

**Complexity and Policy Analysis:
Tools and Concepts for Designing Robust
Policies in a Complex World**

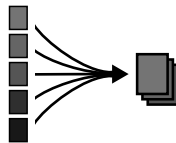
**A Volume in the *Exploring Organizational Complexity* Series
Volume 2**

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Complexity and Policy Analysis: Tools and Concepts for Designing Robust Policies in a Complex World

Edited by

Linda F. Dennard, Kurt A. Richardson & Göktuğ Morçöl



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A Volume in the Exploring Organizational Complexity Series: Volume 2
Edited by: Linda F. Dennard, Kurt A. Richardson and Göktuğ Morçöl

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This volume is dedicated to the late Graham Mathieson and the late Massimo Salzano, and their enthusiasm for keeping policy analysis both rigorous and ‘real’.

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EDITORIAL

Introduction: Science, Theory, Models, and Modeling What Does Complexity Do?

In many ways a ‘complexity’ approach to a subject like policy analysis may simply mean that we are seeing the social landscape as it has always been—dynamic and co-adaptive. The older science of Descartes and Newton was not able to satisfactorily deal with these dynamics, but rather framed the human response to them in a particularly reductive way, one suited to ameliorating the outcomes of interactions that seemed to be beyond the rational explanations of the time. The Modernists, as they came to be known, wanted to control chaos by creating manageable systems with predictable behaviors. Indeed, it is a great irony of the socio-political institutions, those to which analysts are accountable, that they do not often recognize, let alone legitimate, the nonlinear dynamics by which their own institutional boundaries emerged. In synthesizing the papers in this volume one question is recurring. What is the responsibility of ‘complex’ policy analysts given their new understanding of complex adaptive systems (CAS)? If Newton and Descartes, and the management ‘scientists’ who emerged in their wake, did not envision a phenomena like the Welfare State, for example (whose roots can be traced to linear science) do those employing the new sciences have more of an ethical duty to recognize what social landscapes their choices may be putting into motion? That is, is there an implied responsibility that comes with the knowledge of complex adaptive systems? Further, can such a duty be exercised by simply employing the ‘tools’ of complexity such as agent-based modeling without understanding the broader implications of what is a new scientific ontology? Yet, a question about responsibility is not new. Public administrators and their analysts have, in the logic of rationalists like Herbert Simon, been comfortable with simply fulfilling the technical requirements of their positions, without feeling the need (probably due to lack of time) to wonder about the uses or purposes of the knowledge they generate and employ (McSwite, 1998).

Yet these questions cannot be answered in a conventional way. For example, the classic chicken and the egg problem is no more evident than in the emerging field of complex policy analysis. Is a complexity orientation already changing the face of policy analysis, or does complexity simply help explain what is already happening in the trans-border; trans-disciplinary and trans-national phase space of 21st century governance? As the globalized landscape of public policy institutions continues to emerge—becoming less vertical and more horizontal—policy analysis (by default rather than by theory) begins to look more like creative problem solving across conventional borders and among more varied informants to the policy process—a frequent democratic prescription for the public policy process in ‘pre-complexity’ times (McSwite). This emergent reality tempts one to dismiss the need for theory altogether and sim-

ply observe what happens next; conceding that theory—often the practice of creating an intellectual coherence from emerging conditions—is always one or two steps behind reality. At best, theory provides a new lens with which to recognize change and therefore legitimate the process by which change occurs. At worst, theory becomes merely another model for describing, and then acting on a reality that is already different by the time the theory goes to print. Indeed, the defense of theoretical models can divert social adaptation in real, local, time by creating compelling and coercive adaptive conditions—especially if that model becomes imbedded in institutional practice as a policy or a regulatory program. In the synthesis here, models and theories give way to modeling and theorizing as all ideas are ultimately expendable in the learning process implicit in a complexity approach.

A Complex Research Culture?

The works in this volume came from the *First International Seminar on Complexity and Policy Analysis* hosted by University College Cork in Cork, Ireland. The gathering was an opportunity for analysts and academics from various countries to cut a little deeper into just what the new sciences of complexity mean for the practice of policy analysis. Yet in retrospect, this goal was always secondary to what learning could be had when scholars and practitioners shared their ideas. What is certain here is that we are most grateful to those who participated, and added to the quality and depth of the conference and subsequent conversations.

The interdisciplinary group was perhaps a microcosm of global complexity—a diversity of countries and a diversity of ideas and dispositions within those countries. To say, for example, that a cohesive idea about the development of complexity theory emerged from the conference would be first to assume that anyone came with that expectation, and secondly it would deny the emergent nature of the field of study. This synthesis of the conference attempts, not necessarily to reconcile the differences, but rather to point out the emergent questions that these differences produce. We will define our own complexity disposition in this sense—as the desire to keep the evolution of ideas open.

For example, sitting quietly at a back table throughout the conference and taking diligent notes as he listened was Wayne Parsons from Queen Mary's University in London. His books on policy analysis are stock texts in policy schools in the UK and United States as well as other countries in Europe. Parsons forthcoming book on policy (due sometime in 2008) reflects his deep interest in and understanding of the role of complexity in the changing process of governance. At the conference, he had been wondering how new research cultures emerge—is there something different about one that professed to have a 'complexity perspective?' It was not a question that could easily be answered. In retrospect, it would be hard to say that there was a specific 'culture' at the conference that could be said to be 'complex' beyond the complexity that is common to all interdisciplinary groups. Any such culture would need to be defined in terms of individual learning, more than any specific outcome.

