

Complex Systems and International Governance

Amandine Orsini, Philippe Le Prestre, Peter M. Haas, Malte Brosig, Philipp Pattberg
Oscar Wideberg, Jean-Frédéric Morin, Laura Gomez-Mera, Neil E. Harrison, Robert
Geyer, David Chandler

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Forum: Complex Systems and International Governance¹

Introduction

Amandine Orsini and Philippe Le Prestre

That we live in an age of complexity and transition is hardly news. Ours is the age of interconnections, ambiguity, and uncertainty; of the diffusion of authority; of various kinds of revolutions: military, technological, social, political, economic, and even philosophical. What springs from these developments is the feeling of a lack of control. Decision-makers either think they have no other option but to act as they do or are paralyzed by the uncertainties and conflicting pressures they face. The usual solution is to try to reassert control, which leads to new problems. Paradoxically, as our tools to make sense and control societies and our environment increase, our ability to do so diminishes.

One major reason of this state of affairs lies in the difficulty of going beyond the analytical thinking approach that has served us so well to investigate complexity. Complexity indeed lies in opposition to classical analytical thinking. To illustrate this shift of perspective, complexity scholars distinguish between the “complex” and the merely “complicated.” (Morin 1990) Something “complicated,” such as a jet engine, can be approached by cutting it down into manageable parts. Complex problems, on the other hand, cannot be reduced or simplified without being strongly altered or “mutilated” and their behavior is not predictable from the study

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of their parts (Morin 1990). Hospitals' emergency units, terrorist organizations networks or wild bee colonies are typical complex systems.

Much recent work attempts to show the limits of current thinking and the need to forego the prevailing doxa that confuses coordination with control, and ignores whole developments in the study of international governance that point to different dynamics. Even though a spate of books, special issues, and articles have eloquently made the case for "embracing complexity" (Boulton, Allen, and Bowman 2015), International Relations (IR) scholars have been slow to do so. The profession uses the vocabulary, but either forgets the supporting reasoning or rejects it outright as a potential paradigm of IR.

In practice though, scholars have increasingly turned their attention to the problems raised by the behavior of complex systems, notably through models of cooperation, network analysis, the study of regime complexes and boundary-organizations, or multi-scalar governance. In many ways, research largely follows the development of instruments of governance that de facto respond to the challenge of steering a complex system. Intellectually though, the prevailing discourse, both in academia and politics, remains steeped in analytical linear thinking that emphasizes centralized authority and prediction. This is the case in most classical IR theories such as Realism, Liberalism, Neo-Realism, Neo-Liberalism or Constructivism. Nowhere was this schizophrenia more evident than in the analyses and comments surrounding the 21st Conference of the Parties to the climate change negotiations. Prevailing representations were centered on the role of major emitters for the adoption of a strong intergovernmental agreement while the actual dynamics within the negotiations overcame traditional state politics to include a bottom-up evolutionary approach to climate change commitments (see also the contributions below).

To be sure, the interest in conceptualizing complexity is not new. IR theorists have been looking at complexity at least since the late 1990s. Since Jervis' 1997 book and Harrison's edited book in 2006, authors have amply demonstrated the potential usefulness of this approach and suggested ways in which it could alter our thinking and advance systemic approaches (e.g. Bousquet and Curtis 2011). Nevertheless, it has yet to fulfill its promises and be widely used. Kavalski's (2007) characterization of the emergence of a fifth debate sounds today more like wishful thinking than a description of a movement under way. Yet, the current search for new models of international governance, away from a centralized perspective, forces us to take a harder look both at the promises and at the limitations of models based on complex systems.

One difficulty lies in separating the characteristics of a complex system (how do we recognize it?) from its properties (how does it behave and with what consequences?). Too many

definitions confuse causes (the characteristics) with consequences (the properties), and prevent us from asking questions regarding which characteristics of the system lead to what kind of properties (Le Prestre 2017). Moreover, complexity “theory” is diverse and there is no monolithic complexity science. It corresponds to a set of approaches, rather than one coherent theory, used to analyze complex systems. While variants of complexity thinking differ in terms of their ontological and epistemological orientations on how to analyze complex systems (see Byrne and Callaghan 2014), all proponents agree on a few basic characteristics and properties of such systems, the phenomenon rather than the analytical approach (derived from physics or biology, for example), serving as the federating element.

In this forum we build on former attempts of conceptualization (notably Bousquet and Curtis 2011, 51) and define complex systems as open systems, i.e. exchanging information with their environment, that include multiple elements (units) of various types intricately interconnected with one another and operating at various levels. This means that political issues are interconnected in a multiscalar and networked world, although there is unpredictability about which issues may be coupled and to what extent. Complex systems provide a potentially innovative perspective on global governance in that they allow studying governance systems at an aggregate level, these systems being aggregations of regulations, institutions, rules, actors, norms, and decision-making procedures in various combinations.

