Panarchy:

Governance in the Network Age

by

Paul B. Hartzog

INTRODUCTION

> "What makes political systems cross over the threshold into parameter transformations? Some breakpoints occur when a technological development enables individuals to engage in previously unimagined activities and collectivities to pursue previously inconceivable policy goals…. a turning point that occurs when the resources or practices of a system can no longer cope with one more increment of change and its parameters give way under the cumulative load."[1]

In times of great transformation, civilization finds itself in T.S.Eliot's Wasteland.[2] Old rules become increasingly useless and do not result in the same successful outcomes as they did in the past, but a new Kuhnian paradigm has yet to emerge from the chaos of turbulent times.[3] The discovery of a new path lies in the process of recognizing and illuminating patterns in the vectors that are operating in the transforming civilization.[4]

The primary hypothesis that I will endeavor to support is that *leveraging the benefits of network organization constitutes a new source of power and a new way of accomplishing global governance*. As individuals and groups engage each other globally, the locus of global governance shifts from state-centered activities to distributed networks. The cumulative effect of the shift from hierarchies to networks is a system of overlapping spheres of authority and regimes of collective action called "panarchy."[5]

Complexity + Networks + Connectivity => Panarchy

To wit, the emerging **complexity** of our social and political structures, composed of many interacting agents, combined with the increasing importance of **network forms of organization**, enabled by technologies that increase **connectivity**, propels the world system towards a transformation that culminates in a global political environment that is made up of a diversity of spheres of governance, the whole of which is called **panarchy**. To clarify, global linkages between individuals and groups create transnational networks consisting of shared norms and goals. Despite its similarity to macro-level political sociology, complexity and networks are increasingly of interest to international relations scholars as well. These transnational networks' activities not only influence states but

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[1] James N. Rosenau, *Turbulence in World Politics : A Theory of Change and Continuity* (Princeton, N.J.: Princeton University Press, 1990), 83.
[2] T. S. Eliot, *The Wasteland* ([Monterrey,: Ediciones Sierra Madre, 1960).
[3] Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (Chicago, IL: University of Chicago Press, 1996).
[4] It must be noted that many of the following concepts were first articulated and brilliantly handled in Rosenau, *Turbulence in World Politics : A Theory of Change and Continuity*.
[5] An earlier draft of this paper appeared as Paul B. Hartzog, "21st Century Governance as a Complex Adaptive System," in *Proceedings Pista 2004*, ed. Jose V. Carrasquero, et al., *Informatics and Society* (Orlando: International Institute of Informatics and Systemics, 2004).

also serve as a means of social governance that functions *independently of and in parallel to* state governing. As Paul Wapner points out, "What is absolutely essential to recognize, however, is that it is not the entanglements and overlaps with states and the state system that make efforts in global civil society 'political.' Transnational activism does not simply become politically relevant when it intersects with state behavior.... At stake in this analysis, then, is the concept of world politics."[6]

Defining and redefining panarchy is an ongoing challenge because aspects of it are called different things by different scholars. Social and systems theorists use the word "heterarchy" to distinguish the concept from "hierarchy."[7] Political scientists have used the word "anarchy" to describe un-hierarchical systems, but panarchy exhibits self-organized order, and is therefore distinct from the chaotic implications of the term "anarchy." Another synonym is "plurilateralism." "In plurilateralism, the international system structure is complex and volatile because it is not stabilized by any hierarchical system…. It takes all kinds of actors seriously – not just states – and explores how they operate across different levels and functional structures."[8] Panarchy comprises a system of overlapping networks of cooperation and legitimacy, or authority, and therefore resembles recent literature on a "new medievalism."[9] As we shall see, panarchy is governance as a complex adaptive system of anarchical networks that relies on diversity and resists hierarchy in order to function and adapt. Highly interconnected systems of the type we shall explore are called "complex adaptive systems." These systems are 1) dynamic, not static, and 2) not in equilibrium or even trending toward it. Rather, these "dissipative structures" exist in a stable state far from equilibrium and maintain their structure through a process of autopoiesis.[10] Due to the lack of a common interdisciplinary term in my sources, I will use many of the previous terms interchangeably.

Thus, the key research question is one of identifying cases where autopoietic network forms of organization provided significant benefits to groups attempting to meet various goals. A few such cases demonstrate that the benefits of networks are not limited to political forms of collective action, but rather, that the new networks are powerful in many arenas. These new ways of overcoming collective action dilemmas cannot help but have an impact in political science and international relations.

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[6] Paul Wapner, "Politics Beyond the State: Environmental Activism and World Civic Politics," *World Politics* 47, no. 3 (1995): 339.

[7] Kyriakos M. Kontopoulos, *The Logics of Social Structure*, *Structural Analysis in the Social Sciences ; 6* (Cambridge ; New York: Cambridge University Press, 1992), Niklas Luhmann, *Social Systems*, *Writing Science* (Stanford, Calif.: Stanford University Press, 1995).

[8] Raimo Vayrynen, "Reforming the World Order: Multi- and Plurilateral Approaches," in *Global Governance in the 21st Century: Alternative Perspectives on World Order*, ed. Bjorn Hettne and Bertil Oden (Gothenburg: Almqvist and Wiksell International, 2002), 110-11.

[9] Hedley Bull, *The Anarchical Society : A Study of Order in World Politics*, 3rd ed. (New York: Columbia University Press, 2002), Jörg Friedrichs, "The Meaning of New Midievalism," *European Journal of International Relations* 7, no. 4 (2001), John Gerard Ruggie, "Continuity and Transformation in the World Polity," in *Neorealism and Its Critcs*, ed. Robert O. Keohane, *New Directions in World Politics* (New York: Columbia University Press, 1986).

[10] Humberto R. Maturana and Francisco J. Varela, *Autopoiesis and Cognition : The Realization of the Living*, *Boston Studies in the Philosophy of Science ; V. 42* (Dordrecht, Holland ; Boston: D. Reidel Pub. Co., 1980), I. Prigogine and Isabelle Stengers, *Order out of Chaos : Man's New Dialogue with Nature* (Toronto ; New York, N.Y.: Bantam Books, 1984).