What a complexity research culture is, and how it informs such events,

may well be a seminar topic in itself. Indeed, although it was evident, that policy analysis is changing, it was not all that evident that the change was being organized by complexity principles, as much as it was being organized by the possibilities of complexity methodology applied to conventional public management scenarios. Participants were sometimes led by the conceptual differences a complexity approach entails, others by the architecture of their modeling tools, and still others by the mantra of classical policy analysis—being responsive to the ‘real world’ of politics. The synthesis here is not meant to favor one construction over another, but rather to pose some questions that are suggested by the tensions among the differences.

Is Complexity an Economic Management Tool or the Organizing Conditions of a New Social Order?

The end of the Cold War resulted in much more than the epic fall of the Soviet Union. It also marked a turning point, perhaps an evolution, in the way social reality is constructed by its observers and analysts. To a significant degree, the Cold War embodied the dichotomies of the Modernist era. Indeed, there is a nostalgia among some who found the time easier to understand than the current frenzy of global problems, sects and conflicts. The bad guy had an identifiable face in the Cold War, a geographic border. There was a degree of cause and effect certainty in the push and shove of diplomacy. Predicting the response of the other side simply seemed easier. It was us and them, good and bad at perhaps the final loggerhead of the great powers before the world seemed to collapse under the imbalance of such simplistic thinking.

The Cold War and the growing domination of the ‘free’ market occurred with a sense, in liberal States at least, that these phenomena were the elements of a two-act play performed on a closed stage by an assembled cast. In reality, the audience for this play has always been global, diverse and intimately involved. It is a diversity that has both adapted to and resisted the changes. India and China are seeking to be super economic powers in their own right by playing out the Western model. Ireland itself has become a force in the European market by making the social and policy adjustments needed to adapt to mainstream economics.

Much of the Muslim world, however, is only now emerging from relative isolation in a global age; reacting with the defensive alarm of someone who was invaded in their sleep. Yet other ‘developing’ nations in Africa and elsewhere have raised their economic expectations while staggering under the weight of established economic forces, the effects of global warming on growing cycles and food production, and the emergence of oppressive and opportunistic leadership who generally want more than a fair share of the global pie (Chomsky, 2006; Singer, 2002). Whether this arsenal of problems can be ‘solved’ with the application of better models does not seem all that clear, partly because those applying complexity to governance practice have not moved too far out of the orbit of the old science. Indeed, it could be argued that the reduction of a complex social environment to a handful of problems may be an inadequate approach to understanding emergence. This reluctance to break new ontological ground seems

to be a form of altruism as researchers are excited about the possibilities of using complexity models to understand, and perhaps ‘solve’, the wicked problems of Modernism or to reform government. Yet, how do nonlinear dynamics inform problems initially organized by linear dualistic and often economic/managerial logic? The ‘pre-complexity’ thinking of French economic philosopher Bertrand de Jouvenel comes to mind in this regard (1990).

Before the Cold War played out, de Jouvenel predicted the failure of Soviet socialism. However his prediction was not that Western economic liberalism would prevail, and therefore drive out the over-regulated economy of the Soviet Union. Rather, he said, the Soviet experiment would fail because it was organized, not by socialist principles, but rather by market production. That is, the State would never be able to meet its purportedly high-minded social principles, because those principles were merely used to support a state controlled economy. In the end, the Soviet State was organized by the same principles as the United States, if not so well administered. The Soviet State would fail because it was a disappointment to those who earnestly believed that creating a new social order was a moral, rather than merely an economic enterprise. De Jouvenel’s is a complexity insight—that what form society ultimately takes is organized by initial conditions.

De Jouvenel is mentioned here, however, not as a criticism of a liberal western economy, but rather to cast light on a dilemma of applying a ‘new’ science to the problems which emerged from the dualistic organizing principles of the ‘old’ science. Can the potential of complexity to inform the evolution of society in less managerial, regulatory and divisive terms, for example, be encouraged by simply using it as a ‘model’ for improving the efficiency of economic decisions? Complexity models are seductive to managers and decision-makers in that they promise more information, more broadly conceived and within the legitimizing framework of ‘science.’ Additionally, they seem to rationalize inclusive dialogue as the practical engagement of more points of view. Complexity models therefore seem to be more democratic, so public managers and politicians are getting two-states for the price of one—more support for the regular way of regulating problems while also increasing the perception that they are behaving as legitimate democratic public servants—but without having to modify their core Newtonian logic in any real way. Yet, De Jouvenel might say that democracy cannot be organized by more efficient management, or even through the mechanisms of problem-solving based on linear rather than relational logic. Still, if more people are being included in decision-making so that the average individual has more of a chance to participate more meaningfully in the co-creation of his/her future, then why split hairs about what is organizing the system? Will not a form of democracy simply emerge in these new, more inclusive conditions? To answer yes to this question, one would have to assume that agent-based modeling and ‘robust’ policy dialogue are significantly different by themselves, rather than being tools for analysts who themselves frame the world in different terms.

