## Abstract

The idea that decision-making processes and management in public policy and public administration are complex has entered the minds of practitioners and scholars in public administration. Insights from theories on complexity, however, have hardly been used in public administration and management. In other social sciences, like economics for instance, an evolutionary approach has received far more attention. The question whether such a complexity theory approach could help to increase our understanding of public management phenomena is an intriquing one. In this volume the reader will find a selection of articles on public management using insights from the complexity theory. Before we present the seven articles, which all deal with notions from the complexity theory and apply them to phenomena in the public sector, we will briefly introduce some basic ideas concerning this theory.

### **Key words**

Complexity theory, public administration, complex decision-making, complex systems

# COMPLEXITY THEORY AND PUBLIC MANAGEMENT

# An introduction

Geert R. Teisman and Erik-Hans Klijn

#### Geert R. Teisman

Department of Public Administration Erasmus University Rotterdam PO Box 1738 3000 DR Rotterdam The Netherlands E-mail: teisman@fsw.eur.nl

#### Erik-Hans Klijn

Department of Public Administration Erasmus University Rotterdam PO Box 1738 3000 DR Rotterdam The Netherlands E-mail: klijn@fsw.eur.nl



Routledge Taylor & Francis Group

Vol. 10 Issue 3 2008 287-297 Public Management Review ISSN 1471-9037 print/ISSN 1471-9045 online © 2008 Taylor & Francis http://www.tandf.co.uk/journals DOI: 10.1080/14719030802002451

# COMPLEXITY THEORY: WHY IS IT INTERESTING FOR PUBLIC ADMINISTRATION?

Like many other scientific theories the complexity theory is not a unified and homogeneous perspective. But all the variations start with the notion of complexity, which is also the core from which we will start our search for a better understanding of public sector phenomena. And even though there are a variety of definitions of complexity, ranging from complex systems as more complicated versions of simple systems to complex systems as compounded systems, truly different from simple systems, there is also a broad agreement on the characteristics of the phenomena scientists are studying.

The first broadly accepted insight is that phenomena are more dynamic than most of the traditional scientific approaches assumed. Many scientific researchers focus on the stability of their research phenomena. Questions like 'what is the policy of the EU on Z?' and 'how is the national government of country X or Y structured?' are well-known examples of such a focus. The aim is to give an adequate picture of a situation, often assuming that the observed causal relations, teased out by theoretical perspectives, will continue to exist in the (near) future. Using a hypothesis and trying to falsify (the hypothesis) it is one of the well-known methodical approaches. A hypothesis that cannot be falsified can reach the status of law. Complexity theories tend to focus their attention more on the dynamics of phenomena they examine. It is assumed that phenomena like policy, decision making and institutions evolve. A picture just gives information about a certain moment and place. A complexity theory is more focused on making films of how phenomena develop under a variety of influences. The course of developments can therefore be linear, guided by one single dominant force (a powerful causal relation). Often however, developments will be non-linear, guided by a variety of forces. Understanding this non-linearity is an important ambition of the complexity theory. The complexity theory can help to add more analyses of change to public administration, in addition to the well-established analyses of facts, figures and stable (causal) relations. The complexity theory focuses on storylines through time, different from place to place and evolving in an often surprising way. We expect that the complexity theory will help scholars in public administration to improve their ability to make films of governance processes.

A second broadly accepted insight is that phenomena do not develop only by external forces imposed upon them. Entities (in public administration we normally use terms like actors, policies or processes) do not (only) behave according to laws or principles, but they have self-organizing capacities. Due to these self-organizing capacities of entities, within a larger compounded whole, the larger entity will develop in an unknown direction and with an unknown speed. These two characteristics are the result of the self-organization of a variety of interrelated entities and will therefore 'normally' be chaotic: *even though not everything is possible in the next period, much is.* Due to the fact that public administration so often focuses on steering and organization as an activity

imposed by a 'superior' on subordinated entities, self-organization is one of the most intriguing concepts in the complexity theory for public administration. We expect this theory will aid scholars in public administration to generate new and better understanding of the many implementation problems our science has already experienced for decades (Pressman and Wildavsky 1973).

