

The Idea of Innovation Systems and the Need for a New Horizon of Expectation

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Introduction and initial positions

From the mid 1990s, and in an ever accelerating pace, all of the Nordic governments have introduced the idea of innovation systems as a new field of policies. The Swedish Government for instance has recently presented "An Innovation Strategy for Sweden (Ds 2004:36). However, more and more researchers have started to doubt if there actually are any scientific reasons for policies and strategies of this kind. They call in question if it is nothing but rhetoric and symbol politics (e.g. Miettinen 2002, Nilsson 2004, Arbo 2004, Uhlin 2005).

There are many different definitions of the concept of innovation system. But no one has done a broad and critical analysis both of how the concept is defined, what role it plays in the scientific debate, and how it is used in politics. That is, not until Reijo Miettinen has done it in *National Innovation System; Scientific Concept or Political Rhetoric* (2002). His main argument is that the reason for the failure to define the concept in a satisfactory way is because the systemic approach as such does not hold water. And when it comes to the policy context he discusses the many and partly contradictory functions of a concept like national innovation system. His over all conclusion is that since the concept cannot be defined in a scientifically satisfying way politicians have to be extremely cautious when they use it. And he predicts that it will anyway soon be replaced by other and more adequate concepts.

Miettinen writes about innovation system¹ both as a term and as a concept. Sometimes he equals the term with the concept, and sometimes not. A "term" is basically a word that is used within a certain limited field with a defined meaning, one talks for instance about "technical terms". Concepts (*germ.* Begriffe; *sv.* begrepp) differentiate themselves from words in that they are ambiguous. What transforms a word into a concept is the entire socio-political context of meaning that the word refers to and which is a part of the concept (Koselleck 2005). Miettinen furthermore writes about "concepts" as rather loose notions, and sometimes as strictly defined entities. It is notwithstanding important to differentiate between the name (term) and what is named (concept). The question of what an innovation system is and how we shall define it is primarily about the concept, not the term. That is, the term is of course not unimportant, and we understand why as soon as we start thinking about the naming process and who the "namers" were and what aspirations they had. So, what went on when some people started talking about innovation systems, why did they do it, and who were they? And furthermore, how can we understand the concept? Is it a scientific discovery, an administrative invention, or is it a political innovation? Are there such things as innovation systems, and if there are, are they tangibles or pure abstractions?

I will try to give some answers to these questions. And as Miettinen is the first researcher who notwithstanding in a more systematically way has asked a set of fundamental and critical questions about as well the name (term), the named (concept), the naming process as the "namers", it seems natural to use his questions and answers as starting points. On three areas, however, there are reasons to critically analyse his argumentation and to deepen and broaden the discussion.

The first is about systems and systems theory. I agree with Miettinen that the economists who were the first to develop the concept of innovation system did not have enough knowl-

edge about systems theory. But from this does not follow, as Miettinen argues, that the systems approach *per se* is scientifically unsatisfying and, therefore, without meaning.

The second area is about rhetoric. My position is that Miettinen has totally misunderstood the role of rhetoric in the societal change process. Classic rhetoric is by nature dialogical and the new interest in rhetoric among philosophers and researchers is exactly about this. I will therefore develop the idea that an innovation system might be best understood as a complex dialogue system.

The third area of my criticism is about what might be called the naming context. In another article (Uhlen 2005) I have argued that the Government's innovation policies in the first hand have to be understood as symbol politics in order to check the feeling of insecurity that has disseminated as a result of the ongoing withering process of the nation state. I will further develop this hypothesis in this chapter and discuss the idea that, generally speaking, it has become politically necessary to develop a new national horizon of expectation since the common space of experience has fallen apart. It is in this context that rhetoric enters the scene, at best (which at the present unfortunately not seems to be the case) as a dialogue system that in itself is a societal innovation system, in worst case (which seems to be the case) as a smoke screen, and, sometimes, just plain gibberish.

The concept of innovation system

So, let us accompany Miettinen part of the way. The idea about innovation system, he argues, was developed in the middle and the end of the 1980s by researchers who tried to formulate a useful concept for policy design. But soon it got a life of its own. What was originally an analytical research concept soon became a powerful metaphor in public debate and in numerous policy programmes for economic growth and development. In Finland, which Miettinen uses as his main case, the concept was used in the national growth plans already at the end of the 1980s. He also points out that according to a seemingly well accepted opinion this is the explanation to the so called "Finnish economic wonder" during the 1990s.

And when we widen our field of vision to the other Nordic countries it is easy to see how the idea of innovation system rapidly was accepted. In Denmark at the end of the 1990s an extensive national study of the Danish innovation system was carried through, the so called DISCO project (Lundvall 1999). In Sweden the National Board for Innovation System (VINNOVA) was founded in the year 2000. In Norway, where the focus of interest for many years has been on regional innovation systems, an amalgamation of several small agencies to the new agency Innovasjon Norway was carried through in 2004.

So then, according to Miettinen there is no scientific substance in the concept of innovation system. But, nevertheless, politicians do not overload or misuse the idea of innovation system, and researchers do not promise more than they can account for. This is so because sometimes there is a need for boundary concepts, as well between different scientific fields as between science and politics. A certain vagueness of a new concept can thus be perfectly acceptable between parties which would otherwise have difficulties to communicate. Furthermore, a boundary concept can also serve as a metaphor for something that is so new that there are no "old customary words" that can be used in order to describe the new, not to mention to define it.

And parallel to the development of science, he further argues, it can also emerge something that historians of ideas name "a scientific ideology", i.e. sometimes scientific ideas and visions disseminate to societal life and there they form points of departure for policies that reach beyond what research can account for. Miettinen says that this is unlucky for two reasons: First, it can give the impression that researchers have reached real results when they in fact just are in the beginning of something new and promising. And second, it can also come

about, that when the researchers really begin to deliver results these occur within other fields, and point at other connections, than what the original visions and ideas predicted.

Today the concept of innovation system is very much a present and "real" concept in all kinds of contexts that are about economic growth, regional development and societal planning. The EU and the OECD have played principal roles in the process to legitimate the concept, first as a boundary concept and then as a scientifically grounded ideology for economic growth. Miettinen scrutinizes how this has happened and discusses to what degree, if at all, the ideas about innovation system are scientifically grounded.

He focuses two OECD reports, *National Innovation System* from 1997 and *Managing National Innovation Systems* published two years later. The two reports are to a great extent founded on unpublished material that was produced in OECD seminars and workshops with international expert groups consisting of both civil servants and researchers. According to Miettinen this is an important part of the explanation to why the concept so swiftly soaked through in the policy context; the civil servants simply brought the idea about innovations systems back home to their ministries and agencies. Miettinen however emphasises that in the reports there are no theoretical discussion whatsoever and that the definitions of the concept are taken for granted (Miettinen 2002: 24-33)

The circumstance that the reports to such a great extent build on unpublished material and that the references are self-referring in that they just refer to "OECD" means in practice that it is impossible to examine the factual ground for the reports. What is more, scientific journals that are referred to are basically within the field of economics. There are no references to journals within the social sciences and the humanities. In the reports there are also diagrams, figures, tables and so called "knowledge windows", but they have no direct connection to the text, and they are also lacking references. Miettinen argues that these windows, or "knowledge icons" as he also calls them, do not have any other function than to give the reports legitimacy through a mere general reference to science and research. (Miettinen 2002: 34-37) – So far this is Miettinen's over all examination and critique of the term and the concept of innovation system, and its genesis and accuracy. And so far I have no cause for divergent opinions.