On the face of it, for example, there seems to be an implicit responsibility to consider what social order might emerge as a result of problem-solving efforts

addressed by policy analysts. The current world order has emerged from the conceptual conditions created by an old science and those habits of management and regulation that emerged from it (Taylor, 1992). Are new complexity theorists therefore charged with a more conscious employment of a radically new science, especially as complexity science entails a better understanding of how society emerges from initial conditions than Newton or Descartes ever had?

Indeed, the ability of western democracies to respond both effectively and morally to deeply entrenched social problems like hunger has been limited by interpretive models that emerged from post-Enlightenment management thinking—the belief, for example, that hunger can be measured and the resources to resolve it can be equitably meted out through ‘distributive justice’ (Rawls, 2005). The managerial concept of distributive justice is perhaps admission of the liberal State’s lack of a framework from which to make sense of its role in the face of social diversity, as more than the responsibility for regulation of difference and the conflict it generates. The complexification of the Welfare State in western liberal societies like the United States and the UK, for example, is testament to the organizing power of distributive justice embodied in the social CAS through regulatory programs. The Welfare State refers conventionally to liberal states who sought to effect equality through administrative processes. Yet, it also has meant the emergence of an entrenched and complex poor ‘state’ within a powerful nation state and increasingly to a similar nesting of chronic problems of the market economy globally—nesting which has not truly reconciled the market with the democratic ideal of equality as much as it sustains a variation of market efficiency through the redistribution of wealth at the least cost to the rest of the economy (Forty, 1995).

Critical to this efficiency has been the advice of policy analysts who provide lawmakers and administrators with data which aids in legislating this efficiency and predicting positive program outcomes to voters. A dilemma for new complexity theorists involves how to avoid phenomena such as the Welfare State, which ultimately do not ‘solve’ social problems, as much as they create adaptive conditions whereby the trajectory of individuals and society is delimited by the ‘problem’ because it is merely regulated rather than transcended. Can this dilemma be avoided, however, without a clear sense of purpose being articulated by complexity theorists? The need for a single vision is not what is suggested by ‘a sense of purpose.’ Rather what is asked is whether complexity theorists need a deeper understanding of what it means to participate in creating the conditions of society, especially with the powerful ally of science, rather than only the more technical knowledge associated with their ‘tools’?

Does Complexity Answer the Postmodern Critique of Policy Analysis?

In the post Cold War era, academics also began a critical exploration of Modernism, methodically deconstructing public texts to reveal the power assumptions that lay at their core. These revelations were perhaps not surprising, yet Postmodernism was the first provocative step towards making sense of diversity as something other than a problem to solve, and toward making at least academics

more aware of the unconscious and undemocratic assumptions that were being made in the name of science, method, and administrative efficiency. Postmodernism found fault with conventional policy analysis for its tendency to narrow social reality to what fit the methodology; leaving behind, other sources of knowledge, the meaning people made of their unique circumstances, and what they had learned in their unique environments.

However, it was perhaps not until the emergence of both complexity theories and globalization¹—and their acceptance by policy analysts (as demonstrated in this text)—that the conditions of Modernist government became subject to true architectural (and perhaps democratic) change. The distribution of power in a political system, for example, has dominated the Modernist discourse of policy analysis and political science. Yet power relationships may not accurately describe the social system in its entirety. Therefore, limiting change to a debate over the proper ‘distribution of power’ may merely promulgate another adaptive game between critics and defenders of the political system that, in the long run, serves only to re-enforce the assumption and discourse of power. The dilemma is that power does dominate the modernist political system. However, complexity is a theory of change (in theory), rather than only of historical explanation, so that using it as a basis of analysis does not necessarily resolve the problem of power as much as it opens up the possibility of other variables besides power operating in the same system from which change might emerge. Is there therefore an implied responsibility to consider these other variables when conducting policy analysis, or are complexity analysts only responsible for meeting the political needs of the political CAS, which seems to depend on adapting and therefore re-asserting a power discourse?

Complexity, perhaps more than the cerebral Postmodern critique of policy analysis, has brought into question the fear that Newtonian science (reduced to management science in the 20th century) seemed to foster—that difference is the source of instability and conflict (Taylor). This fear tempers the vision of democratic possibilities. Government was/is characterized by management, and regulation of conflict and resources, rather than by a more aspiring view of the possibilities of individual freedom or participation in the co-creation of the future (Wolin, 2008). The question is whether policy analysts see themselves acting in this broader field of social change, or rather only feel comfortable as the purveyors of information.

Of course, ‘fixing’ this fear in Modernism is unlikely to happen as a result of more reform, the destruction of public institutions or even with a harsher reaction to reductive science and the economy it supports. Inducing new fears that derive from a reaction to an original organizing state is the beginning move in adapting to the problem, rather than transcending it. A *theory* of complexity that frames itself as being both new and improved, or even the ‘opposite’ of Modernism, therefore is perhaps more problematic than simply identifying different less fearful conditions from which society might yet emerge, regardless

1. It is interesting to think about the possibility that complexity science is perhaps a coevolving response to globalization; one that seems to support the complexity suggestion that solutions evolve with problems.

of the dominance of past models. The tension evident in this volume is one of delicacy—how does complexity change society without engaging in the adaptive process of reform? Further, how do policy analysts articulate their involvement in this change? Further, how do analysts respect society as it has emerged while producing openings for continued evolution? Do policy analysts believe that social problems can be transcended through continued social evolution or only through means-ends adjustments that are slightly better informed by complex data?