Finally, I present my two objectives for this paper. The first is to provide a descriptive basis for understanding the shift from hierarchies to networks. In short, recent changes have an effect:[11]

1) "on the emergence of various transnational processes that have erosive effects on the power and authority of states," and
2) on "the growth of institutions of governance at all levels of analysis, with concomitant implications for state and system."

Second, because the new international system exhibits different properties, there are normative implications. Systemic change produces new winners and losers, and issues of equity and justice should not be overlooked.

To accomplish these objectives, I have organized the paper as follows:

1. A section on **international relations** discusses existing literature on system-level theorizing in political science.
2. A section on **complexity** discusses complex adaptive systems, order in leaderless systems and swarms, and the way systems embody space and change.
3. A section on **networks** discusses social networks and their topologies, how agents' identities affect networks, and how thresholds and cascades can create sudden change.
4. A section on **connectivity** discusses the arrival of connective technologies, the phenomena of netwar, the emergence of "smart mobs", and transnational social movements.
5. A section on **network culture** that demonstrates cases of networks in action.
6. And finally a section on **panarchy** that discusses complex adaptive governance and swarm diplomacy.

In addition, a brief conclusion admits to some of the complexities involved in proposing such a Lakatosian research programme.[12]

This kind of broad synthesis is sometimes received poorly as a vain attempt at prophecy or at best non-empirical. Such an effort is occasionally of necessity non-empirical – the world transformation currently occurring is the first instance of its kind – thus there is no history upon which to base an empirical analysis, but this does not mean that such an effort is doomed to non-empirical status, however, as long as it offers suggestions for ways of testing and validating its hypotheses. Historical examples can offer insights however as metaphors if not as perfect examples of the transformation itself. Umberto Eco has provided some comfort for those who would attempt this sort of venture: "There is only the risk of contradiction. But sometimes you have to speak

[11] Ronnie D. Lipschutz and Judith Mayer, *Global Civil Society and Global Environmental Governance : The Politics of Nature from Place to Planet*, *Suny Series in International Environmental Policy and Theory* (Albany: State University of New York Press, 1996), 249.
[12] Imre Lakatos and Alan Musgrave, *Criticism and the Growth of Knowledge* (Cambridge [Eng.]: University Press, 1970).

because you feel the moral obligation to say something, not because you have the 'scientific' certainty that you are saying it in an unassailable way."[13]

INTERNATIONAL RELATIONS

Because complexity and network research is inter-disciplinary, some justification is in order regarding the validity of importing these ideas from one discipline into another. Suffice it to say that the study of networks and complexity is the study of underlying principles that are manifested in *all kinds of systems* regardless of those systems' particular components. Ecologies, the Internet, social networks, international society, insect swarms, superconductor physics, gene networks – all exhibit similar properties when seen through a network/complexity lens. The key to understanding all of these systems is not to whitewash their differences, but not to over-emphasize them either. Certainly, individuals in a social network may have more freewill than electrons in a superconducting fluid, but the level-of-autonomy doesn't change the systemic forces that are at work. Understanding of the underlying dynamics of such systems has proven exceedingly useful for the cross-pollenation of academic disciplines. As the saying goes "Nothing succeeds like success." Unfortunately, Lars-Erik Cederman, who endorses the "complex systems approach," also notes that there have been "surprisingly few attempts to employ the CAS [complex adaptive systems] concept in political science."[14] In order to provide some theoretical context for an excursion into new forms of governance, we need to first examine some ways that political science has analyzed the international system to date, including systems theory, structure/agent relations, the nature of anarchy, and sources of change.

For Kenneth Waltz, the international anarchy is fundamentally a self-help system in which agents will rarely if ever cooperate. The material realities and pre-eminence of security concerns drive the behavior of agents in the system. The system's structure is defined according to three properties: the ordering principle, the functional differentiation of the units, and the distribution of capabilities among units.[15] For Waltz, "the structure of a system acts as a constraining and disposing force, and because it does so systems theories explain and predict continuity with a system."[16] As a result of his definition, a change in technology is a change *within* the system, not a change of the system itself.[17] "A macro-theory of international politics would show how the international system is moved by system-wide aggregates."[18] Unfortunately, Waltz makes the mistake of saying that states would still be the only agents who could act. As we shall see, that is no longer the case. Because Waltz's system is global, and he locates the only source of structural change as exogenous to that system, one is left somewhat confused as to what could possibly engender systemic change? Alien invasion, perhaps. Ruggie suggests that an infusion of Durkheim's "dynamic density" of interactions can

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[13] Umberto Eco, *Travels in Hyper Reality : Essays*, 1st ed. (San Diego: Harcourt Brace Jovanovich, 1986).
[14] Lars-Erik Cederman, *Emergent Actors in World Politics : How States and Nations Develop and Dissolve*, *Princeton Studies in Complexity* (Princeton, N.J.: Princeton University Press, 1997).
[15] Kenneth Neal Waltz, *Theory of International Politics*, 1st ed. (Boston, Mass.: McGraw-Hill, 1979), 88.
[16] Ibid., 69.
[17] Ibid., 67.
[18] Ibid., 110.

provide an endogenous source of structural change.[19] Similar to the Rosenau quote at the beginning of this paper, Ruggie's suggestion implies that some sort of threshold must be crossed that would result in a systemic change. This further implies some kind of self-organizing property of the system that is operative both above and below thresholds and is triggered when internal systemic changes cross those thresholds. Waltz turns to microeconomics and markets for the invisible orderer, but then invokes an informal, or positional, hierarchizing force that "orders" international relations. However, networks are "neither market nor hierarchy."[20] Still, as Waltz correctly underscores, the essential explanatory function and intellectual obstacle of a systemic theory is "how to conceive of an order without an orderer," a point we shall return to throughout this paper.[21]

Keohane and Nye were among the first to analyze the possibility of systemic change arising from increasing interdependence.[22] Also, they stress that one of the limitations of purely structural explanations is that they ignore the potential impacts that a "change in perceptions" can have, i.e. the role of individual agency.[23] Finally, they encourage the addition of "systemic political processes" to compensate for the deficiencies of a narrow structure/agent definition of structure.[24] Hedley Bull makes a further distinction based on his observation that the *density* of interaction *alone* is not sufficient to understand systemic processes. The *content* of those interactions is a force in system dynamics as well. Specifically, if the interactions are "shallow" then agents in the system can still be relatively individualist, but if the content of the interactions is more substantive then agents in the system begin to constitute a "society." Thus, merely increased interaction can produce a *system*, but it takes shared norms and practices to create a *society*.[25] These two perspectives lay the groundwork for a much richer understanding of international structure.