A third broadly accepted notion in complexity theories is the importance of contexts. A well-known metaphor to highlight the importance of contexts is that of the fitness landscape. It refers to the surroundings in which living beings exist and behave. The landscape, which changes continuously as a result of the choices of the agents and external pressures, determines the effectiveness of the behaviour of the acting agents in search for survival.<sup>1</sup> While public officials normally tend to focus on their own ambitions and their abilities to make a difference (and by doing so tend to overestimate their abilities), the complexity theory emphasizes the impact of context on the effects of behaviour. Due to the multiplicity of contexts and the dynamics of agents' behaviour and context the landscape in which public managers perform will 'normally' change constantly. The fit between the changes that occur and the behaviour that is performed will determine the effectiveness of the behaviour. The emerging changes in landscapes can result from the behaviour of the public officials themselves (for instance when they implement New Public Management Arrangements, like performance contracts, performance rewards, procurement methods and new control mechanisms). Many of the changes, however, will be generated by self-organization of other entities in the action field of the officials and by events that come from outside the action field but do have a major impact on the landscape of that action field. This idea of a fitness landscape is different from the classical perspective of the contingency theory, which also stresses the impact of the environment on organizations and organizational behaviour. In the contingency theory, certainly in the early version of it, the environment is a relatively stable set of characteristics. Also in its later version it has nothing of the complex interaction between actors, external environment and path dependency that characterizes fitness landscapes.

A fourth theme dealt with in the complexity theory is the behaviour of actors – often the term agent is used – within complex dynamics, self-organizing landscapes. These actors are self-organizing, creating their own perception of what they want and how to behave in the landscape they are in. This can lead to self-referential behaviour denying the effects from (other agents in) the context. This has already been elaborated by Luhmann (1986) in terms of autopoietic social systems. Governments often seem to perform as self-referential entities. Things going wrong are blamed on 'the other' and improvements are often sought in the acquisition of more power and control in order to get in charge again. However, it has also become clear to many actors in public administration – that is, the public managers in the broad sense of the word – that effectiveness really has to do with the ability to adjust to external forces and changes. This so-called dissipative or adaptive behaviour is seen as an important and, in public administration, underestimated option for agents.

### PUBLIC ADMINISTRATION AND COMPLEXITY THEORY

The characteristics of the complexity theory mentioned above will be elaborated in the different contributions in this special issue. We try to pay special attention to the peculiarities of social systems in general and governance systems in particular. We are aware of the pitfalls attached to applying concepts of natural science to social science. Social systems are characterized by self-reflecting agents who try to understand the social systems they themselves are in (the double hermeneutics problems, see Giddens 1984). This has led to the understanding that although social science can learn from natural science it is always necessary to translate the insights of the one for the conditions of the other. Or as Broadbeck (1962: 47, cited in McIntyre 1996: 209) tells us:

Laws in social science, if we had them, would contain many more variables than those in physics. Yet we berate the social scientists for not being able to do what even the natural scientists cannot do. The multiplicity and complexity of factors in social phenomena impose limits upon what we can reasonably expect to achieve.

This is an intriguing argument with respect to the topic of this special issue. If social phenomena have already for a long time been recognized as complex and therefore difficult to understand, the complexity theory seems to offer a lot of promising possibilities applicable to public administration.

The contributions in this special issue pay attention to the dynamics in governance systems. By applying the complexity theory to governance processes they also contribute to what may become or may be called an evolutionary approach of public administration. Our overall ambition is to give a concerted attempt to introduce complexity theory concepts in public administration and to show that they have added value. Central concepts used to describe a normal state of governance processes in the different contributions are self-organization, fitness landscape and dynamics. Stability can be present in processes, but mainly as a punctuated equilibrium. Stability is just one of the types of dynamics that will appear in processes.