Does Complexity Assume the Need for Complex Ethics?

From a complexity perspective, the project of Postmodernism has not necessarily been the reform of the socio-political system, as much as it has been the liberation of the individual from fixed social states through an understanding of the change dynamics of social reality. Therefore, by leaving behind habitual and delimiting behaviors, and the fear that often sustains their boundaries, policy analysts may, with or without a guiding theory, change the social landscape by the choices they make, and the choices they create for citizens. Is there an assumed ethical disposition in creating more choices and therefore more paths to the future that is different than merely being accountable to the status quo? Do these choices produce the conditions by which individuals in society may then make ethical, rather than merely expedient, decisions?

Which then comes first, ethics or a change in landscape in which ethical behavior becomes possible? Indeed, ‘complex’ ethics (as distinct perhaps from theory) implies action, but it also implies an awareness of the organizing effects of that action. Is, for example, a policy that promotes continued social evolution more ethical than one that merely stabilizes the existing order of relationships? Indeed, ethics may be easier to talk about from a complexity perspective, in which an awareness of social organizing principles and adaptive relationship (how we affect each other) has supplanted the need for certainty of measurable outcomes as a focal point of discussion. Ambiguity and uncertainty are the conditions in which ethics, as an active and renewing discourse about how we live together, becomes relevant.

Goodbye to Rational-Comprehensive Planning or Not?

A recurring dilemma of classic policy analysis is the need to deny social reality in favor of ‘scientific’ models of that reality. In this regard, however, is there any real difference between a complexity ‘model’ and a rational-actor ‘model’? Does it matter if complexity theorists do not themselves embrace a complexity approach to research beyond the use of modeling tools? That is, will complexity modeling change the policy mind-set with or without a well-articulated ‘complexity’ approach? For example, in their paper Moobela and Price demonstrate how complexity in practice, as a way to re-envision the self-organizing processes of urban renewal, may indeed result in a change in both the process of planning and in planning priorities. Most importantly perhaps, Moobela and Price demonstrate the effectiveness of not simply reforming old planning processes,

but rather allowing the social landscape to reconstitute these processes with the result that true change becomes possible.

Policy analysts can point to social programs that have survived and complexified and budgets that are balanced, but not necessarily to the alleviation of poverty, the end to traffic congestion, pollution, crime or even effective and 'cost-efficient' warfare. The Welfare State, the centerpiece of the western liberal tradition, for example, is now seen as an abomination by many liberal and conservative critics—the source of dehumanizing administrative habits and failed social architecture that only dimly reflects the original dream of social equality. Likewise, globalization is characterized by some as the patterning of a failed Modernist project across a much broader social landscape.

However, sorting out the dynamics that created the Welfare State, and the adaptive side effects of globalization, from those that might produce a new more equitable, sustainable and free social order is no easy task for policy analysts working in a system that still operates largely according to older dualistic paradigms. For example, a conventional understanding of American Federalism describes this basic governance architecture as the means by which power is dispersed by sustaining the competition among fragmented issues and interests across multiple sectors of society. Therefore, policy analysts are likely to find themselves connected to small, broken off parts of larger emergent sets of relationships, rather than to evolving systems. The beauty of nonlinear dynamics, of course, is that a policy analyst mindful of adaptive dynamics can create initial conditions in one part of the system that will pattern to other parts. It is this possibility that brings us once again to the question of ethics. Where does the dialogue about these ethics occur? What do professional ethics look like in the absence of certainty?

Should We Translate Apples into Oranges?

Before his sad and untimely death in 2006, Graham Mathieson provided the studied matrix for what managers need from a complexity approach that appears in this volume. His work provides the architectonics for bridging the gap between older management dispositions and responsibilities, and the possibilities of complexity. Mathieson's approach is helpful because it responds, not to the resistance to complexity, but rather to the reality that understanding and learning is also emergent. He is not therefore simply translating one science into another, but rather providing a non-contested landscape for learning within the landscapes that managers find themselves. Of all the papers, Graham's perhaps best articulates the hope of a non-dualistic approach to change. The past cannot be denied without adapting to its weakest links, but space and freedom can exist for a new future to emerge through conscious coevolution and learning. No apologies needed, just a pathway.

Generally, the study of complex adaptive systems provides an expansive and potentially interactive framework within which to view the ordinary territory of policy analysis. In re-looking at public housing in Ireland, for example, Rhodes applies a complex adaptive system framework with which to consider the multiple variables surrounding a complex political issue. Like Moobela and

Price, she is seeking to find third space in which to consider a problem that often gets bottle-necked by political conflict and a contest over the few alternatives that devolve from that conflict.

The juxtaposition of this 'real' world of politics and administration, and the 'real' world of complexity was a common theme at the conference. Future conferences on policy analysis may want to consider the topic of transitions more carefully. Social change happens in the transition from one state of order to another. Policies therefore that address only the past or the ideal of the future often miss or distort the evolutionary processes already afoot in society.

Catching Up with Science: Whose Real World?