The systems approach

But then Miettinen takes a closer look at the idea of innovation as a result of processes in systems. He asserts that the view about systems that is developed in the OECD reports emanates from evolutionary economic theory and that it above all takes into account interactive learning between different actor groups in the marketplace. In this assertion one finds the nucleus of Miettinen's critique of the innovation systems approach, i.e. that there is no scientific substance in the systems part of this approach. He points out that economists in general, and institutional and evolutionary economists in particular are no exceptions, have not made themselves renown for having developed significant knowledge of either networks or learning.² In order to find more profound and substantial knowledge, Miettinen argues, one has to go to other academic disciplines where researchers have studied innovations and technological development. But when he accounts for what has been achieved within other disciplines he first equals networks with systems and then, paradoxically enough, denounces the systems approach. I will soon come back to this.

Now, Miettinen says that social psychologists have studied individuals who have created networks of communication concerning technological issues. And sociologists interested in technological development have studied larger groups of actors that are involved in product development. What is more, researchers in business administration have studied networks between enterprises on an even higher actor level. And geographers have studied regional networks that include both public and private organisations. And so far, Miettinen argues, sub-

stantial scientific knowledge has been developed. But, he adds, national innovation systems are about interaction between national institutions and actors. On this very high and aggregated actor level it is too difficult to define actors and nodes and to analyse the dynamism between them. This difficulty is the reason, he further claims, why OECD recently has changed its focus from national systems to "more reduced systems" such as clusters and regional innovation systems, which are considered to be easier to govern.

By this way of arguing Miettinen has actually equalled the regional networks studied by geographers with "the more reduced systems" such as regional innovation systems. Hence, we have to watch his arguments more closely:

1. Miettinen argues that what researchers within social psychology, sociology, business administration and geography say about actor-networks is of interest because they have studied such networks from the individual to the regional level, i.e. these researchers have been able to develop substantial scientific knowledge.
2. He further argues that on the national level, which is the research field for economists, it is too difficult to study actors and nodes and the dynamism between these. Therefore economists have not been able to develop substantial knowledge about innovation and learning on this level.

From these two premises Miettinen derives two conclusions:

- A. Since economists have not been able to develop knowledge about innovation and learning on the national level one has to be sceptical towards the systems approach in their concept of national innovation system.
- B. OECD has moved their focus of attention from national innovation systems to regional innovation systems because it is easier to govern the latter kind of systems.

However, the circumstance that economists according to Miettinen's conclusion A have not been able to develop knowledge about innovation and learning on the national level cannot *per se* be an argument for rejecting the systems approach. What can possibly be rejected is *the way* in which economists have used the systems approach. From this follows, however, that one is also obliged to put in question Miettinen's statement that it is too difficult to obtain knowledge about innovation and learning on the national level. Miettinen has narrowed his field of vision to actor-networks that researchers within social psychology, sociology, business administration and geography have studied from the individual to the regional level. But he has, for instance, excluded historians and sociologists that have studied national systems of various kinds. He has also, and foremost, excluded about sixty years of advancements within systems theory.

Furthermore, Miettinen equals networks and systems, but then denounces the latter. Now, this is not the right place to start a profound discussion about the differences between networks and systems. In this chapter it ought to be sufficient with some rather simple statements. Hence, there exists, on the one hand, a tradition with its roots in mathematics and within which one understands networks as relations between empirically observable entities of various kinds, such as people, firms, airports, institutions, etc. (e.g. Buchanan 2002, Barabási 2002). These relations are the object for computations, calculations and *linear* causal analyses. On the other hand there is already a long tradition within the social sciences and the humanities that is about *non-linear* causal relationships in complex social systems (e.g. Cilliers 1998, Kiel & Elliot 1997, Luhmann 1984, Checkland 1981).

It is important to notice, though, that sometimes the term "network" is used as a synonym to the term (complex social) "system". This is perfectly acceptable as long as the term network also is used to denote something that is complex and non-linear. That is, as long as we talk about non-linearity, complexity and dynamism it does not matter if we refer to the concept of system or the concept of network.

I want to emphasise two points with this line of reasoning. First, it is not networks in general we are discussing but non-linear and complex social networks. This is basically about complexity theory that has historically evolved from many sources, such as cybernetics, chaos theory, etc. That is, it is complexity theory we are discussing no matter if we talk about actor-networks or innovation systems, i.e. as long as we take I for granted that they are non-linear, which is certainly the case when geographers inquire about both clusters, regional networks and regional innovation systems (e.g. Isaksen 1997; Maskell et al 1998).

My second point is that it is the language, the said, the written and the thought, that are the most important instruments either we talk about complex actor networks or complex social systems. The influence comes from the natural sciences, foremost cybernetics, physics and biology, but unlike their colleagues in the natural sciences social scientists and humanists are not in a position to scientifically experiment with complex social systems and networks, nor are they usually able to mathematically model them, but they are obliged to resort to describe systems and networks like these in "common language".

Miettinen comes close to these distinctions, but he does not draw any conclusions. He tells the story about how the concept of national innovation system at the end of the 1980s was introduced in Finland, and how it was used as a powerful instrument in order to reconstruct the Finnish economy after the depression in the beginning of the 1990s. The concept was introduced with a forceful political rhetoric and was presented as a strategic and fateful choice for the nation. But what started as an idea, a way of thinking, more and more developed into a reification process. At the end of the day the Finnish national innovation system has come to be described as something objectively existing and tangible, something that can be planned and managed. This, Miettinen points out, in a way comes close to the wet dream of all kinds of policy people, namely to be able to control complex social processes.

However, he summarises his view about systems like this:

I find it perfectly sensible to speak about science, technology, innovative activity, risk funding, education, and so forth, in their own terms and to analyze their interactions without any comprehensive systems approach. What value does the metaphor of "system" have? One wonders why the thesis of knowledge and know-how as key factors of successes in competition between industrialized countries presupposes the development of a national innovation *system*? (Miettinen 2002:77)

Old and new systems thinking

Thus, according to Miettinen systems thinking is not a prerequisite for studying interactive innovation processes. And with a reference to his own and other researchers' results he adds that "the actor-network theorists in the field of sociology of science and technology who developed the conception of innovation process as a network construction, categorically rejected the possibility and sense of any systems description and explanation" (Miettinen 2002:40).

It is not quite easy to get the hang of Miettinen's critique of systems and systems thinking. That he prefers the term "actor-network" does not as such explain what is wrong with systems and systems thinking. It is in itself easy to agree with him that the early "national innovation economists" were utterly vague in their references to the concept of system. For instance, Charles Edquist's (1997:15) definition of an innovation system ("we will, for the time being, specify system as including all important determinants of innovation"), that Miettinen uses as an example in order to justify his criticism, has such wide and general character that it becomes totally meaningless. It is furthermore evident that these economists, which Miettinen also emphasises, have not linked the term and the concept innovation system to earlier works within systems theory, and they have not bothered about how the concept of system has been defined in the systems literature. But neither has Miettinen.