Governance processes take place in existing societal and physical landscapes. We will illustrate this in three contributions that focus on the collective decision making in socio-physical upgrading, the first in the upgrading of existing infrastructure facilities in the UK, the second one in Urban Area Regeneration in Ireland and a third one in the improvement of water systems in the Netherlands and Germany. Two other contributions focus on UK local government accounting systems and health care systems. In the health care system the patient is the socio-physical subsystem that should be healed, while many of the governance activities focus on the whole of healing and supporting subsystems. In that sense these contributions focus more on creating circumstances for improvement than on the direct improvements aimed at by public management, which are the subject of the first three contributions. This distinction, of course, is relative, in the sense that it is more a matter of focus than of reality itself. For instance, in the case of upgrading infrastructure the EU creates rules that clearly affect the improvement processes. Nevertheless it is important to understand that an analysis based on the complexity theory can focus on very specific and unique (in time and place) processes such as infrastructural and urban renewal and on more aggregated levels such as the health care system in a country and that both tell a part of a whole story and neither of them is able to tell the whole story or even the main part of what is really going on.

We are interested in the course (direction) and speed (time) of governance processes. All processes face high risks of failure, delay and cost overrun. For a long period scientists and practitioners have tried to find the factors causing failure and to get a hold on these factors. Despite these attempts failure did not disappear. We elaborate the hypothesis that this has to do with insufficient understanding of the working of the complex system (in terms of dynamics, self-organization capacity and co-evolution) and with the one-sided attempt to gain control over factors that are assumed to guide processes of development. Like many scientists within public administration, the authors in this issue aim for increasingly realistic representations of the dynamics of governance processes. We will demonstrate that governance processes are complex systems in which decisions are not the strong buoys that guide processes, but just temporary, punctuated equilibriums in a dynamics clew of numerous decisions and events. The events and their interpretation (of these events) by agents are, to a large extent, guiding processes.

#### THIS SPECIAL ISSUE

The special issue consists of seven contributions. First Erik-Hans Klijn elaborates the use of complexity notions in public administration theories over the last decade. The article explores how three dominant concepts in complexity theories, dynamics, self-organization (and emergent properties) and co-evolution, are reflected in public administration theories. It shows the differences between these ideas and the way complexity theories deal with them and what public administration could learn from the complexity theory. The article also pays attention to public management and how it could be understood from a complexity theory point of view.

Tony Bovaird elaborates in more detail the relationship between network theory and complexity theory. He analyses policy networks dealing with the implementation of the Best Value Programme, a controlling mechanism developed by national governments to improve local service delivery, using the Complex Adaptive Systems (CAS) approach. He compares the strategic planning approach and the expectations that national governments develop at the beginning of the implementation with the actual process of implementation. He shows that this actual process is much more dynamic. Due to the self-organization of subsystems such as the inspectors and the local government networks, the implementation can be defined as strategic shaping instead of planning. He describes the roles of actors in networks as a combination of selfreferential and adaptive behaviour leading to emerging processes and punctuated equilibriums. By doing so he demonstrates that networks have the characteristics of a CAS and will lead to processes in which a policy strategy is shaped out of emerging interaction.

Geert R. Teisman describes another highly dynamic and eventually rather successful interaction between managers from a variety of organizations. The case is the upgrading of one of the most important railroad tracks in the UK, the West Coast Mainline between London and Glasgow. The analysis does not only show the dominance of dynamics in governance processes, but also describes the dramatic changes in the fitness landscape that took place during the ongoing process of upgrading. The upgrading activities were first embedded in a public monopolistic environment. Due to privatization policies the ongoing process of upgrading was transplanted into a private context. After the bankruptcy of the private infrastructure provider it was transferred into a hybrid public/private action field in which 600 organizations (were part of the action field) participated. Teisman also shows the impact of 'coincidental events' like an accident on the railway system and the impact of external events and changes like privatization and the third-way ideology of New Labour on the course and pace of the process of upgrading.