Alexander Wendt's Social Theory of International Politics attempts to build such a richer understanding of the international system.[26] Wendt accepts a "rump materialism" that begins the process of ordering the international anarchy, but departs from Waltz's merely material structure by including the effect of shared ideas on agents in the system. Since the agents can change systemic processes by adopting new ideas, the socially "constructed" nature of the international system loses any inherent systemic "logic." Thus, for Wendt, the processes of international interaction can represent one of three "cultures," of anarchy.[27] These cultures of anarchy have not only different causal effects on agents' behavior in the system but also constitutive effects on their identities,

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[19] Ruggie, "Continuity and Transformation in the World Polity."
[20] See Walter W. Powell, "Neither Market nor Hierarchy: Network Forms of Organization," *Research in organizational behavior* 12 (1990). and Grahame Thompson, *Between Hierarchies and Markets : The Logic and Limits of Network Forms of Organization* (Oxford ; New York: Oxford University Press, 2003).
[21] Waltz, *Theory of International Politics*, 89.
[22] Robert O. Keohane and Joseph S. Nye, *Power and Interdependence*, 3rd ed. (New York: Addison, Wesley, Longman, 2001).
[23] Ibid., 40.
[24] Ibid., 281-84.
[25] Bull, *The Anarchical Society : A Study of Order in World Politics*, 13-21.
[26] Alexander Wendt, *Social Theory of International Politics*, *Cambridge Studies in International Relations* (Cambridge ; New York: Cambridge University Press, 1999).
[27] Ibid., 246-312.

which can in turn further affect behavior.[28] Again, this creates an endogenous source of both order and structural change.

It has been argued that what appear to be systemic forces may in fact be reducible to the choices of agents, either the choices of *important* agents, or the choices of *many* agents. Stephen Krasner's theory of "hegemonic stability" asserts that international public goods, like free trade for example, have to be provided by a dominant hegemon.[29] Drawing on the realist and neorealist tradition, "hegemonic stability" includes the relationship between power and order in its analysis. Arguing against the notion that the presence of a hegemon is sufficient to provide order in the international anarchy, Duncan Snidal remarks, "collective action will depend on a host of relevant circumstances."[30] From this observation, numerous authors have analyzed ways in which order is achieved multilaterally.[31] Furthermore, "the theory of collective goods does not properly imply that cooperation among a few countries should be impossible."[32] The ability to foster and maintain large-scale cooperation through regimes is the basis of liberal institutional theories in international relations and the focus on international regimes as cooperative sources of order.[33] Oran Young, for example, has extensively examined regimes as sources of governance.[34]

On the other hand, some theorists argue that rational utility assumptions and positivism are not sufficient to understand regimes as sources of order in anarchy.[35] In their discussion of "strong cognitivism"[36] and international regimes, Hasenclever and Meyer, echoing Wendt, note that the question is not "why do we cooperate", but "how is cooperation made possible at all?"[37] The role of norms and rules and their causal and constitutive effects has been well studied in international politics, including the ways in which they not only shape agents and their behavior, but also define what actions and actors are even possible.[38]

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[28] Ibid., 313-69.
[29] Stephen D. Krasner, "State Power and the Structure of International Trade," *World Politics: A Quarterly Journal of International Relations* 28, no. 3 (1976).
[30] Duncan Snidal, "The Limits of Hegemonic Stability Theory," *International Organization* 39, no. 4 (1985): 594.
[31] John Gerard Ruggie, *Multilateralism Matters : The Theory and Praxis of an Institutional Form*, *New Directions in World Politics* (New York: Columbia University Press, 1993).
[32] Robert O. Keohane, *After Hegemony : Cooperation and Discord in the World Political Economy* (Princeton, N.J.: Princeton University Press, 1984).
[33] Ibid, Ruggie, *Multilateralism Matters : The Theory and Praxis of an Institutional Form*.
[34] Oran R. Young, "Governance without Government," in *Governance in World Affairs*, ed. Oran R. Young (Ithaca, N.Y.: Cornell University Press, 1999).
[35] Friedrich Kratochwil and John Gerard Ruggie, "International Organization: A State of the Art on an Art of the State," *International Organization* 40, no. 4 (1986).
[36] Andreas Hasenclever, Peter Mayer, and Volker Rittberger, *Theories of International Regimes*, *Cambridge Studies in International Relations ; 55* (Cambridge ; New York: Cambridge University Press, 1997), 154-210.
[37] Ibid.
[38] Bull, *The Anarchical Society : A Study of Order in World Politics,* Stephen D. Krasner, *Sovereignty : Organized Hypocrisy* (Princeton, N.J.: Princeton University Press, 1999), Friedrich V. Kratochwil, *Rules, Norms, and Decisions : On the Conditions of Practical and Legal Reasoning in International Relations and Domestic Affairs*, *Cambridge Studies in International Relations ; 2* (Cambridge [Cambridgeshire] ; New York: Cambridge University Press, 1989), Michael Taylor, *The Possibility of Cooperation* (Cambridge [Cambridgeshire] ; New York: Cambridge University Press, 1987), Wendt, *Social Theory of International Politics*.

To synthesize the aforementioned, in the current international order 1) the ordering principle is changing, 2) the functional differentiation of the units are changing, 3) the capabilities of the units are changing, 4) the structural processes are changing, 5) norms and ideas are changing, and 6) identities are changing. States have been organizing "cooperation under anarchy" for years.[39] The key difference between studies of regime theory and the new networks is that new actors are taking matters into their own hands. Now, the use of coordinated anarchical networks, once the unique domain of nation-states, is being diffused to other actors in the system. The formation of global networks is enabling regime-like governance among numerous players. Elinor Ostrom, in particular, continues her ongoing investigation of self-managed cooperative arrangements among individuals and groups in both environmental and information issue areas.[40] As Ostrom and others have noted, as a result, our understanding of how these systems function will rely on many of the same conditions analyzed in international relations: trust, reciprocity, transparency, as well as the agent-based and systemic payoffs explored in game-theory.[41] But that alone won't be enough. The constitutive and causal effects of rules and norms in the international arena need to be extended to include other actors who are able to participate directly in transnational networks without the intermediation of the state.[42] Individuals are increasingly becoming constituted by transnational networks rather than traditional and domestic hierarchies.[43] Actors who are constituted by transnational networks are likely to be different than actors who are constituted by nationalist hierarchies. As Oran Young has noted even "international regimes do not operate in a social vacuum."[44] As a result, unlike Waltz's merely "constraining and disposing force," Rosenau suggests that "the nonhierarchical ordering of the multi-centric world is more facilitative than constraining" due to the "complexity that underlies the proliferation of its actors."[45]

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[39] Kenneth A. Oye, *Cooperation under Anarchy* (Princeton, N.J.: Princeton University Press, 1986).