Thus, it is correct that it is almost impossible to find satisfying definitions of the concept innovation system. But that does not imply that there is no knowledge and thinking about sys-

tems and systems behaviour. On the contrary, knowledge development in this field has a long history with a broad field of applications. Several disciplines within as well the natural sciences and technology as the social sciences and humanities have been influenced (e.g. Kiel & Elliot 1997). No, what we have to do, and what Miettinen has not even tried to do, is to show that there is a “natural” connection between the concept of innovation and the concept of system.

Briefly, systems theory has a history of about 60 years. Today we talk about the “older” systems theory from the 40s and 50s, which encompass Ludwig von Bertalanffy’s general systems theory, the cybernetics of Norbert Wiener and Ross Ashby, the information theory of Claude Shannon, the computer design of Alan Turing and John von Neuman, and so on. This was about simple, or complicated, but nevertheless linear systems and the key concepts were information and feedback. Then emerged the “younger” systems theory from the 60s and onwards with Heinz von Foerster’s “order from noise”, the cognitive biology of Humberto Maturana and Francisco Varela, the dissipative structures of Ilya Prigogine, the social systems of Niklas Luhmann, and so on. This was about non-linear and therefore complex systems, and the key concepts were, and still are, representation and self-organisation (Uhlen 2000). I will soon come back to these to concepts.

Simple (i.e. linear) systems can be designed, and the function of the systems can not only be understood by an external agent, e.g. an engineer, but they can also be explained, in detail as well as wholes. A jumbojet is an example of a simple system, although it is very complicated. A complex system, on the other hand, and just in order to remind us of a few well-known characteristics, also consists of a large number of elements, but these elements interact in a dynamic way. The entire complex system changes with time, and, thus, it always has a history. These interactions do not have to be physical, they can also be thought of as transference of information. Any element in the system therefore influences and is influenced by many other elements, i.e. the interactions are non-linear. A large system of linear elements can usually be collapsed into an equivalent system that is very much smaller, which is not the case with a non-linear system. That is, Ochams famous razor is definitely out of question when it comes to complex systems. Furthermore, in non-linear systems small causes can have large results, and vice versa. There are positive (enhancing, ampliative) as well as negative (detracting, inhibiting) feedback-loops in the interactions, thus, complex systems operate far from equilibrium. Moreover, complex systems are usually open systems, i.e. they can interact with their environment. As a consequence it is often difficult to define the border of a complex system. It is mostly determined by the purpose of the description of the system, and is thus often influenced by the position of the observer (e.g. Cilliers 1998, Senge, 1990).

So far this description of complex systems is of course more or less generic. It nevertheless contains elements that cast a dark shadow of doubt over the innovation economists’ perception of the concept of system. Innovation systems *are complex*. Since it would go too far to seriously discuss complex social systems in this article, just let me say this.

Complex systems have two specific capabilities, self-organisation and representation. Self-organisation has to do with the need of the system (in its relation to the external environment) to develop and change its internal structure without the *a priori* necessity of an external designer. Hence, it is now easy to see that self-organisation has to do with the crucial question whether it is possible or not to design, implement, manage, evaluate, change and develop innovation systems.

Representation has to do with the necessity for the system to store information for future use concerning the environment. However, there is a problem with representation that has been debated for centuries. Namely, the structure of a living system cannot consist of a random collection of elements. They must have some meaning *vis-à-vis* each other. In traditional philosophical terms this means that the system must somehow “represent” the information

important to its existence. This representational phenomenon constitutes a set of philosophical problems. Most solutions that have been suggested postulate a one-to-one correspondence between the elements of the system and specific external causes. That is, the structure of the system has been split from the meaning of that structure (Uhlen et al 2000).

However, a thought style that has gained ground the last few years instead argues for distributed representation (e.g. Gibbons et al 1994; Etzkowitz & Leydesdorff 1997; Leydesdorff & van den Besselaar, 1994; Amin & Hausner, 1997). In such a framework the elements of the system have no representational meaning by themselves, but only in terms of patterns or relationships with many other elements. Such distributed representation is best realised in 'connectionist (or neural) networks' as opposed to rule-based symbol systems (such as artificial intelligence) where an external agent has set the rules. According to the connectionist model a complex system will develop an internal structure, based only on the local information available at each neuron or node. "This development of structure", Cilliers (1998) states, "can also be called 'learning'".

Now, just to touch upon a few and well known examples. The language, the economy and the Internet are complex and self-organising systems. No one has control over the development of the language, it develops itself. And there is no one that can be said to have control over the ups and downs of the economy, even if governments and banks do their best. Internet, lastly, is a new world wide complex system that defies all attempts to control it, it governs and develops itself. Notwithstanding, there is of course both thinking and knowledge about complex systems. Such thinking and such knowledge have bearing on the question of how people, organisations, regions, nations and supranational entities innovate and learn. Thus, it is not surprising that Miettinen disallow of the scientific substance of the concept of innovation system, but I find it extraordinary that he does not approve of the concept of system such as it has been developed in the OECD reports..

But not at all surprising. There is a widespread and deep, but at the same time paradoxical, scepticism against systems thinking. On the one hand, there are systems understood as dystopian monsters used by the authorities in order to subjugate, suppress and dominate people. This is the kind of aversion against systems that for instance Václav Havel expressed when he said that "I am adherent of anti-political politics, i.e. politics not as manipulative technology, not as cybernetic domination over people ..." (Havel 1989:207, my transl.). On the other hand systems are also comprehended as utopias. The Lisbon-strategy that aims at developing the EU to the most competitive and knowledge-based economy in the world through fostering national innovation systems is a good example.

At first sight it is easy to think that the paradox is about a contradiction between the dystopian and the utopian. But that is not the case. No, the paradox is about the word "try". Because, it does not matter if the authorities try to control the complex social system in order to subjugate it, or in order to develop it economically, socially and environmentally, no, they always stumbles on one and the same problem, namely that such systems cannot be controlled by any single element inside or outside the system, for instance by a Government or an agency of any sort. The explanation to this is that none such element, nor any scientist or group of scientists, can have or obtain full knowledge about all the other elements in the system, about the dynamisms and about the non-linear processes that this dynamism leads to. It is an illusion that systems like these are possible to steer in the same way that it is possible to manoeuvre a car or boat, or even a jumbo jet. Complex social systems can only be influenced, and always with a highly unpredictable outcome of this influence. However, because of this complexity in social systems there is not only an inherent capacity in the system for self-organisation and representation, i.e. learning, but there is also a constant tendency towards innovation of the system. This tendency is especially palpable at certain times that have particular characteristics, which, in turn, Koselleck (2005) has encapsulated in the concept of

“historical time”. The French revolution is an example of such a time, which in this case amongst many other things led to the innovation of the 19th century nation state. Later on I will argue that this perspective on the dynamism of complex social systems can be an interesting point of departure in order to understand not only the processes behind the alleged present withering of the nation state (e.g. Veggeland 2003; Jessop 2002)) but also the innovation of a new horizon of expectation.