A tension was evident at the conference between those already using agent-based modeling and its iterations to model complex social and political phenomena, and those who were still wondering just what a complexity approach was. The later might be characterized as budding romantics (in a good sense) in that they sensed the importance of complexity principles to how reality is framed, and how social order emerges, but were still struggling to find space to express the less expedient and more philosophical implications of the new science. When policy analysis emerged as a 'science' during the 1960s and 1970s it was strategically divorced from those 'less-scientific' endeavors that the study of politics traditionally entailed—political theory and the philosophy of science, ethics and futurist studies. Political processes were reduced to 'problem-solving' and policy analysis was the means for marrying economic efficiency and social equity (McSwite, 1997). A new 'science' once more concerned with relationships than with data may ultimately require policy analysts to find their roots.

Those already modeling, of course, were eager to deepen the application of their personal models which, not entirely logically, also seem to fit well within the conventional logic of 'rational' or Public Choice Theories (Mueller, 2003). The basic assumption of these theories is that all human 'transactions' are economic in nature, and therefore all adaptive behavior can be understood as either competitive or utilitarian.

In David Earnest's chapter on the traditional political science subject voting behavior, for example, Public Choice is the lens through which the findings of agent-based modeling are interpreted. Earnest's research suggests, however, that voting behavior is complex and perhaps not as easily quantifiable as once thought. This information may be helpful to those seeking elections, but it also provides food for thought for those who still assume that voters are voting their 'interests.' Will findings like these eventually change the presumptions of Public Choice, or will they be used to shore up its basic organizing structure?

The appropriation of complexity science by Public Choice theory raises another question. Are policy analysts responsible for recognizing the delimiting effects of the basic assumptions of their theoretical (rather than methodological models)? If all human interaction is accepted as merely transactional, for example, is not the potential of complexity to inform us of other, perhaps more hopeful, social arrangements also limited? Does complexity merely provide a way to manipulate and demonstrate our favorite social theories, or does it in-

deed suggest the need for other, perhaps multiple theories of human interaction, or indeed a more robust practice of theorizing and learning, rather than merely ratifying old theories?

Theories and Theorizing

The cautionary precision of veteran complexity theorist Göktuğ Morçöl, for example, reminds us that some questions about complexity are yet to be answered. Further, they are not likely to be answered in any meaningful way without a theory to guide the enterprise that is likely to limit itself to the proliferation of competing methodologies, before ever realizing the potential of complexity to inform complex systems such as those involved in governance. Complexity is different, a condition Morçöl suggests that makes it worthy of deeper thought.

A further concern is expressed in Linda Dennard's piece on legitimacy and the evolution of the State—that it may indeed be hard to teach an old, well-adapted, dog new tricks, especially in policy analysts content to simply be the latest technology merchants to arrive in the conventional policy arena. Although, the landscape of public policy is definitely becoming more horizontal, Dennard wonders if ultimately all such movement will only serve the more reductive organizing principles of the Modernist State—that is unless policy analysts are more mindful of the landscape they ask society adapt to. At the same time, however, she senses that the State is also subject to evolution, and how this evolution is interpreted depends on whether one is at the center of the State CAS, or at the more volatile edges of administrative reality.

Implicit in some works like Dennard, Levick and Kernick is the belief that human beings can still participate meaningfully in the creation of the future—a sentiment not fully shared by everyone at the conference. Although it could be argued that everyone still recognized the efficacy of the human voice, some simply have more faith in technology when it comes to solving problems—and problems have trumped any other flow for determining the future of humankind.

Can Humans Solve Complex Problems?

Another tension emerged (perhaps in retrospect) among those who still held out hope that humans could solve the complex problems of their existence, or at least learn something from the failures that contributed to social evolution and those, like biologist Jack Cohen, who have long since deferred the side effects of the human project to the calculating power of high-speed computers, and a continued devotion to Herbert Simon.

The intersection of complexity modeling and new evolutionary theory in this regard has produced 'scientific' support it seems for Herbert Simon's belief in the capacity of artificial intelligence to surpass the limitations of human beings. In the pre-complexity days of the 1950s, Simon ranked among the primary architects of the modern administrative state; conceiving it as operating within a rather simplistic model, one aided in its linear duties by its distance from the more emotionally complex realms of politics and society (Simon, 1997). Simon later adopted complexity 'models' and took on complex social problem—solving

by being instrumental in the development of artificial intelligence. The message has remained the same, however, one re-enforced by evolutionary science—the ‘bounded rationality’ of human beings does not change with the same temporal speed as the exponential rate of 21st century problems. Therefore, the logic is that humans need computers to bridge the gap.

The tension, therefore, was a complex one itself. Does the undeniable lag in human capacity to understand the interconnections among vast global events preclude any arguments other than those advocating a superior artificial intelligence? Given our limitations is it even appropriate to ask if the sense of perfection that drives the need for ‘faster & better’ intelligence did not help produce the complexity of social problems we face. If this drive toward a problem-free state is complicit in the problems it seeks to solve, can faster computers—whose drivers employ the same ideal models as modernism—cure what ails us or will it only move us faster toward our destruction?