[40] Elinor Ostrom, *Governing the Commons : The Evolution of Institutions for Collective Action*, *The Political Economy of Institutions and Decisions* (Cambridge ; New York: Cambridge University Press, 1990), Elinor Ostrom and Nives Dolésak, *The Commons in the New Millennium : Challenges and Adaptation*, *Politics, Science, and the Environment* (Cambridge, Mass.: MIT Press, 2003), Elinor Ostrom and Charlotte Hess, *Ideas, Artifacts, and Facilities: Information as a Common-Pool Resource* [Journal] (Duke School of Law, 2003 [cited 2004]); available from http://www.law.duke.edu/journals/66LCPHess, Elinor Ostrom and National Research Council (U.S.). Committee on the Human Dimensions of Global Change., *The Drama of the Commons* (Washington, DC: National Academy Press, 2002).

[41] Robert M. Axelrod, *The Complexity of Cooperation : Agent-Based Models of Competition and Collaboration*, *Princeton Studies in Complexity.* (Princeton, NJ: Princeton University Press, 1997), Robert M. Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984), Robert M. Axelrod and Robert O. Keohane, "Achieving Cooperation under Anarchy: Strategies and Institutions," in *Cooperation under Anarchy*, ed. Kenneth A. Oye (Princeton, N.J.: Princeton University Press, 1986), Keohane, *After Hegemony : Cooperation and Discord in the World Political Economy,* Elinor Ostrom, Roy Gardner, and James Walker, *Rules, Games, and Common-Pool Resources* (Ann Arbor: University of Michigan Press, 1994), Elinor Ostrom and James Walker, *Trust and Reciprocity : Interdisciplinary Lessons from Experimental Research* (New York: Russell Sage Foundation, 2003).

[42] The parallel here to information networks like the Internet in which data is automatically routed around structural "bottlenecks" is both striking and illuminative.

[43] Although not discussed explicitly, the driving forces behind this change are implicated in Margaret E. Keck and Kathryn Sikkink, *Activists Beyond Borders : Advocacy Networks in International Politics* (Ithaca, N.Y.: Cornell University Press, 1998).

[44] Young, "Governance without Government," 8.

[45] Rosenau, *Turbulence in World Politics : A Theory of Change and Continuity*, 263.

The necessary upshot of all of this is a requirement to distinguish between change that occurs *within* the system versus a change *of* the system. Merely changing hegemons is *not* systemic change, but changing to a non-hegemonic cooperation is a start. In the study of complex systems, Phil Anderson coined the phrase "more is different" to underscore the point that systemic emergence is not reducible to agents' properties or behavior.[46] "More is different " can also apply to the relationship between micromotives and macrobehavior.[47] Sometimes systems undergo radical change after crossing a statistical "critical" threshold. There is evidence for this in many kinds of systems across different disciplines. It *has* been observed in "artificial" social systems.[48] Therefore, in keeping with certain systemic theories, it is my assertion that in social systems as well, more *is* different. I admit that it is difficult to tell when or how (or even if) a systemic change will occur. I am grounding my assertion on similarities between the international anarchy and complex systems in other disciplines. As I will explain, what makes this a new force in politics is unheard of levels of transnational connectivity among non-state agents, ushered in by communications technologies.[49]

COMPLEXITY

What is Complexity?

Complexity theory has a history ranging across many disciplines. In the early 1980's Eric Jantsch's The Self-Organizing Universe and Ilya Prigogine's Order Out of Chaos catalyzed interest in a new study of complex systems and emergent order.[50] Shortly thereafter, a group of scholars, including a number of Nobel prize winners, founded the Santa Fe Institute in New Mexico to discuss the ways in which their research programs were all revealing the same principles in their respective disciplines.[51] Murray Gell-Mann in physics, Stuart Kauffman in biology, Brian Arthur in economics, John Holland in information theory, and others, representing everything from computer science to social networks, began to rigorously explore the nature of complex systems. Holland, Kauffman, and Gell-Mann have all published substantial works on Complexity.[52] Brian Arthur has written about the economy as a complex adaptive

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[46] P. W. Anderson, "More Is Different," *Science* 177, no. 4047 (1972).
[47] Thomas C. Schelling, *Micromotives and Macrobehavior*, 1st ed. (New York: Norton, 1978).
[48] Joshua M. Epstein, Robert Axtell, and 2050 Project., *Growing Artificial Societies : Social Science from the Bottom Up*, *Complex Adaptive Systems* (Washington, D.C.: Brookings Institution Press, 1996).
[49] Keck and Sikkink, *Activists Beyond Borders : Advocacy Networks in International Politics*, 200.
[50] Erich Jantsch, *The Self-Organizing Universe : Scientific and Human Implications of the Emerging Paradigm of Evolution*, 1st ed., *Systems Science and World Order Library. Innovations in Systems Science* (Oxford ; New York: Pergamon Press, 1980), Prigogine and Stengers, *Order out of Chaos : Man's New Dialogue with Nature*.
[51] Since then the discipline has infected academia everywhere. There are complexity centers at the University of Michigan, Cornell, Stanford, etc. as well as academically-affiliated research centers for the study of complexity like the New England Complex Systems Institute.
[52] Murray Gell-Mann, *The Quark and the Jaguar : Adventures in the Simple and the Complex* (New York: W.H. Freeman, 1994), John H. Holland, *Emergence : From Chaos to Order* (Reading, Mass.: Addison-

system[53], and Duncan Watts has applied Complexity to the study of social networks.[54] In fact, Complexity theory has made substantial contributions in nearly every discipline. Most recently, Fritjof Capra uses Complexity theory in the creation of integral networks for sustainable development[55], while Mark Taylor's Moment of Complexity reveals how Complexity is creating a new "emerging network culture."[56]

The study of complex systems begins with the following definitions:

1. Systems are groups of individuals (cells, consumers, nations, molecules, atoms, etc.) called agents.
2. Agents interact according to sets of rules, or norms.
3. Agents adapt to their environments using feedback and learning.
4. These systems, dubbed ***complex adaptive systems*** **(CAS)**, exhibit unexpected emergent properties that cannot be reduced to the properties of the agents themselves.