Mary Lee Rhodes presents a study of urban generation processes. Using the concept of Complex Adaptive System (CAS) she provides a framework for the treatment of the important public management issues of interdependency. She indicates not only that networks (as a well-known way to describe landscapes in public administration) emerge from interaction, but also that new organizational structures emerge from behaviour and interaction. Rhodes shows that processes in complex systems are unfolding series of events. They are not knowable in advance, but can be reconstructed in retrospective, generating insights in the patterns of interaction and relationships between actors and factors that occur in the cases. She also shows that fitness landscapes, which she calls performance landscapes, are a combination of emerging interactions and existing rules, decisions and environments that facilitate and complicate actions and interactions. Agents therefore can activate certain landscapes by conscious choices of interactions that they start up, continue or intensify. However, they are also confronted with other agents actively choosing to interfere and by doing so change the action landscape.

In their contribution van Buuren and Gerrits define governance processes as complex systems of content in which decisions are not more nor less than the temporary points in a much more dynamic, uncontrolled (self-organizing) course of action. Decisions are reinterpreted over and over again due to new knowledge and new images of what the process is about. The authors explore the application of the concept of punctuated equilibrium to understanding collective processes as periods of instability that alternate with periods of stability in which decisions are agreed upon by actors. From this perspective the authors argue that processes unfold themselves if three sub-processes, called tracks by the authors, namely processes of fact-finding, processes of portraying what the process is about and the process of taking a standpoint, become interrelated. When tracks co-evolve, a decision can be made that fits in with facts and goes along with a joint image as to what the decision is about. This creates a temporal equilibrium in which actors 'know what to do'.

Bringing the tracks together, an intriguing new public management activity, is not easy to accomplish. Tracks are subject to internal pressure, which results from competing claims within and between these tracks (i.e. competing ambitions or interests, competing frames of reference and competing facts) and external pressure that results from competing policy processes.

After these case-oriented presentations of empirical exploration of the use of the complexity theory in describing and analysing 'real life processes', the contributions of Philip Haynes and of Butler and Allen will focus on dynamics in processes on a more aggregated level. The evolution of the policy of privatization and market managerialism in the social care service is Haynes' object of study. He does not describe and analyse the disaggregated 'real life processes' in, for instance, a hospital or another servicedelivering organization or network, but presents aggregative quantitative data in order to indicate the type of dynamics of the aggregate of processes in a whole system of a country. He combines this typology with a qualitative historical description of developments in the action field in three periods. Both elements are part of a Complexity theory as a methodology that consists of four steps: (1) a qualitative description of a time-line, a story-line and important events that transform the process from one type to another; (2) a time-line typology in terms of dynamics based on a quantitative measurement of variation in specific variables; (3) a synthesis of the two analyses leading to a proposition about what the attractor logic seems to be in that period; and (4) a critical evaluation of the added value of the method as well as that of the attractor concept in comparison with the well-known public administration concepts of goals and targets.

In their contribution Butler and Allen reinterpret data previously published in the *British Journal of Management* to reveal a new notion, that is, that policy implementation processes should be understood as self-organizing systems. They show how national policy is reinterpreted at the local level. This so-called receptivity, presented here as a special type of self-organization, creates processes in which each local organization is uniquely mixing elements of national policy with their own requirements. It is an important source for unpredictable output and outcome of national policies. In the previous article receptivity was assumed to be guided by the type of leadership of change programmes, local politics and implementation strategies and visioning. Butler and Allen, however, argue that a fifth factor has to be taken into account: the possibility space. Possibility space has four characteristics: no universal Best Practice; organizational play; path dependency; and choice. On the one hand this space is limited in terms of path dependency. This is a first level of receptivity within an organization. One could call this the more mechanistic and restricting level for

possibilities. There is, however, also another more organic and deeper level of choice that generates potential for creativity and unexpected adaptive behaviour. One can call these forms of behaviour mistakes: things done for a period in a stable way are done in another way. Path dependency tends to suppress creativity, but sometimes does not manage to do so. The possibility space is then enlarged. The authors argue that unless both sets of processes are considered during policy implementation, the management of change might fail. Learning from the past (path dependency) and anticipating the future (choice) are both at work.