A transdiscursive approach

After this extension about systems theory we will return to Miettinen’s argumentation. He thus develops what he calls a transdiscursive approach in order to more conceptually try to understand why the concept of innovation system has been so powerful, as well in Academia as in the policy context. And this in spite of the fact that the concept has far from the same meaning in these two arenas. It is furthermore so, he points out, that concepts of the kind might have different time directions. They might be directed backwards and serve the purpose to explain what has happened, or they might be directed forwards and serve the purpose to orientate towards the future. I will soon come back to a more profound meaning of how concepts in this way have a two way temporal denotation, but so far it is easy to contribute with an example of Miettinen’s observation: The Triple Helix concept was at first scientifically aimed at explaining the historical and systemic process in which university, industry and government more and more turned towards each other in a spiral like development process driven by mutual expectations (Etzkowitz & Leydesdorff 1997). Today the concept is used almost solely in policy contexts in order to plan for the future.

Miettinen designates concepts like these “transdiscursive terms” because terms like these semantically have a “polyfone”³ character. He further suggests that these terms “socio-epistemically” can have at least six different functions and fields of usage. He calls these functions socio-epistemic because in daily usage it is difficult to differentiate the societal and the epistemic functions from each other. According to Miettinen (2002:137):

- 1 They have traditional epistemic functions as representations and as well-founded accounts of reality
- 2 They function as epistemic-organizers: terms and metaphors used as organizing or umbrella terms integrating in themselves various themes formerly regarded as separate
- 3 They supply a world-view or a diagnosis of an era
- 4 They serve as boundary crossers by engaging various social groups and institutions in shared discussion
- 5 They serve ideological and consensus-creating functions
- 6 They mobilize and empower

Against the background of these six transdiscursive functions Miettinen urges us to reflect upon the tension between the epistemic (the beginning of the list) and the social (the end of the list) usages of a concept like innovation system. However, there could be no doubt of Miettinen’s own position. He emphasises that “[the concept’s] strength as a rhetorical device in policy is dependent on its epistemic qualities”, and “Scientific credibility is [...] vital for the ideological, empowering and consensus-creating functions of transdiscursive terms” (Miettinen 2002:141).

He then ends his book by urging politicians and policy-makers to be cautious with these powerful terms:

Although visionary concepts are powerful means of opening new horizons and questions, they are not sufficient for the sensible policymaking, nor do they constitute a foundation for understanding society. Even if visionary concepts are efficient in organizing discussions of new issues, they do not provide the solutions in the form of policy measures. Policymakers can certainly not wait for definitive factual knowledge or welldefined concepts in orienting itself into the future. We need diagnoses of the times in which we live that capture our imagination and inspire us. It is, however, important to recognise their nature, functions and epistemological limits as tools of policymaking (Miettinen 2002:149-150).

Rhetoric

So far Miettinen's message is clear enough: Innovation system is a multifaceted concept with many functions and we have to be cautious when and how to use it. All in all, there is too much rhetoric and not enough epistemological substance in it.

It is easy to fall in with Miettinen, especially if one is scientifically and epistemologically educated. That is to say, in most learned contexts rhetoric is a negatively burdened concept. We look upon those who are engaged in rhetoric with deepest scepticism. And Miettinen is no exception; he uses the concept with a preconceived mind. Notwithstanding, the subtitle of his book – "Scientific Concept or Political Rhetoric" – is a piece of classic rhetoric; contrasting terms like this is a classic rhetoric figure of style called *antithesis*.⁴ I emphasise this in order to point out that even scientists uses rhetoric in the particular meaning that language (at least some sort of) often is their most important instrument. It is of course the same for politicians and policymakers.

In this paragraph I will develop a line of reasoning that aims at showing that it is not only science that lay claims to being the source of new knowledge, so does (classic) rhetoric. My point is that science and rhetoric do not exclude each other; on the contrary, they are complementary. What is more, rhetoric gives us possibilities to understand what a complex social system is. But the opposite is also possible; a complex social system can be understood as a rhetorical and dialogic system. I will soon develop this position.

But first, some words about the classic rhetoric and about its relationship to science. In Athens about 350 B.C. there was a fierce competition between two different schools of knowledge. The arguments from both sides basically amounted to that it was only the own school that was able to offer the true insights about the kind of knowledge that was most important for the society. Thus, the competition really was about which school could win the assignments to educate the young men from Athens's most important and influential families. Plato's dialogue *Gorgias* is a pure libellous pamphlet aimed against the competing school, their rhetoric, and their claims for true knowledge. It is in this dialogue we find the first preserved and strongly derogatory opinions about rhetoric. At the same time it is interesting to notice that *Gorgias* in itself is a masterpiece of rhetoric. A couple of decades after this dialogue was written Aristotle wrote *On Rhetoric*, i.e. the book that brought the Greek rhetoric tradition to the Roman rhetoricians such as Cicero and Quintilian (e.g. Rosengren 1997).

That is, classic rhetoric is not just about how to speak well and convincing, it is primarily based on an epistemology, a knowledge theory. To express an insight, according to this theory, is not something extrinsic in relation to the insight, no, it becomes an insight at the very moment it is possible to speak about it. Secondly, according to this knowledge theory all understanding is related to man. Understanding is supposed to be mediated to somebody in order to make action possible. The rhetoric tradition therefore has as its objective to unite understanding and action, knowledge and emotion. This means, and in contrast to science that wants to be value free, that the strongly process and action oriented (classic) rhetoric pays regard to ethical aspects, and as mentioned before, above all to what is good for society (e.g. Lindhardt 2005)

Besides the classic Greek period rhetoric had its heydays during the Roman Empire and the Renaissance. However, the new ideas of Francis Bacon and René Descartes during the late 16th and early 17th centuries about scientific methods turned out to be a massive attack against the rhetoric tradition. By that time rhetoric had anyway become more or less mechanistic and scholastic. With very few exceptions, and above all Giambattista Vico and his new interpretation of Aristotle's *On Rhetoric* in the first part of the 18th century, rhetoric deteriorated to more or less speech techniques and the epistemological basis was soon completely forgotten.

However, in connection to what is commonly called "the linguistic turn" in philosophy in the 1940s, -50s, and -60s, e.g. Wittgenstein's so called second philosophy, there was new

interest in the epistemological aspect of rhetoric. Pure analytical philosophy has been forced to yield for the insight that all kind of statements nevertheless have to be expressed in some sort of language, and furthermore, that thought, language, and action belong together. This is also the point of departure for the theoretical school that is called "la nouvelle rhétoric" and which was started, among others, by Chaïm Perelman (e.g. Perelman & Olbrechts-Tyteca 1969). Perelman tries to bridge the gap between, on the one side, the heuristics of disbelief ("critical thinking") that has characterised western scientific thinking ever since Plato and Descartes, and on the other side, the overall neglected heuristics of Aristotle, Vico and others, in which trust instead plays an important role, especially as it stands out in rhetoric (also see Rosengren 2002).