Robert Axelrod and Michael Cohen define Complexity as the study of **systems**, comprised of **populations**, or groups, of individuals, or **agents**.[57] As a result of their interconnected **structure**, complex systems exhibit **emergent properties**, one of which is **self-organization**, i.e. organization that has no leader but is generated from the "bottom up" by the interactions of the agents themselves. Furthermore, complex systems' dynamics are **non-linear**, therefore the properties of the whole cannot be reduced to the properties of its parts. M. Mitchell Waldrop explains:

> "The very richness of these interactions allows the system as a whole to undergo *spontaneous self-organization*…. Furthermore, these complex self-organizing systems are *adaptive*…. All these complex systems have somehow acquired the ability to bring order and chaos into a special kind of balance. This balance point… [is] often called *the edge of chaos*…. The edge of chaos is the constantly shifting battle zone between stagnation and anarchy…."[58]

Wesley, 1998), John H. Holland, *Hidden Order : How Adaptation Builds Complexity* (Reading, Mass.: Addison-Wesley, 1995), Stuart A. Kauffman, *At Home in the Universe : The Search for Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995), Stuart A. Kauffman, *Investigations* (Oxford ; New York: Oxford University Press, 2000), Stuart A. Kauffman, *The Origins of Order : Self Organization and Selection in Evolution* (New York: Oxford University Press, 1993).

[53] W. Brian Arthur, "Complexity and the Economy," *Science* 284, no. 5411 (1999), W. Brian Arthur et al., *The Economy as an Evolving Complex System Ii* (Reading, Mass: Addison-Wesley, Acfanced Book Program, 1997).

[54] Duncan J. Watts, *Small Worlds : The Dynamics of Networks between Order and Randomness*, *Princeton Studies in Complexity* (Princeton, N.J.: Princeton University Press, 1999).

[55] Fritjof Capra, *The Hidden Connections : Integrating the Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability*, 1st ed. (New York: Doubleday, 2002).

[56] Mark C. Taylor, *The Moment of Complexity : Emerging Network Culture* (Chicago: University of Chicago Press, 2001).

[57] Robert M. Axelrod and Michael D. Cohen, *Harnessing Complexity : Organizational Implications of a Scientific Frontier* (New York: Free Press, 1999).

[58] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York: Simon & Schuster, 1992), pp. 11-12.

Complex adaptive systems, then, are systems that somehow balance themselves on the boundary between order and chaos: too much order and they rigidify into stasis, too little order and they dissolve into chaos. In Robert Jervis' study of complexity in politics he states that complex systems "display nonlinear relationships, outcomes cannot be understood by adding together the units or their relations, and many of the results of actions are unintended…."[59] It is important to stress that this is not a reification of system properties. The observation that a sand-pile maintains a consistent form no matter how many grains of sand are added, or that a whirlpool maintains its form as water molecules flow in and out of it, results in the recognition of a consistent pattern across many kinds of systems. That pattern is organization on the edge of chaos. So how do these systems manage such a feat?

The Lack of Leaders

> "We're naturally predisposed to think in terms of pacemakers, whether we're talking about fungi, political systems, or our own bodies…. For millennia we've built elaborate pacemaker cells into our social organization, whether they come in the form of kings, dictators, or city councilmen."[60]

> "So dominant in contemporary consciousness is the assumption that authority must be centralized that scholars are just beginning to grapple with how decentralized authority might be understood....The question of how to think about a world that is becoming 'domesticated' but not centralized… is one of the most important questions today facing not only students of international relations but of political theory as well."[61]

As Steven Johnson describes in "The Myth of the Queen Ant," humans have traditionally looked for "rulers" in ordered systems, "pacemakers" that are responsible for the maintenance of order. In addition, we look for such primary causers in other systems, from terrorist networks to fads to mass demonstrations to peer-to-peer file-sharing. However, "we know now that systems like ant colonies don't have real leaders, that the very idea of an ant 'queen' is misleading. But the desire to find pacemakers in such systems has always been powerful…."[62] In complex adaptive systems, though, organizers are entirely unnecessary when the structure of the system follows certain organizational parameters. These parameters determine whether a system will self-organize or not, into a state which Per Bak calls "self-organized criticality."[63] In highly interconnected systems, when conditions permit, order can emerge spontaneously, what

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[59] Robert Jervis, *System Effects : Complexity in Political and Social Life* (Princeton, N.J.: Princeton University Press, 1997), p. 6.
[60] Steven Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* (New York: Scribner, 2001), p. 14.
[61] Wendt, *Social Theory of International Politics*, 308.
[62] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, p. 33.
[63] Per Bak, *How Nature Works : The Science of Self-Organized Criticality* (New York, NY, USA: Copernicus, 1996), pp. 33-48.

Stuart Kauffman calls "'order for free.' – self-organization that arises naturally."[64] Indeed, what Complexity reveals is that sometimes *there is no orderer of order*.

Swarming

When you examine insects swarming, birds flocking, fish schooling, or ants foraging, you learn that they do not follow an individual leader, but rather they obey micro-level rules that *in toto* somehow produce an emergent phenomena we call "the swarm." Recently, the study of insects, such as fireflies engaging in synchronous flashing, has shed light on how such emergent phenomena operate.[65] Stanford I.R. theorist John Arquilla has examined swarming as a "revolution in military affairs."[66] This revolution can equally be applied to diplomatic and civil affairs.