Complex systems display unique properties. A first property is self-organization meaning that order does not rely on a clear authority but on the system itself and on its multiple interactions. Uneven nonlinear interactions among units create multiple feedback loops that lead to a range of possible outcomes. Positive feedbacks can readily emerge from unit interactions with each other and with the system that might magnify small causes into large effects. In complex social systems, the range of possible paths towards equilibria, or equifinality, is extensive since issues are not merely technical but also normative and political. Regime complexes can be considered as examples of self-organized structures in a given issue-area (see Alter and Meunier 2009, 15 and Orsini et al. 2013).

A second property, emergence, is at the core of the notion of complex systems and of what makes them particularly interesting. Emergence is usually referred to as systemic unexpected outcomes, illustrated by the expression that “the whole is greater than the sum of its parts.” However, this expression is misleading for, as Jervis (1997) points out, the sum is not only greater but most of all different. Unexpected patterns, processes or properties arise from interactions among the elements of the system.

Finally, a third property, adaptation, refers to the potential capacity of units to learn from and co-evolve with their environment. Units co-evolve and affect the system which in turn affects their capacity of co-evolution. Adaptation or the failure thereof takes place at the unit level, but evolution is a systemic property that may, for example, be characterized by the disappearance of certain units, as when successful specialization impedes adaptation to changing circumstances. In a sense, the expression "complex adaptive systems" (Miller and Scott 2007) is a misnomer. Units adopt strategies of adaptation that may or may not be successful, but which nevertheless lead to the evolution of the system as other units react to them. Whether the result is "adaptive" depends on the distribution of preferences among units regarding desirable outcomes such as agreement on common goals and adoption of synergistic policies.

Each of these properties and their degree of achievement induce contradictory dynamics. First, while complex systems might seem chaotic, as a result of multiplicity and feedback loops, self-organization and adaptation mean that they also know phases of continuity in the form of: equilibrium when no unit has an incentive to change the rules; stability as the maintenance of these rules over time in the face of disruption; and resilience as the capacity to return to a stable state that may or may not be different from the initial one. Just as certain ecosystems can be constant and persistent thanks to uneven disruptive events such as forest fires, complex systems constantly regenerate themselves after destabilizing situations or evolve into new ever more complex systems. Second, like other systems, complex systems might be subject to path dependency; but they also regularly present surprises and unexpected outcomes. They may also become dysfunctional if there is no co-evolution, or even crash after having reached a tipping point. Complexity science, therefore, lies in opposition to classical analytical thinking and simple system theory. Relationships are key to understanding (unexpected) behavior.

Beyond its heuristic value, to be useful, the approach itself has to be operationalized (Young 2017). How can complex systems thinking facilitate a policy-oriented agenda? How can we reconcile what takes place at different levels of governance, and how can we foster synergies among them? Are standard computational approaches feasible? Many approaches to contemporary international governance reflect an adaptation to complexity, such as insisting on local participation in order to address potential non-linear effects (Clemens 2013), or promoting a dialectical construction of the science-policy interface. These developments are conceived outside a complex intellectual framework, however. Rather, they seek to respond to specific problems and are appended to linear frameworks. Yet, we have *de facto* entered the complexity era. The issue is how governance should be conceived with regards to complex systems. The very notion of governance, as articulated in IR, addresses the need to cooperate in solving common problems

in the context of a fragmentation of authority and multiplication of actors. Thinking in terms of complex systems can help us identify the contours of a more relevant global international governance system.

This is precisely the aim of this collection of essays that brings together scholars from various disciplinary backgrounds, based on three continents, with different theoretical and methodological interests, but all active in the topic of complex systems as applied to international governance. They investigate how complex systems have been and can be applied in practice and what differences it makes for the study of international governance. Two important threads link all the contributions: (i) To what extent does the complex systems approach offer a promising path toward understanding global governance dynamics? (ii) How can it be implemented in practice? The forum starts with three general contributions that retrace the historical account of the links between complex systems thinking and IR (Peter Haas), suggest a middle-ground approach to adapting complexity approaches to IR (Malte Brosig), and explain how global governance can be studied as a complex system (Philipp Pattberg and Oscar Wideberg). The following two contributions (Jean-Frédéric Morin and Laura Gomez-Mera; Neil Harrison and Robert Geyer) present two detailed case studies on international trade and climate change governance respectively. The last contribution (David Chandler) comes back to the main lessons drawn from the forum and engages in a reflexive discussion on the added value of a complexity perspective. Overall, thinking in terms of complex systems invites us to give up on prediction, to dissociate management from control, to be attuned to unintended consequences, and to rethink the role of power. The world is not a machine, for better or for worse.

IR Encounters Complexity

Peter Haas

Complexity is a structural condition of world politics. It provides the ontology behind challenging current research questions. It has been most deeply studied through research on international environmental politics, global change, and the Anthropocene (Crutzen 2003; Biermann 2014). International Environmental Politics scholars were some of the earliest to describe and understand the broader implications of complexity, in part because of the affinity between ecosystem dynamics and complexity. Moreover, they were among the first to recognize the interconnections between physical and social systems, and to study the broader dynamics by which complex global relations are understood and governed.