Vico and *senso communis*

We will stay for a short while with Vico, who thus in sharp polemics against the then new Cartesian methodology decidedly vindicated the rhetoric's epistemological value. This is neither the right place to go deeply into Vico's arguments, but a couple of his ideas even today illuminate what (classic) rhetoric has to offer (Uhlin 1998).

An important concept in Vico's philosophy is the Roman idea about *senso communis*, which is not the same as the kind of common sense (although the modern concept doubtless derives from the ancient) that most people possess. No, *senso communis* is that kind of reason that is about what is possible and probable, and which is fundamental for the upholding of society, i.e. it is not about what is scientifically true. Vico attaches this to the concept of *eloquentia*, eloquence, but not primarily in the meaning of being able to talk well, but above all in the sense of being able to say what in a specific situation is best for society. Vico's usage of these two concepts, however, also alludes to yet another element in the classic tradition, namely on the contrast between the learned and the wise, a difference that goes back to Aristotle's idea about *phronesis*, that is best (but not at all equivalent) translated to practical wisdom and prudence. That is, the learned knows much about such things that compose facts ("the invariables") whilst the wise knows much about what is dynamic and changeable ("the variables"), i.e. the wise knows about society (Aristotle 2004:1139b 25-1140b5).

According to Vico the most important element in the education of young people was practice in *senso communis*. They should not be trained in critical thinking, at least not solely, and definitely not too early. Young people need images for their fantasy, which they do not get in critical thinking (Vico [1749] 1990). But this is what they can get through what Aristotle calls *topica*, i.e. the art of arguing from what is probable and what aims at developing the sense for what is intrinsically convincing – an art that functions *ex tempore* and that strongly reminds us of what for instance Donald Schön (1983) calls "reflection-in-action" and what Michail Bakhtin (1993) has named "thinking in action".

Hence, Vico argued for an old rhetoric tradition. However, what he really meant, according to German philosopher Hans Georg Gadamer, goes far beyond a defence of this tradition. Vico wanted something more. What it ultimately was about was Aristotle's distinction between practical and theoretical knowledge, a distinction that cannot be reduced to the distinction between what is true and what is possible and probable. *Phronesis* is at the first hand directed towards the actual situation with all its circumstances and infinite variations. In Vico's way of understanding *fronesis* a positive ethical motive is combined with the Roman doctrine of *senso communis*. To practice this virtue for Vico meant to be able to make a distinction between what ought to be done and what must not be done. This, however, was not about practical shrewdness or common smartness. No, it was about what from an ethical perspective is good, or no good, for the society (Gadamer 1989).

Now, to me it is no problem to understand Vico thus that he in fact describes the precondition for what for instance Niklas Luhman (1995) designates complex social systems, a cate-

gory that I argue also include what we now call innovation system. Because, it seems as if we anyway have come to a point where we agree that it is not enough to say that an innovation system aims at the development of new technologies and economic growth. No, it seems as we have begun to endorse a viewpoint that innovation systems are about processes, parallel processes, intertwined and complex processes, e.g. interactive and collective learning processes and ethical, cultural, economical, political, organisational, technological and many other societal processes (e.g. Lundvall 1999; Maskell et al 1998; Nilsson & Uhlin 2002). I mean, that this latent capacity for self-organisation and representation that characterises complex social systems – innovation systems – is about prudence that evolves between the participants in all these ever ongoing processes. This is not a variant of scientific theoretical and technical knowledge, but another kind of knowledge that in the first hand is developed in what Gadamer (1989:21) has called “the concrete situation and all its circumstances in their endless richness of variations”. It is of course also possible to name this kind of practical wisdom “collective rhetoric knowledge”.

Rhetoric for the past, present and future

In this paragraph I will take a closer look at the third point in Miettinen’s model of transdiscursive terms, i.e. the point that says that transdiscursive concepts also supply a world view or a diagnosis of an era, and that this in fact was one of the strategic aims with the new concept of national innovation system in the OECD reports. This has obviously to do with the past, present and future, and here is another, and important, connection to rhetoric.

Aristotle divided rhetoric into three kinds, the judicial directed towards the past, the deliberative towards the future, and the demonstrative towards the present.⁵ José Luis Ramírez (2004) has recently suggested that we should understand this as rhetoric’s three kinds of discourses. He further argues that while the temporal perspective as a principle is not present in the scientific discourse, it is always present in all kinds of human actions, i.e. in the kind of situations that rhetoric is about.

Now, the first of Aristotle’s three rhetoric discourses is about to try to decide what has happened in past time, e.g. in connection with legal processes and evaluations. However, it is not about finding fact in a scientific meaning, no, it is rather about what has actually happened in relation to what should have happened if one acted in another way. That is, what has happened is put into a context where one has to assess if what has happened can be considered good and righteous, or bad and iniquitous, or if it downright ought to have happened in another way. Hence, this kind of rhetoric discourse turns on to considerations about approval or disapproval of performed deeds, and, in other words, on deliberations about what sort of arrangements ought to be taken.

That is, this first discourse immediately leads to the second that is about deliberations about actions for the future. The Latin term for this is *genus deliberativum*, i.e. the same term that is now used by for instance political scientists that talk about “deliberative democracy” (e.g. Elster 1998). Hence, in this rhetoric discourse it is about deliberations about *possible* actions. And, of course, actions of this kind take their point of departure from what has been done and happened in the past, but it also is a question of what is good for the community without this “good” necessarily having a connection to experience, i.e. to the past. What is important when it comes to deliberative rhetoric thus is what has to be done in the future.

The third and demonstrative kind of rhetoric discourse really does not make any statements about what is happening in the present (situation). This is a common misunderstanding among all the recent “experts” on rhetoric. Ramírez (2004:53), for instance, instead argues that this third kind of rhetoric is a “penetration of in what way the designer of the speech chooses words, structures and arguments”. And he adds: “This demonstrative kind of rhetoric discourse is the instrument that is used in order to make a discourse trustworthy” (my transl.).

That is, this third discourse is according to Ramirez the instrument that binds together the rear-looking and the forward-looking discourses.⁶ But, and as we will now see, “the present” is an indescribable phenomenon, which in a mysterious way binds together the past and the future.⁷

Space of experience and horizon of expectation

We have now come to the third area where there is reason to critically watch Miettinen’s arguments and to deepen and widen the discussion. The point of departure is still his thesis that a transdiscursive term like innovation system among many other functions also provides us with a new worldview, or a diagnosis of an era. This is also supposed to be one of the strategic objectives with the concept of national innovation system in the OECD reports.

Now, Miettinen describes and analyses the introduction, usage and success of the concept of national innovation system in Finland. But he really does not discuss why the people behind the reports, and the politicians and policymakers that received and endorsed them, were in need of a new world view or a diagnosis of an era. This is what I will do in this paragraph.