For example, Deborah Gordon studies societies where members "who are unable to assess the global situation still work together in a coordinated way."[67] As it so happens, these societies are ant colonies. What fascinates her is that "ants have no dictators, no generals, no evil masterminds. In fact, they have no leaders at all."[68] Again, Johnson points out, "they think locally and act locally, but their collective action produces global behavior."[69] Thus, although it may seem as if agency is missing in these systems, i.e. that they are structurally deterministic, they are, in fact, exactly the opposite. *Swarms are entirely comprised of agency, and yet, coordinated behavior emerges.* There is some question about the nature of emergent system behavior when agents are aware of the system and are self-reflexive. Even when agents are aware, however, often this awareness does not eliminate the emergent system dynamics. In fact, studies of crowds have shown that under numerous instances crowds behave like particles in a fluid, exhibiting perfect Brownian motion.[70]

Eric Bonabeau also notes that the study of swarming in insect populations "provides us with powerful tools to transfer knowledge about social insects to the field of *intelligent system design*. In effect, a social insect colony is undoubtedly a decentralized problem-solving system, comprised of many relatively simple interacting entities."[71]

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[64] Stuart A. Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995), p. 71.

[65] Some sources of note: Eric Bonabeau, Marco Dorigo, and Guy Theraulaz, *Swarm Intelligence : From Natural to Artificial Systems* (New York: Oxford University Press, 1999), Steven H. Strogatz, *Sync : The Emerging Science of Spontaneous Order*, 1st ed. (New York: Theia, 2003).

[66] John Arquilla, David F. Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense., *Networks and Netwars : The Future of Terror, Crime, and Militancy* (Santa Monica, CA: Rand, 2001).

[67] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 74.

[68] Deborah Gordon, *Ants at Work : How an Insect Society Is Organized* (New York, NY: Free Press, 1999), x.

[69] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 74.

[70] See for example: Illes Farkas, Dirk Helbing, and Tamas Vicsek, "Crowd Behaves as Excitable Media During Mexican Wave," *Nature* 2002, Mark Granovetter, " Threshold Models of Collective Behavior," *American Journal of Sociology* 83, no. 6 (1978), Dirk Helbing and Peter Molnár, "Self-Organization Phenomena in Pedestrian Crowds," in *Self-Organization of Complex Structures: From Individual to Collective Dynamics*, ed. F Schweitzer (London: Gordon and Breach, 1997).

[71] Bonabeau, Dorigo, and Theraulaz, *Swarm Intelligence : From Natural to Artificial Systems*, 6.

In Out of Control, Kevin Kelly sums up the "swarm model" as follows:[72]

> "Since there is no chain of command, the particular action of any single spring diffuses into the whole, making it easier for the sum of the whole to overwhelm the parts of the whole. What emerges from the collective is not a series of critical individual actions but a multitude of simultaneous actions whose collective pattern is far more important. This is the swarm model."

Swarms obey a few basic rules:[73]

- "The absence of imposed centralized control
- The autonomous nature of subunits
- The high connectivity between the subunits
- The webby nonlinear causality of peers influencing peers"

To sum, the swarm model is a decentralized, non-hierarchical form of organization that leverages the power of distributed intelligence to function.

Space and Change

Axelrod and Cohen's work with complex adaptive systems goes further than mere self-organization. Using computer modeling of intelligent evolving agents to study cooperation, their findings shed some light on the dynamics of Complexity. First, agents exist in both **physical and conceptual spaces**, and along a continuum of **proximity** – from close to distant – in each space. Second, **selection pressure** on agents directs the evolution of **strategies** that agents employ.[74] It should come as no surprise that James Rosenau entitled his most recent book Distant Proximities, and in it he explores these spaces and pressures in regard to governance specifically. "To maintain clarity with respect to the important distinction between spatial and contextual proximities, henceforth I shall refer to the former as *local phenomena* and to the latter as *localized phenomena* (suggesting they have to be contextually redefined in order to become proximate)."[75] A similar understanding of the shifting definition of "proximity" is occurring in complex ecological networks. "To a major degree, this separation between 'global' and 'local' phenomena is the result of political boundary-drawing exercises, and not a consequence of nature."[76] The continuous contextual redefinition of "proximity" is accelerated by modern connective technologies and generates what Rosenau

[72] Kevin Kelly, *Out of Control : The Rise of Neo-Biological Civilization* (Reading, Mass.: Addison-Wesley, 1994), 21.
[73] Ibid., 22.
[74] Axelrod and Cohen, *Harnessing Complexity : Organizational Implications of a Scientific Frontier*.
[75] James N. Rosenau, *Distant Proximities : Dynamics Beyond Globalization* (Princeton, N.J.: Princeton University Press, 2003), p. 88.
[76] Lipschutz and Mayer, *Global Civil Society and Global Environmental Governance : The Politics of Nature from Place to Planet*, 22.

characterizes as "turbulence."[77] Axelrod and Cohen, too, suggest that because complexity is "rooted in patterns of interaction among agents, then we might expect systems to exhibit increasingly complex dynamics when changes occur that *intensify* interaction among their elements. This, of course, is exactly what the Information Revolution is doing: reducing the barriers to interaction among processes that were previously isolated from each other in time or space."[78] We have no way to know at what point global interconnectivity will cross a self-organization threshold; in fact, we may already have. In addition, there may be multiple thresholds and multiple rounds of organization and re-organization. For this reason, it is significant that John Holland describes complex adaptive systems as sources of "perpetual novelty" and thus provides us with our first glimpse into the need for adaptive governance.[79] To better understand how "perpetual novelty" will manifest itself, we must examine the social networks that are being reshaped and redefined by complexity.

NETWORKS

Social Networks

Social network theory investigates systems of interconnected individuals, and yields insights into both social **structure** and the **agents** within it. Social networks, like other networks, consist of **nodes** and **links**, or relations, that make up the network's structure. The particular type of network of importance both for complexity as well as in the real world is one called a "small-world network."[80] There are two aspects of network structure that define the small-world network phenomenon: **clusters** and **bridges**. Clustering refers to the fact that social relations tend to be embedded in communities, wherein *most of the individuals know most of the other individuals in that community*, creating a cluster. Bridges exist when a person in one cluster knows someone in another cluster, and are particularly important when they connect distant clusters, making them "near," thus enabling Rosenau's "localization." The small-world network, which describes the real world, consists of *numerous highly interlinked clusters connected to distant clusters by means of bridges*.[81] It is this unique structure, how it affects perceptions of proximity, and how those perceptions shape behavior, that are of concern.