For some participants, the difficulty of Cohen’s assertion was not resolved by recognizing as problematic the ‘incomplete’ state of human evolution or likewise by recognizing that social problems are mind-bendingly complex. Rather, as David Levick writes, some analysts may be asking the wrong questions about complexity. Complexity, he writes, is not merely a model or a method but rather a way of being and knowing—the ability to participate in and sustain the relationship with an interactive and therefore instructive labyrinth by which human social evolution occurs. Levick’s turn on policy analysis and complexity suggests that, rather than becoming more explicit, precise, and even accurate, policy analysis must retain ‘a certain level of ambiguity’ in which citizens can struggle with and make meaning from—therefore sustaining and thickening social complexity. For analysts with Levick’s take on complexity, like Annie Ginibre who also attended the conference, the need to ‘solve’ complexity still lingered in the conversations among those trying to perfect their models.

Likewise Kernick, proposed that complexity implies the need to teach analysts and others how to have a ‘complex’ dialogue. The skills involved in a complexity approach he argues are different than those needed for conventional modeling which involve a narrow relationship between a researcher and his/her model. Through discourse training, purveyors of complexity would learn to practice what they preach, so to speak. This perspective implies again the need for a broader scope of analysis. It is important to solve critical social problems, but it is perhaps at least equally important that human beings remain engaged in the project by which social evolution occurs. Expediency may seem even more necessary now than it did in the 20th century because the problems, like global warming, are overwhelming and dangerous. Yet, handing over the hard stuff to computers, again leaving behind the ethics, morality and emotional life, needed to sustain society, and preserving the false distinctions between science and humanistic endeavors seems self-defeating to some who would gladly sacrifice the die-hard resilience of the modernist dream of a perfection engineered by experts, for a less divided and more sustainable planet.

Yet complexity implies that there is no *one* solution to any problem any more than there is one discreet cause. The good news is that an abundance of ap-

proaches to problem-solving is more productive than a reduction of methodology to one or two 'proven' methods or even interpretations. Complex adaptive systems are learning systems as most of the authors in this volume recount. This means that prior assumptions of methodology about what will or should work in any given context may fail or, more problematic, they may recreate the problem by re-developing the discourse that organizes those assumptions through regulation (Ruhl & Salzman, 2003).

Further, as Wayne Parsons has noted elsewhere, learning failures are as important, or perhaps more important, as perfectly predicted outcomes in gauging what will work in an emerging context (Parsons, 2004). Likewise learning, as Levick and Kernick's works imply, has the effect of organizing the system around the *process* of learning, therefore freeing it from the more limiting discourse of fear associated with the control of difference. One might provide the conjecture that moving beyond fear of difference or the impatience with imperfection by engaging social complexity as reality rather than as a deficit state gives policy analysts an important role in the emergence of a learning-based democracy; one which develops the human capacity for meaningfully engaging the complexity the social environment creates.

Is Complexity Always Theoretical?

Another tension at the conference seemed to be between various iterations of the arguments about what is complexity 'theory' and what is 'science.' By internal definition, policy analysis traditionally has been the act of using models and replicable methodologies to garner the most reasonable decision or problem-solving program. These tools are supplemented by the faith that the more precise the tools, the better the measurement, the better the decision outcomes. Yet, complexity eludes this model in which having the mathematical tools would appear to make the rest of the multivariate implications of complexity articulated in theory irrelevant. An engagement of complexity always produces more questions in the added dimensions created in the dialogue. This construct is 'simplified' by saying that complexity as a scientific model is concerned with learning rather than prediction. Ideally, this was the bent of older models of scientific method in which experimentation was valued—a value lost in the frenzy for certainty and the need for causes and villains in political discourse.

It is noteworthy to mention perhaps that this spirit of experimentation marked much of the depression era in United States politics. The 'traditionalists' as they are sometimes called were policy advisors and cabinet members to Franklin Roosevelt in a time when the belief in Adam Smith's 'invisible hand' in the market was badly shaken (McSwite, 1997). The Great Depression seemed to deny the observation that the market would correct its own excesses—even as it was organized by principles of inequality. The chaos of the time was marked by confusion about just what would work given the collapse of this older belief in the face of economic chaos. If anything, that era, marked by the rise in Keynesian behavioral economics, introduced the possibility that choices had to be made about what the country and the world adapted to.

The traditionalists (called so because of their belief in the responsibility of government to affect social change in a ‘high-minded’ manner) had free reign to experiment, to adopt programs or to throw them away when they did not work. They worked close to the ground—interacting with the people at the local level to develop innovative projects. It is ironic perhaps that the Welfare State emerged from that era as experimentation gave way to the need for prediction and control.

Conceivably, complexity theory could imbed itself in the way Modernist policy analysis has—creating yet another paradigmatic architecture from which citizens must wrestle free. Having a well-articulated ‘theory’ of complexity, one shored up by the ‘right’ methodology, may simply emerge in time as another imbedded model. Complexity, however, has ‘built in’ qualifiers in this regard that hold a different potential—as exhibited to the multiplicity of views in this volume. For example, complexity analysis cannot promise certainty of outcomes or even generalizability. Rather, as a concept, complexity limits policy analysts to *theorizing* about what might be happening in a social context, and what might happen in the future. Further this need to theorize, rather than defend a theory, also seems to open the doors to more collaboration and dialogue among researchers whose goal is learning rather than the production of a marketable theory alone.