However, there are two possible and very different ways one could embark on for such a discussion. The one is the “ordinary historical” way, i.e. to account for the much discussed crisis of the nation state and the emergence of a new supra national level. This is the way Miettinen has chosen in his account for the crisis for the Finnish nation state from the late 1980s into the recession of the early 1990s. However, this kind of story-telling does not explain why there is a need for a new worldview (which reasonably has to do with the future) or a diagnosis of an era (which likewise reasonably has to do with the past).

The other way is what in German is called “Begriffsgesichte”, which is described as “a methodology of historical studies that focuses on the invention and development of the fundamental concepts (*Begriffe*) underlying and informing a distinctively historical (*gesichtliche*) manner of being in the world” (White 2002). Reinhart Koselleck is considered to be “the foremost exponent and practitioner” (ibid.) of this kind of history and I will follow him in this paragraph.

Now, we take it for granted that there has been a past, there is a present, and there will be a future. But, says Koselleck (2004), this “present” is not just the place where the future is transformed into a past, it is also the space of action where the battle is fought over our understanding of the past, and, at the same time, the field where political and other interests is fighting over the shape of the future.

Koselleck is of course not the only one that has been, and is, thinking about how the past, present and future interfere with each other, how they shape each other, and in strange ways presume each other; Aristotle and Vico did it, as we have seen, but Augustine, Tolstoy, Kafka and Orwell also did it, just to name of few of many. However, Koselleck stands out in one particular respect, namely, he is *methodologically* occupied with what Arendt (2004) with reference to Kafka has described as man’s “battle experience” holding the position between past and future. It is exactly this aspect I will focus upon.

Because, Koselleck calls in question the linear assumption of time and argues that neither the past nor the future is something absolute and exclusive. Instead he claims that both concepts have to be understood relatively and as existing in a continuum; there is a future in the past, and a past in the future. Historic prophecies and prognoses are nothing but forecasts in the past, i.e. every time we do something with some sort of request on the future – for instance when we plan for regional development – this very request is in fact a piece of the past in a story-bound future.

Now, it goes without saying that there is such a thing as diachronic time, i.e. where past time, present time and future time follow each other linearly. But the way Koselleck argues imply that there is *also* synchronic time where the past, present and future are stacked as time-

layers over and under each other in a non-linear way; these time-layers constitute what Koselleck has called "simultaneous non-simultaneity". Hence, in order to inquire about the time in which we live it is necessary to separate these time-layers from each other in order to describe their respectively specific nature. The way to do this, Koselleck argues, is to investigate the basic concepts we use, and especially the concepts that characterise our time.

Now, we have already said that concepts differentiate themselves from words in that they are ambiguous. What transforms a word into a concept is the entire socio-political context of meaning that the word refers to and which is a part of the concept. Moreover, concepts are used synchronically. And of course, this is how matters stand with many of today's socio-scientific and socio-political concepts, e.g. triple helix, cluster, partnership, and, of course, innovation system. Koselleck does not discuss these concepts, he is occupied with concepts like revolution, democracy, communism, and so forth. But he makes a statement about "his" concepts that also holds for "our's"; concepts like these have a clear temporal dimension, i.e. they not only reach back-wards, to history, but they also interfere with the future, and they define the horizon of expectation. This is for instance obvious with the concept of innovation system in the Lisbon-strategy of the European Union.

Hence, this brings us to the relation between two of Koselleck's most interesting methodological concepts, namely space of experience ("Erfahrungsraum") and horizon of expectation ("Erwartungshorizont"). Experience and expectation are not alternative concepts, on the contrary, they are intertwined and presume each other, no experience without expectation, and no expectation without experience. For instance, prognosis always takes off from experience and with a diagnosis, i.e. it is from the space of experience that the horizon of expectation is seen. However, the prognosis is also constructed in the light of the decree to expect something. That is, in the prognosis expectations are let loose, expectations that can not be deducted only from experiences. Put another way, "the previously existing space of experience is not sufficient for the determination of the horizon of expectation" (2004:263). Hence, the ever existing tension ("battle") between experience and expectation sometimes brings forth a particular kind of time that Koselleck calls "historical time", and this kind of time, he says, governs political and social actors.

This meta-perspective of course becomes especially interesting as soon as we realise that there are obvious prognostic elements in a concept like innovation system. In fact, the concept innovation system in itself contains prognostic elements, i.e. expectations that are let loose as soon as one talks about innovation. The same of course goes for concepts like triple helix, regional development, and so forth.

Now, the nucleus of Koselleck's thesis is this: When the space of experience falls apart all old expectations lose their values and a new horizon more or less *has* to be opened. This was for instance the case at the end of the 18th century and with the French Revolution. This is a good example of "historical time" which governed political and social actors in the sense that they just had to find, or invent, or perhaps even innovate, a new horizon of expectation, because no experiences were valid any more, the space of experience had fallen apart. In his novel *Absolute Friends* (2004) set in in the aftermath of the DDR collapse John le Carré has succinctly formulated this kind of situation: "There is no tomorrow. Not as it was yesterday." That is, now and then a historical time occur when innovation of a new "tomorrow" becomes the most urgent task for politicians and policymakers. The connection to rhetoric's deliberative kind of discourse is obvious.

Is there such a historical time today? Well, political scientists, sociologists, historians and others have since long discussed the crisis of the nation state; it is not at all implausible to interpret this crisis as a space of experience that is falling apart. The European Union, on the other hand, has been described as the solution of this crisis; it is likewise not far-fetched to see this as the suggested new horizon of expectation (e.g. Milward 2000). At the moment, how-

ever, the brightness of this horizon seems to be somewhat overshadowed by the results of a series of negative national referendums regarding as well the EMU as the proposed European constitution. Deliberative dialogues about the future, simultaneously on many levels, and in many arenas, are obviously called for. To me it is far from evident that rhetoric in this context should be regarded with suspiciousness, mainly for epistemological reasons.

Concluding discussion

I will end this chapter with two objections based on principles against the nucleus of Miettinen's basic argument, i.e. that the systems approach in the concept of innovation system is without any real scientific value, and that the concept's consensus building and ideological value is directly related to this doubtful scientific value.

My first objection is this: It is often the case that we can observe the effects of a phenomenon, but we cannot see what causes it. This is the usual situation within science. If it was otherwise, i.e. if it was enough to "approach reality" and first gather and then sort empirical facts in order to try to understand how the world is functioning science would not be necessary. It is precisely because that what is empirically observable only constitutes "the tip of the iceberg", and because that what is "under the surface" is not immediately accessible that science and research at all exist.

In order to solve the problem to get to know what is under the surface the natural sciences have developed a methodology that builds on the formulation of hypotheses followed by meticulously organised series of experiment in order to verify the hypotheses. But social scientists cannot follow this kind of methodology, e.g. they cannot experiment with societies. Instead they work with transfactual questions. That is, abductively and retroductively they have to transcend what is possible to empirically observe in order to understand what is not possible to observe and find the *possible* causes to what they actually can observe. This is the farthest social scientist can reach (e.g. Bhaskar 1975; Danermark et al 1997).

