as the resource allocation rises (Denzau & North 1994: 6). Mental models on which the cost reduction draws, experience "positive feedback" and are thus reused with a higher probability.

As explained above in Figure 2 this logic has an impact also on the social level that becomes visible through observable artefacts. A rise in the number of individual or written representations for an institution, ideology, or knowledge will increase their stability with respect to the future.

(*Inefficient*) Lock-in – An individual, mental lock-in has occurred, if an individual in  $t_n$  is not able to consider (choose) any other problem solution as it has done all the periods before. This is due to the effect of the recursive resource allocation supporting certain mental models that will lead to what is called an individual Eigen-Value (Portele 1994: 117; von Foerster 1995a: 55).

But a path is only problematic if the lock-in is an inefficient one; otherwise the lock-in (for which the here the Eigen-Value stands for) can be a reasonable solution<sup>3</sup> for a behavior in a specific setting. This would be the positive side of learning effects and describes the strength of competencies (Leonard-Barton 1992). Accordingly, if the individual recognizes that the selected problem solving behavior does not fit the intended outcome and if the individual is not able to utilize any other of the possible ideologies, institutions, or knowledge a path emerges. This is caused by an accepted accommodation regarding the result (Piaget 2003 [1981]), which is mostly caused by paradoxical situations, heavy shocks, or sense shifting, and an assimilation strategy according to problem definition and

<sup>&</sup>lt;sup>3</sup> For a further discussion on inefficiency of paths especially for the QWERTY please refer to the following literature: Liebowitz & Margolis 1990; Liebowitz & Margolis 1995; Liebowitz & Margolis 2001 (1999).

the creation of a solution. It is the negative side of core competencies namely core rigidities (Leonard-Barton 1992).

The resulting model of individual paths in an institutional environment is presented in Figure 3. The feedback arrows leading from action to the support institutions, ideologies, and knowledge are now extended with an artefact function  $(A_{t+1})$  that improves their probability of usage (P). And the feedback arrow from the evaluation process of mental modelling supports the created and used mental models and is therefore extended with the individual resource allocation function  $(R_{t+1})$ . This also increases the probability of usage in the next time step.



Figure 3 - Model of Individual Paths in an Institutional Environment

This last Figure shows how individual path dependency occurs due to recursive resource allocation and final Eigen-Behavior of mental models. On the social level the individual lock-in results in rigid institutions, ideologies, and knowledge that are used over and over again. Because institutions are humanly devised (North 1990), a change of institutions (as well as knowledge based on new methods or ideologies) needs changes in individual action and perception. Only then new solutions can be created that will lead to a change in institutional patterns.

As already pointed out by Denzau and North (1994), complexity and motivation are major drivers in this process. The more complex the legitimized institutional patterns and individually created mental models are, the faster the lock-in will appear and the harder it is to break open the lock-in. Individual motivation (e.g. Maslow 1970 (1954); Herzberg, *et al.* 1959; Barnes 1960) is probably a key driver on the legitimacy of external institutions, ideologies, and knowledge.

### Practical Implications - On institutional change based on the new model

Theoretically, this framework answers the question of how paths can emerge in individuals and cause institutional rigidity. Empirically, further research needs to be done, especially to explain how the lock-in can be overcome (soon to be seen in Roedenbeck [forthcoming]). Finally we would like to give one example extracted out of an expert interview that shows how managers can prevent themselves from lock-in within self-reinforcement. The example is meant to serve as a starting point for discussion.

Let's assume a start-up company in a new market: A German industrial company that founded a new subsidiary in the Chinese market for Chinese consumers. Assume the managers of this start-up have no idea about the institutions or ideologies available in the Chinese market but very good knowledge about their home market ( $R_t(MM_{German})$ ). However, the managers legitimized (accepted) some of the institutions and ideologies in the Chinese market ( $P(Ideology_{Chinese})$  and  $P(Institution_{Chinese})$  and transformed them into rules for problem solving ( $MM_s$ ).

For example if a corporation with another company is attempted, intermediaries have to be contacted who are expected to possess information about the managers of the addressed company. The middlemen would then ask the managers of the target firm if it might be in their interest to get to know the managers of a German industrial company. This behaviour for problem solution does reinforce the Chinese market ideology and institutions  $(A_{t+1}(Ideology_{Chinese}))$  and  $A_{t+1}(Institution_{Chinese}))$ .

Other rules or ideologies (such as the arbitrariness of the Chinese government to re-declare liberty and ownership) will be probably scrutinized by the managers of the German company due to their positive experience with the German system. If the Chinese government undertook attempts to break with the rules guaranteed to foreign investors, the world's free press would be informed immediately. This would lead to a climate bad for new investors. Such a behaviour by the Chinese government and the ideology behind it is therefore not approved by the German managers.

Due to this "mixed behavior" of accepting some ideologies and institutions while withdrawing others, a mental co-evolution of the German managers in the start-up as well as Chinese managers employed in local incumbents can take place. A lock-in, a getting stuck with the traditional styles of thinking and acting, does not necessarily occur.

Other German managers in different companies, who are not able to participate in the mental co-evolution, will probably leave the foreign market.

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