A complexity approach, therefore, is inherently theoretical and, further, such theories emerge in the relationship between ideas and the nonlinear dynamics of social landscapes rather than in the ideas alone. Grand designs are therefore always problematic. Those concerned about complexity being ‘headless’, or even heartless, without more theory to support the modeling perhaps have less to worry about than in older policy science when theorizing was not itself *the* methodology. However, although complexity logic seems most stable in the act of theorizing, there still remains a question as to whether an ethical disposition towards such a learning approach must be discussed, rather than merely assumed as a inevitable by-product of the more technical aspects of the field of study.

How to be Accountable to Politicians and Citizens

For policy analysts working in the public sector, the relentless ambiguity of complex adaptive systems presents a problem if held up against conventional standards of accountability. The pressure on policy analysts is to produce measurable, predictable results that are then passed down the line to information users and program administrators who must in turn produce measurable results as a test of the efficient and fair use of public funds. One response to the dilemma of accountability is the re-education of policy-makers and public administrators who are still governed by modernist models of resource distribution and conflict resolution among warring and competing social factions—a reality that recreates itself in each programmed response to social and political systems.

One or two of the younger participants at the conference, for example, complained that they had been funded to attend the seminar in Cork, not because of the potential of complexity to enlighten government in a new global

age, but rather because new tools for ‘measuring’ and ‘managing’ complexity were being discussed—those for which the deans and chairs approving the travel could visualize a use not evident in the fuzzier discussions of ontology and purpose.

Perhaps there is an appropriate note of caution in this complaint. For those ‘un-learned’ in the differences of a complexity ontology (non-dualism, for example), *newer, faster, better* are compelling enough advertisements for complexity modeling. These selling points, however, may distort the potential of the new science to produce new questions and new knowledge unaddressed by Modernism. In this caution are the beginnings of a discussion about what might be termed ‘deep efficiencies’—broader indicators of program success and administrative accountability. For example, involvement of more local knowledge, and less reliance on expert knowledge alone, may result in the alleviation of a variant of a problem, but it might also build the capacity of the locals to sustain themselves in changing and difficult circumstances. Complexity analysis implies it would seem that more than one effect can emerge from any one problem or even from the process of research. Problems can be solved without recreating society in their image. Meaningful social evolution can occur.

What Emerges From Modeling?

Yet, as the papers in this volume suggest, complexity modeling *does* produce interesting questions about the nature of governance practice, and the presumptions made by those who study social institutions. Jack Meek, for example, unfolds the dynamics of a ‘sub-regional cooperation’ where problems which exceed conventional boundaries are addressed. These dynamics have perhaps always been there, but have not always been accessible to the observer looking primarily for dualities, problems or outliers. Such arrangements were conventionally seen as ‘informal’, and therefore slightly illicit organizations because they appeared to operate outside the formal organization of the system. From a complexity perspective, Meek surmises that a major shift in perspective from modernist methodology is evident in his observations. The self-organizing cooperative implies to him that something else besides competition and transactional games are afoot in these cooperative sub-regions—something more amenable to the social nature of human beings. This observation alone opens up a larger field of inquiry for observer/participants of society and politics.

A variation of Meek’s observation, however, was presented by Francesca Borrelli, *et al.* Agent-based modeling is used to observe the patterns of influence of informal coordination on the ability of an industrial district to remain competitive in a changing environment. Their data suggest that cooperative districts are not necessarily better performers in turbulent scenarios. Rather, the best performing districts are those in which cooperation, competition, trust and opportunism ‘balance out.’ What the study suggests is that it is difficult to gauge the effectiveness of one approach over another. Would competition, for example, be as effective in the absence of cooperation? Likewise, does opportunism require a certain level of trust among participants in a system to allow such opportunities to emerge?

Tool Kits for the Trade

The uses of agent-based modeling were, of course, of great interest to participants at the seminar as the science of complexity moves deeper into practice. The ‘how-to’ of complexity and the ‘toolkits’ were the topics of various papers. The ‘tools’ are seductive, as Kurt Richardson notes. There is simplicity and perhaps a misleading elegance to ‘bottom-up’ modeling from the proposition that collective phenomena emerge from simple underlying rules. Is there, he suggests however, really much difference between ‘new science’ and ‘old’ if the new is treated simply as a better tool? One cannot deny that the papers produced results that were variants of the norm which is indeed compelling to the researchers accountable for results. Yet, the question haunts this book as to whether administering the tools without embracing the profoundly different world implied by complexity principles in research practice can really produce a significantly different policy science. Is emergence, for example, simply a phenomenon to be mapped so that policy can be more strategically implemented, or is it also a way of more deeply understanding the relationship human beings hold one to another?

The Many Uses of Complexity Modeling

Chen and Chie use ABM to model the lottery market to determine an optimal lottery tax rate. It is an example of the variations in conclusions that are garnered with a more complex interplay of different elements of the system. Similarly, Maureen Brown seeks to revive the Modernist hope that the ‘hidden complexities’ of trans-disciplinary computer system integration can be mapped, and the risks eliminated even as the system complexifies in interactions with users, and within the technological system. It is perhaps interesting to think about the self-organization among users that is producing this complexity—can risks be eliminated if the users continue to learn? Should such learning be part of the modeling process, rather than only a variable that it seeks to predict and control? McArthur and Hammond consider network rules for international technology transfers.