So, what is it that has made it possible that politicians, policymakers, scientists, and many others from the mid-1990s not only have endorsed the idea of innovation system, but also that this has become the idea that so many of us think we have to serve? What has made innovation system policies possible? (Uhlir 2005)

Miettinen has inquired into and has discussed how the OECD's and the EU's civil servants together with researchers have developed and legitimated the concept of innovation system. He has also discussed the many and partly contradictory functions of the concept. *But he has not discussed if there nevertheless exists a reality that can perfectly well be named innovation system, a reality that however is not immediately accessible to social scientists.*

Miettinen is very particular about emphasising that transdiscursive terms have to have an empirical accountability; if this is not the case these terms do not exist but as rhetoric. This is why he rejects the systems approach at the same time as he admits the the concept of innovation system may have a passing intermediary function. I argue, however, that complex social systems are not empirically accessible but in a very limited sense. That is, we can never get empirically grounded knowledge about the totality of such a system.

In other words, it is self evident that the concept innovation system is an abstraction. Innovation systems do not crop up before our eyes just because we observe the empirically perceptible world; to think that that is possible is to commit what Roy Bhaskar (1975) calls "the epistemic fallacy". No, innovation systems emerge in two steps, firstly because researchers, policymakers and politicians together have constructed a new and hypothetical framework, an abstraction, and a concept they call "innovation system". Now, we have to be precise about causality: What was it that caused the concept to appear during the OECD seminars? Of what was the concept an effect? Miettinen says not more than that there was a need for a new world view and a new diagnosis of an era. Well, I think that Miettinen basically is right about this,

but there is obviously a necessity of a more penetrating historical inquiry. Miettinen has studied secondary sources, i.e. the OECD reports, the first hand sources of course consists of the seminar documents and the material from the workshops. Hence, here waits an exciting research project for, perhaps in the first hand, scholars within the field of conceptual history. Anyway, I have touched upon this in another article (Uhlilin 2005) and therefore restrict myself to say, that the need for a new world view *etcetera*, all things considered, has occurred in connection with the gradual falling apart of the space of experiences and, therefore, as a need for a new horizon of expectation.

What is more, innovation systems emerge in a second step because *social structures and processes become real when they are reproduced and transformed by people that act in accordance with their abstractions and concept* (Bhaskar 1975). That is, in many cases these abstractions and concepts are constitutive to the social phenomena, in this case the innovation systems.

Well, to this Miettinen could of course reply that this is exactly what he points at with his transdiscursive analysis; the concept innovation system has become real because of the six functions he emphasises. However, my understanding of Miettinen's position is that he argues that it is the *concept* that has become real in the meaning that it is used by researchers and policymakers, he does not say the innovation systems have become real. On the contrary, he rejects the idea that there could be any such systems in reality. He furthermore criticises the Finnish authorities for reifying the national innovation system in a vain attempt to control the complex reality. To this I will say, that we are creating innovation systems because we need a language in order to define a new societal organisation as well as a new order; the nation state as we know it from the 19th and 20th centuries has come to the end of the road.

But I can already hear the objection: Isn't this just other words for social construction!? Of course it is, and this construction, which in its first phase is an *idea* about innovation systems, is simultaneous with an entire bunch of similar ideas about clusters, partnership, triple helices, mode 2, regional development, etc. But these ideas are more or less transformed into tangible structures when they are reproduced by people who act in accordance with their favoured abstractions and concepts. About two hundred years ago people thus came up with this new and incredible idea about the nation state, and under the umbrella of this meta-idea other ideas were developed about various democratic, educational and other civic institutions. And from this multitude of ideas people gradually derived and created real institutions and structures such as national assemblies, franchise reforms, social security systems, etc.

My second objection to Miettinen's basic argument concerns his opinion that the consensus building and ideological value of the concept of innovation system is directly related to its doubtful scientific value. This means, however, that Miettinen puts the scientific claim for truth at the centre of his argument; what does not build on and departure from scientific facts has by definition a doubtful value.

This position of Miettinen of course places us in front of one of the fundamental questions of science philosophy: How far is science valid? The question is of course too far-reaching to be dealt with in its entirety in this chapter. But there is one aspect that is both highly relevant and possible to deal with in this context, it is an aspect that Alasdair MacIntyre (1987) has developed in an insidious thought experiment about innovation and language.

The experiment goes like this: Suppose that you and me, sometime during the Stone Age are talking about the future, and that I predict that within ten years someone will invent the wheel. "Wheel", you ask, "what is that?" And I describe what a wheel is, and of course it is with some difficulties that I describe spokes, hub, axle, and so forth. But then I become silent, absolutely flabbergasted, and exclaim: "But nobody *will* invent the wheel, because I have just done it!"

MacIntyre's point is, of course, that you cannot predict an invention without saying what it is, i.e. to say what it is is to invent it. Now, my point with MacIntyre's thought experiment is that this experiment so clearly illustrates that *the new, and of course also the scientifically new, nevertheless has to be expressed in some sort of language, usually in words or symbols*. And it is exactly here where we can find the nucleus of the claim for knowledge within the rhetoric tradition. That is, it is not the words, the symbols, or the language as such, which give birth to the new, but the action specific dialogues between people.

I have above said that classic rhetoric is based on a particular epistemology, a knowledge theory. To express an insight, according to this theory, is not something extrinsic in relation to the insight, no, it becomes an insight in the moment it is possible to speak about it. Secondly, according to this knowledge theory all understanding is related to man. Understanding is supposed to be mediated to somebody in order to make action possible. This "somebody" can be I or somebody else. Hence, this is about as well inner dialogue as dialogue between people, even dialogue with the action.

Miettinen uses the concept "polyfon" when he characterises his transdiscursive approach. He has borrowed it from Michail Bakhtin's (e.g 1991) analyses of Dostojevsky's novels where the throng of characters (the brothers Karamazov, Raskolnikov, The Grand Inquisitor, and many, many more) in all their dialogues in a peculiar way are independent from the author; they are their own voices, ideologies and idiosyncrasies, they are not the mouthpieces or the marionettes of the author, the novels are enormous heteroglossic⁸ fresques that represent the complex society. An alternative concept in order to describe this complexity would be "redundancy of dialogues."⁹ I argue that an innovation system represents such a redundancy of dialogues. It is this redundancy that creates the non-linear complexity and the selforganising and innovative potential in the social system. This, of course, is sometimes also called "critical mass".

Finally, at the start of this chapter I asked if the concept of innovation system is a scientific discovery, an administrative invention, or a politico-rhetoric innovation? It is possible that we have to understand it in all these ways. If so, there are prerequisites not only for a redundancy of dialogues, but also for the innovation of a new horizon of expectation.

Notes:

¹ Miettinen writes about *national* innovation system. I abbreviate this to just innovation system because it is innovation and system that Miettinen discusses in the first hand. In cases where he explicitly discusses national innovation system, e.g. compared to regional innovation system, I especially emphasise that.

² Miettinen's critique is not new. It was formulated by several researchers at the end of the 1990s, for instance by the present writer: Uhlin, Å; "The Concept of Learning within the Systems of Innovation Approach" in *Concepts and Transformation* 5:3., 2000, p 283-319.

³ From greek *poly*, many, and *fone*, voice, tune.