The bridges that serve to bring distant clusters closer often go unnoticed. As Duncan Watts describes it, the small-world network "is a global phenomenon, yet individuals are capable only of local measurements. You only know whom you know, and maybe *most* of the time, your friends know the same sort of people you do. But if just *one* of your friends is friends with just *one* other person who is friends with someone

[77] Rosenau, *Turbulence in World Politics : A Theory of Change and Continuity*.
[78] Axelrod and Cohen, *Harnessing Complexity : Organizational Implications of a Scientific Frontier*, p. 26.
[79] Holland, *Hidden Order : How Adaptation Builds Complexity*.
[80] The term was adopted by Steven Strogatz and Duncan Watts. See Watts, *Small Worlds : The Dynamics of Networks between Order and Randomness*.
[81] Ibid.

not like you at all, then a connecting path exists."[82] And Steve Strogatz echoes that "the transition to a small world is essentially undetectable at a local level. If you were living through the morph, nothing about your immediate neighborhood would tell you that the world had become small."[83] Even so, it is the bridges that provide the crucial inroads for the arrival of new ideas and information.

Acknowledging Identity

Social networks share with Complexity the concepts of structures and agents, but unlike many complex systems, social systems are comprised of agents that have another, in fact crucial, property: **identity**. Identity has two consequences in particular for small-world networks. First, it acts as a source of **randomness**, and second, it acts to **affiliate**, or connect, parts of the network when nodes participate in multiple social contexts.

Social network theory has traditionally been "concerned with the relationships between individuals, the patterns of interactions. The precise nature of the individuals is downplayed, or even suppressed, in hopes of uncovering deeper laws. A network theorist will look at any system of interlinked components and see an abstract pattern of dots connected by lines. It's the pattern that matters, the architecture of relationships, not the identities of the dots themselves."[84] This inflated view of structure neglects potentialities in individual agents, and, as such, parallels deterministic structural theories in political science, e.g. Kenneth Waltz's neo-realism.[85] Agent behavior may be *influenced* by structure, but it is not *determined* by it. Individual agency effectively provides *random* input into the social network.[86]

Social identity is complex identity. Because individuals participate in many groups, they themselves act as bridges, not across *geographical* distance, but across *conceptual* distance. "Social identity, therefore, exhibits a multidimensioned nature – individuals spanning different social contexts…."[87] Consequently, a simplistic diagram of a social network often fails to accurately represent the complexities of the real world. For this reason, social network theorists use maps of **affilation networks**. "Affiliation networks… are thus networks of overlapping cliques, locked together via the comembership of individuals in multiple groups."[88] Affiliation, like bridging, reduces distance. This renders network effects almost impossible to trace. Information can leap from group to group even when those groups seem to have nothing in common, because all they need in common is a single individual who is a member of both groups and therefore has a bridging identity.

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[82] Duncan J. Watts, *Six Degrees: The Science of a Connected Age*, 1st ed. (New York: W.W. Norton, 2003), p. 83.
[83] Strogatz, *Sync : The Emerging Science of Spontaneous Order*, p. 242.
[84] Ibid., pp. 231-32.
[85] Robert O. Keohane, *Neorealism and Its Critics*, *The Political Economy of International Change* (New York: Columbia University Press, 1986), Waltz, *Theory of International Politics*.
[86] It should be noted that quantum physics posits the same type of agency as the inroad for indeterminacy in quantum-level phenomena. Physical and social networks are not as different as we may wish.
[87] Watts, *Six Degrees: The Science of a Connected Age*, p. 151.
[88] Ibid., p. 128.

Thresholds and Cascades

The structure and identities of agents in social networks determine the network's **threshold** with regards to effects that **cascade** throughout part or all of the network. Agents have their own thresholds as well, but network connectivity is what makes cascades possible.

For instance, in epidemiology, a highly clustered social network works against the rapid spread of infection because individuals have contact primarily with those who are already infected. In addition, an agent that is not susceptible to the disease has less chance and possibly no chance of becoming infected. "The possibility of an epidemic depends on the existence of… a *percolating cluster* – a single cluster of susceptible sites… that permeates the entire population,"[89] in other words, a chain of interconnected nodes which connects the entire rest of the network. An identical analysis is possible as regards the spread of ideas, or memes, and behavior. Social networks utilize threshold models of decision making that take into account two factors: the **number** of connections, and their **weight**, or likelihood of influence. Paralleling Complexity's "edge of chaos," agents are poised between too few connections and too many. Too *few* connections and an individual is less likely to be influenced, but counter-intuitively too *many* connections produces the same result because the relative influence of each connection is smaller. In addition, individuals, in general, are more influenced by those socially "near" to them than by those that are socially "distant." Nonetheless, how an individual's threshold is calculated is irrelevant, since once it has been crossed, it may have repercussions for the population as a whole. Because social bridges reduce "distance" between clusters, they increase the "closeness" of all nodes, and thus, increase the likelihood that they will have an influence. This provides a mechanism for the reinterpretation involved in creating Rosenau's "localized phenomena." It is important to realize that there are in effect *two* thresholds operating simultaneously: the individual's threshold which is similar to his "susceptibility" and the network's threshold which is a function of connectivity.

Once these thresholds are crossed, the network becomes vulnerable to cascades. "Networks of social information," Watts tells us, "are important not just because they help us make better individual decisions but also because they allow things that have caught on in one setting to spill over into another. Since this kind of spillover is critical to the dynamics of a cascade, social networks are central to the notion of a little thing becoming big."[90] Furthermore, thresholds behave similarly "with cultural fads, technological innovations, political revolutions, cascading crises, stock market crashes, and other manners of collective madness, mania, and mass action. The trick is to focus not on the stimulus itself but on the structure of the network that the stimulus hits."[91] Again, the danger is in looking for "causes" because "*contingent decision making* comprises the essence of an information cascade, and in so doing renders the relationship between initial cause and ultimate effect deeply ambiguous."[92]

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[89] Ibid., p. 185.
[90] Ibid., p. 229.
[91] Ibid., p. 249.
[92] Ibid., p. 246.