Gabrielle Bammer also takes the approach that ‘more is better’ in proposing a comprehensive, interdisciplinary system for tackling social problems systematically. The proposal focuses on integration of information from different systems. On one hand, the proposal smacks of an emerging credo among analysts that you ‘fight complexity with more complexity.’ The proposal then runs the risk of eventually becoming its own closed reality bounded by the tasks of information processing. Yet, the paper is interesting in the sense that there is recognition that more than complexity modeling is needed to effectively address emergent problems in different contexts. In this light, the paper is an attempt to decipher how to ‘integrate’ a complexity perspective in the use of multiple methodologies. Ironically perhaps, complexity principles do not suggest that older methodologies are necessarily wrong, rather that complex environments suggest the need for multivariate approaches which inform each other. This introduces an important nuance of complexity thinking. Complexity can be understood as a new method of mapping emergent behavior, for example, but

it can also be understood as the recognition of a reality that is much more lively and vast than any one methodology can corner. How does our approach to modeling preserve this vaster sense of reality? More importantly perhaps—should the notion of complexity be reduced to the ability of its attendant mathematics to solve problems? Are we missing a larger, perhaps more sustainable conversation?

Runhaar, Dieperink and Driessen propose a complex policy analysis ‘toolbox’ for environmental social scientists, one that they suggest will support the project of politics—be scientifically valid, relevant to the policy debate, and accepted by stakeholders. This approach perhaps raises the question again of how much complexity can adapt to conventional politics and still remain a complexity approach. Will a better understanding among policy-makers of complexity help this, or will complexity ‘results’ change the landscape of knowledge and how we respond to social scenarios? Or will the use of complexity modeling to support conventional politics simply re-enforce the pathologies from which social problems emerge? The answer to all these contrasting questions, which is often the case with complexity scenarios, is likely to be ‘yes.’

A new economic theory, one that establishes a different, more contextual approach to the relationship between macro and micro economics is proposed by Salzano. The project of the paper is to demonstrate how different modes of complexity modeling produce not only responses to specific time-bound problems, but may also contribute to a variation in social and economic theory.

Another conventional duality seems to disappear with the agent-based modeling proposal of Dixon, whose research suggests that the conventional separation between ‘qualitative’ and ‘quantitative research’ may be yet another illusion of the modernist mind. Qualitative research is usually concerned with individual interpretations, meaning attributions and narrative while quantitative in modernist terms—considered what was replicable and predictable ‘facts.’ The authors suggest that qualitative agent-based modeling can produce a surprising amount of qualitative ‘facts,’ indeed richer in content because they interact with the complexity that defines human existence. One could question whether the quantitative data is not still subject to interpretation, but it is perhaps not accurate to say that quantitative analysis is not always subject to interpretation anyway. The importance of this paper’s hypothesis seems more to be that the demarcations between ‘types’ of data are perhaps less important than, as Kurt Richardson suggests, the willingness to use multiple methodologies appropriate to the complexity of social environments.

Robust Policy Analysis and an Institutional Sea Change

Yet the tension between old science and the new science imagined at the conference seemed most profound in the presentation of Steven Bankes who proposed a ‘robust policy analysis’ for complex open systems. As a military analyst, Bankes is in the midst of an emerging institutional sea of change in how human behavior is understood as the military actively engages complexity modeling. For someone in the social sciences, for example, the idea of pluralism is perhaps not a new one. Yet, the idea in practice has often been confined to broad general-

izations about what a good thing it is, or alternatively it has been ‘implemented’ without recognition of the complexity that already exists.

Bankes’s approach breaks with the belief that experts armed with all the appropriate information are the best source of solutions to social problems. Also, in focusing the quality of a ‘robust’ dialogue among diverse participants in the policy analysis ‘process’ he concerns himself less with accumulating especially expert information about a few plausible alternatives as with waiting for what might emerge from the dialogue. This approach mirrors some of the concerns of Richardson that policy analysts should be more focused on the modeling process than with advancing the merits of one model or another. Learning takes place as much in the development of models perhaps as in their implementation. Models are experimental in his view, amendable and disposable.

Summary

The complex and difficult global environment has overwhelmed, exasperated and saddened many observers. Even if we view it as a transition from the dominance of the nation-state model, from the decline of faith in older models of reality—the chaos necessary for the emergence of a new order—it is unsettling. Some see this time as irretrievable chaos and long for the ‘simple’ equilibrium of the Cold War, or a clearly defined evil that would provide decision-makers with a moral certainty. At the same time, it seems increasingly difficult to muster concern over recurrent and entrenched problems like poverty or the looming climate change from global warming. For citizens who have been taught to respect the ability of experts and technology and to doubt their own knowledge, it is perhaps perplexing to suddenly be told that they too are responsible for what ails the planet and its people. The guidance of policy analysts is important in this transitory time. But what may be needed, and perhaps what complexity offers most, is not only better data, but more people involved with each other in creating sustainable solutions. The potential then is for policy analysis to either be marginalized as an artifact of Reductionist Science, or to become a central organizing dialogue from which both governments and citizens can learn, create and produce sustainable civic cultures. Perhaps complexity is the means by which—as policy icon Aaron Wildavsky once advocated—policy analysts can be active participants in conscious social evolution, rather than merely reactive defenders of the status quo.

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