Table 1 gives an overview of the contributions of this special issue according to some important concepts that are used.

#### A COMPARATIVE REFLECTION ON THE CONTRIBUTIONS

All authors in this special issue indicate and demonstrate that governance processes take place within a specific and complex context. This context consists of compounded subsystems of action, process and content and the subsystems are interconnected. This makes the context multiple as well as dynamic for public managers.

Several of the contributions demonstrate that 'normal' behaviour of public managers (focusing on one goal, one implementation trajectory and a well-defined set of actors) will not take away dynamics in governance processes. The authors describe how dynamics evolve through changes in the context, through self-organizing capacities and through interactions. Changes can appear in all three domains. Some changes come suddenly and others slowly, some are created consciously and others emerge by mistake and as a surprise. It is a great challenge for (public) managers to deal with them. It seems to be a common pattern that managers at first tend to underestimate or overlook these changes. When gradually some of these (in the beginning tiny or irrelevant) changes become major impacts the managers have to adjust to them. In the infrastructure case described by Teisman the underestimation of the (importance of the) technical quality of the existing railway leads to huge cost overruns, while Butler and Allen show how local governments develop quite opposite ways to cope with national outsourcing policy in the UK due to all kinds of local variations. This is (a more than) an utterly important insight.

Furthermore the authors highlight the importance of the context. Several of them describe this context in terms of fitness landscapes. Butler and Allen indicate how changes in national policy landscapes with respect to outsourcing clash with the local landscape, leading to unpredictable reactions on local levels. Rhodes shows how the landscape of urban generation changes and how the creation of new organizations is part of that change. Van Buuren and Gerrits show how the landscape of content changes due to actions of a variety of actors. Teisman describes the dramatic and ongoing change of landscape in which an existing bundle of infrastructure had to be upgraded. Bovaird shows how the implementation of an inspection system in the UK creates a new

Concept	Definition	Used by
Complex systems	Compounded wholes of interrelated subsystems	Bovaird/Rhodes: Complex Adaptive Systems (CAS)
Governance processes	Timelines of interrelated actions developed by a variety of action systems (managers and organizations) leading to complex	Bovaird: strategic shaping Butler & Allen: implementation processes
		Van Buuren & Gerrits: joint processes of fact- finding, portraying and decisions
	and dynamic changes in landscape, content and action	Haynes: local strategic reactions Rhodes: regeneration processes
		Teisman: realization of an upgrading project
Fitness landscape	The multiple contexts in which public managers have to behave and which guide the effects of that behaviour	Bovaird: national re-landscaping and local responses intermediated by a newly created landscape of inspectors
		Butler & Allen: possibility space, national re- landscaping and local receptivity
		Van Buuren & Gerrits: the landscape of sense- making by facts, images and decisions
		Haynes: aggregated quantitative indications of change in the whole system, while accepting
		Rhodes: the urban regeneration landscape as a result of decisions, rules and external
		Teisman: ungrading in rounds of
		implementation in which the context can change dramatically
Dynamics and	The emerging speed and direction of	Bovaird/Butler & Allen: national
sources of dynamics	governance processes as a result of interaction between a variety of	re-landscaping provokes unexpected local reactions
	actions and interpretations	Van Buuren & Gerrits: new content leading to new interpretation of the complex reality
		Haynes: change events
		Rhodes: newly created actors reshaping the landscape of regeneration
		Teisman: small variations leading to impact

Table 1: An overview of concepts used in the coming articles

landscape of inspectors between national and local government, developing its own logic and a new self-organizing reaction system at the local level. This last point is also made by Butler and Allen. All actors show how the inevitable multiplicity of the landscape in which the managers find themselves will also create unavoidable dynamics. It is for this reason that all actors pay attention to the important phenomena of selforganization and adaptive behaviour. Special attention is given to self-organization and the dilemma of adaptiveness versus self-referentiality. All authors add their contribution to this important task. Van Buuren and Gerrits show how these two tensions can be seen in the development of the content. Bovaird shows how local, national and inspectors systems all develop strategies of adaptiveness and self-referentiality and how this shapes the emerging strategy in the whole system. Butler and Allen beautifully demonstrate how local governments develop contrasting behaviour on the same national policy impulse due to self-organizing abilities to combine adaptiveness and selfreferentiality.