⁴ A useful specification of more than forty rhetoric figures is to be found on <http://www.uky.edu/ArtsSciences/Classics/rhetoric.html>.

⁵ There are many translations and commentaries to Aristotle's *On Rhetoric*. I have used George A. Kennedy's translation, Oxford University Press, 1991. See especially Book 1, Chapter 3.

⁶ The third rhetoric discourse, however, is debated. According to some scholars this is an insertion into the original text that was been done long after Aristotle's death. See Kennedy's commentaries, note 77, p. 48 in *On Rhetoric* (1991). See also Garver, E.; *Aristotle's Rhetoric*, The University of Chicago Press 1994, p. 55-.

⁷ Aristotle himself was obviously puzzled about the concept "now", i.e. what it really consists of, what its function is for time and change, etc. He conducts a long discussion about it in his *Physics*, Book IV, Chapters 10 & 11, but he does not reach any definite conclusion. Ackrill, J.L. (ed); *A New Aristotle Reader*, Princeton University Press 1987.

⁸ A concept also used by Bahktin; from greek. *heteros*, olika, and *glossa*, tunga.

⁹ This concept I have got from dr. ing. Henrik Finsrud, Work Research Institute, Oslo, in a conversation about mechanisms for societal development.

References:

- Ackrill, J.L. (ed); *A New Aristotle Reader*, Princeton University Press 1987.
- Amin, A. & Hausner, J. (eds.); *Beyond Market and Hierarchy: Interactive Governance and Social Complexity*. Edward Elgar. 1997.
- Arbo, P.; "Kan innovasjon planlegges?", i Arbo, P. & Gammalsæter, H. (eds.); *Innovasjonspolitikken scenografi. Nye perspektiver på næringsutvikling*, Tapir Akademisk forlag, 2004.
- Arendt, H.; *Mellan det förflutna och framtiden. Åtta övningar i politiskt tänkande*. Daidalos 2004.
- Aristotle; *The Nicomachean Ethics*, Penguin Classics 2004.
- Aristotle; *On Rhetoric*. transl. by George A. Kennedy, Oxford University Press, 1991.
- Bachtin, M.; *Dostojeskijs poetik*, Anthropos 1991.
- Bakhtin, M. M.; *Toward a Philosophy of the Act*. University of Texas Press 1993.
- Barabási, A.-L.; *Linked. The New Science of Networks*. Perseus Publishing 2002.
- Bhaskar, R.; *A Realist Theory of Science*, Verso 1975.
- Buchanan, M.; *Small World. Uncovering Nature's Hidden Networks*. Wiedenfeld & Nicolson, 2002.
- Checkland, P.; *Systems Thinking, Systems Practice*, John Wiley & Sons, 1981.
- Cilliers, P.; *Complexity and Postmodernism. Understanding Complex Systems*, Routledge 1998.
- Danermark, B., Ekström, M., Jakobsen, L. & Karlsson, J. C.; *Att förklara samhället*, Studentlitteratur 1997.
- Edquist, C.; "Introduction", i Edquist, C. (ed); *Systems of Innovation. Technologies, Institutions and Organizations*, Pinter 1997.
- Elster, J. (ed.); *Deliberative Democracy*. Cambridge University Press 1998.
- Etzkowitz, H. & Leydesdorff, L. (eds); *Universities and the Global Knowledge Economy. A Triple Helix of University-Industry-Government Relations*. Pinter 1997.
- Gadamer, H.-G.; *Truth and Method*, second revised edition, London 1989.
- Garver, E.; *Aristotle's Rhetoric*, The University of Chicago Press 1994.
- Gibbons, M. et al; *The New Production of Knowledge*, Sage 1994.
- Havel, V.; *En dåre i Prag. Brev, tal texter 1975-1989*, s. 207. Symposion 1989.
- Isaksen, A. (ed.); *Innovasjoner, næringsutvikling og regionalpolitikk*, HøgskoleForlaget 1997.
- Jessop, B; *The Future of the Capitalistic State*, Polity Press 2002.
- Kiel, D. L. & Elliot, E (eds.); *Chaos Theory in the Social Sciences. Foundations and Applications*. The University of Michigan Press 1997.
- Koselleck, R.; *Erfarenhet, tid och historia. Om historiska tiders semantik*. Daidalos 2004.
- Leydesdorff, L. & Van den Besselaar, P. (eds.); *Evolutionary Economics and Chaos Theory*. St Martin's Press 1994.
- Luhmann, N.; *Social Systems*, Stanford University Press 1995.
- Lundvall, B.-Å.; *Det danske innovationssystem – et forskningsbaseret debatoplæg om innovationspolitiske udfordringer og handlemuligheder*. DISKO-projektet: Sammanfattende rapport. Erhvervs-ministeriet 1999.
- MacIntyre, A.; *After Virtue. A Study in Moral Theory*. Sec. ed., Duckworth 1987.
- Maskell, P, Eskelinen, H., Hanibalsson, I., Malmberg, A. & Vatne, E.; *Competitiveness, Localised Learning and Regional Development*, Routledge 1998.
- Miettinen, R.; *National Innovation System; Scientific Concept or Political Rhetoric*. Edita, Helsinki 2002.
- Milward, A. S.; *The European rescue of the Nation-State*, Routledge 1992.
- Nilsson, J.-E.; "Innovation Policy as an Alternative to Institutional Changes", i *Structural Change in Europe 3. Innovative City and Business Regions*. Hagbarth Publications, 2004.
- Nilsson, J-E. & Uhlin, Å.; *Regionala innovationssystem; En fördjupad kunskapsöversikt*. Vinnova 2002:3.
- Perelman, C. & Olbrechts-Tyteca, L.; *The New Rhetoric. A treatise on Argumentation*. University of Notre Dame Press 1969.
- Ramírez, J. L.; "Retorik som humanvetenskaplig kunskapsteori", *Rhetorica Scandinavica* Nr. 31, 2004.
- Rosengren, M.; *Doxologi; En essä om kunskap*. Rhetor förlag 2002.
- Rosengren, M.; *Psychagogia – konsten att leda själar*. Symposion 1998.
- Schön, D.; *The Reflective Practitioner. How Professionals Think in Action*. Basic Books 1983.
- Senge, P. M.; *The Fifth Discipline*. Doubleday Currency 1990.
- Uhlin, Å.; "Innovation, osäkerhet och det instrumentalistiska misstaget" in Benner, M. (red.) *Innovationer, dynamik och förnyelse i ekonomi och samhällsliv*. Studentlitteratur 2005.
- Uhlin, Å; "The Concept of Learning within the Systems of Innovation Approach", *Concepts and Transformation* 5:3., 2000.
- Uhlin, Å.; "Vico i kunskapssamhället", *Nordiske Udkast. Tidskrift for kritisk samfundsforskning*. Nr 1, 26. årgang, Dansk psykologisk Forlag 1998.
- Veggeland, N.; *Det nye demokratiet – et politisk laboratorium for partnerskap*, Høy-skoleforlaget 2003.
- Vico, G.; *On the Study Methods of Our Time*. Cornell University Press, [1709] 1990.