Processes are often influenced by attempts to bring actors together and (the) attempts to create a more attractive fitness landscape. Mary Lee Rhodes illustrates the dynamics of the organizational landscape. At first interactions are relatively limited, then the interaction becomes more intensive and sometimes this leads to the creation of a new agent, changing the interactions into internal processes and procedures. Creating new agents is therefore an important part of evolutionary processes. Geert Teisman, however, indicates that agent creation does not necessarily improve the evolution of the topic that is dealt with. The infrastructure provider RailTrack, for instance, can be seen as a new agent that did not manage to survive.

Geert Teisman indicates that the landscape can also change dramatically through outside actions. The new landscapes, first primarily public, then dominated by private sector companies and after that becoming a real hybrid landscape on the edge of public, not-for-profit and private, clearly influence the course and speed of processes. The idea of different periods and different degrees of dynamic(s) is also elaborated by Philip Haynes. Where Teisman indicates that the public period could be identified as quite inert, the private period was quite chaotic and the hybrid period combined dynamics and stability, Haynes indicates not only that local dynamics can go hand in hand with aggregated stability on a national level, but also that on the aggregated level periods of stability and dynamics alternate.

# THE FURTHER DEVELOPMENT OF AN EVOLUTIONARY PERSPECTIVE ON PUBLIC MANAGEMENT

It is our belief that the combination of contributions in this special issue can contribute to our analytical and interpretative understanding of the complexity of governance systems. This may lead to an evolutionary approach of public administration and management. An evolutionary approach seems to fit in well with the proclaimed trend from government to governance. Focusing on the interplay between actors, strategies and the 'landscape' in which actors act and try to achieve results can be regarded as a next step in public administration to improve our analytical understanding of complex governance processes. Focusing on temporary equilibriums and how they lead to other temporary equilibriums and on the self-organizing characteristics of autonomous agents will certainly lead to new perspectives on the behaviour of managers. We already know that managers are not the rational beings presented in many managerial handbooks and that they try to avoid choices or act according to the circumstances. The complexity theory gives us a different image of the manager as someone who is trying to survive in the 'fitness landscape' that he is creating jointly with other agents, by slightly bending and changing the conditions and using the moments and possibilities perceived. This will, almost certainly, also provide us with different prescriptions for these managers.

### NOTE

1 Due to the fact that landscapes in social sciences can only be studied by social beings who are part of that landscape, it will be difficult to generate an objective and fully accepted description of the landscape. All descriptions presented will be partial and are temporarily valid.

### REFERENCES

Giddens, A. (1984) The Constitution of Society: Outline of the Theory of Structuration, Cambridge: Polity.

- Luhmann, N. (1986) 'The Autopoiesis of Social Systems' in F. Geyer and J. van der Douwen (eds) Sociocybernetic Paradoxes: Observation, Control and Evolution of Self-Steering Systems. London: Sage.
- McIntyre, L. C. (1996) Laws and Explanation in the Social Sciences: Defending a Science of Human Behavior, Boulder, CO: Westview Press.
- (1997) Gould on Laws in Biological Science, Biology and Philosophy. 12: 3 pp357-67.
- Pressman, J. L. and Wildavsky, A. (1973) Implementation: How Great Expectations in Washington Are Dashed in Oakland, Berkeley, CA: University of California Press.

Copyright of Public Management Review is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

Copyright of Public Management Review is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.