So, what kinds of cascades are we talking about? Cascades can include cultural fads, financial bubbles, transnational environmental concern, coordinated mass demonstrations, the spread of new behavioral norms, damage from computer viruses, epidemics like SARS, large-scale system failures such as the power outage in the U.S. in August of 2003, increased participation in online social networks like Friendster, and grass-roots political campaigns like that of Howard Dean.[93]

The main point is that "only when the network becomes dense enough do we see the percolating vulnerable cluster appear."[94] It is an open question as to 1) whether or not increasing network densities can be reversed, and 2) the role of states in so doing. While it is conceivable that a concerted authoritarian effort on the part of states could slow or even reverse global connectivity, significant obstacles would have to be overcome. The desire for connectivity, both by individuals and corporations, enacted through telecommunications industries and the Internet, could prove insurmountable. As a result, perhaps ironically, this is the threshold where we find ourselves, ushered in by the revolution in connective technologies.

CONNECTIVITY

The recent proliferation of mobile communications – cell-phones, text messaging, email, etc. – has created a social realm of constant communications. It is this innovation that changes everything, for as network connectivity becomes omnipresent, *emergent properties* manifest themselves. A host of recent communications theory has focused on the impact of technological and mobile connectivity on society, via the Internet and mobile telephony. Cell-phones and SMS text-messaging are used by people around the world in innovative new ways. Email provides geographically distant individuals with easy contact. Connective technologies are ushering in a society of "**perpetual contact**," where individuals are never isolated from their communities or from information, i.e. network pathways have become "always-on" connections.[95] The world of perpetual contact affects social change through two influences: 1) the global breadth of connective technologies, and 2) the speed of cascades enabled by these technologies. Because transnational networks foster the spread of norms, the breadth and speed of those networks has potentially strong implications for the rise of global norms.[96]

Connective Technologies

[93] Ibid., p. 205, pp. 307-12.
[94] Ibid., p. 239.
[95] James E. Katz and Mark Aakhus, *Perpetual Contact : Mobile Communication, Private Talk, Public Performance* (New York: Cambridge University Press, 2002).
[96] See Martha Finnemore and Kathryn Sikkink, "International Norm Dynamics and Political Change," *International Organization* 52, no. 4, International Organization at Fifty: Exploration and Contestation in the Study of World Politics (1998), Katz and Aakhus, *Perpetual Contact : Mobile Communication, Private Talk, Public Performance*.

Connective technologies include the Internet, wearable computers, Global Position Systems (GPS), Computer Mediated Communications (CMC) such as email, and Personal Communications Technologies (PCTs). These technologies have two effects on behavior: 1) the norms they help to spread, and 2) the norms they bring with them, i.e. that are a function of the technology itself. "In social relationships among adults, mobile communication leads to different forms of coordination, cooperation and conflict…. Questions of folkways, norms and cultures of adoption and opposition also arise."[97] Also, "when people interact with their PCTs they tend to standardize infrastructure and gravitate towards consistent tastes and universal features" much the same as "people and corporations worldwide create and gravitate toward common designs for airports, cars , bicycles and computers, regardless of cultural diversity."[98] These influences taken together constitute what Katz and Aakhutz have termed *Apparatgeist* – the "ghost in the machine" – which enacts "the logic of perpetual contact."[99]

For example, one such logic is the dilution of broad-coverage centralized sources of news and information (TV, mass media, etc.) in favor of topic-specific decentralized sources. In the global information society, connective technology, "empowers individuals to decide on their own about the modalities of segregation or permeability between different institutional settings, social systems, inter-individual relationships and individual roles."[100] Arguably individuals have always been so empowered. But the difference now revolves around *who* influences their decisions: the conceptual space of the network contends with the physical place of geography; the global info-sphere spars with traditional media. Manuell Castells warns us that the struggle for influence is "twisted, manipulated, and transformed, by a combination of computer-enacted strategic maneuvers, crowd psychology from multicultural sources, and unexpected turbulences, caused by greater and greater degrees of complexity…."[101]

Even though, we are only now beginning to get real data, one thing is clear. The effects we are witnessing are decidedly non-linear: "As more people share information in any particular venue, the ratio of potentially valuable information to the number of participants rises much faster than the number of participants – even if many participants do not actually contribute any particular content…."[102]

Netwar

The term "netwar," coined by David Ronfeldt and John Arquilla, originally referred specifically to "network-centric warfare," but herein I extend the term (as they do) to include all forms of network-organized social and political conflict. To wit, "netwar

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[97] James E. Katz and Mark A. Aakhus, "Conclusion: Making Meaning of Mobiles -- a Theory of *Apparatgeist*," in *Perpetual Contact: Mobile Communication, Private Talk, Public Performance*, ed. James E. Katz and Mark A. Aakhus (New York: Cambridge University Press, 2002), p. 301.
[98] Ibid., p. 310.
[99] Ibid., pp. 305-07.
[100] Hans Geser, *Towards a Sociological Theory of the Mobile Phone* (Sociology of the Mobile Phone, 2003 [cited 2003]); available from http://socio.ch/mobile/t_geser1.htm.
[101] Manuel Castells, *End of Millennium*, 2nd ed. (Oxford ; Malden, MA: Blackwell Publishers, 2000), p. 374.
[102] James Everett Katz and Ronald E. Rice, *Social Consequences of Internet Use : Access, Involvement, and Interaction* (Cambridge, Mass.: MIT Press, 2002), p. 350.

refers to conflicts in which a combatant is organized along networked lines or employs networks for operational control and other communications."[103] "Its distinguishing element is that at least one of the protagonists, usually a nonstate actor, organizes as a network rather than a hierarchy."[104] Netwar is "an emerging mode of conflict (and crime) at societal levels, involving measures short of war, in which the protagonists use – indeed, depend on using – network forms of organization, doctrine, strategy, and communication. These protagonists generally consist of dispersed, often small groups who agree to communicate, coordinate, and act in an internetted manner, often without precise central leadership or headquarters."[105] These networks are characterized by a "flat structure: no central command, little hierarchy, much consultation, local initiative – a 'panarchy.'"[106] It is this "panarchy" of collective action that will constitute the primary basis of conflict in the next era.[107]

Networks are not new, but the difficulty of coordination has traditionally been an obstacle to their effectiveness. Because, networks are dependent on dense webs of intercommunication, the rise of the network form is a function of recent innovations in communicative technologies. Ronfeldt sees network forms of organization as the next stage in a historical progression aided by technological change. "Its key principle is heterarchic (or, to offer another term, 'panarchic') collaboration among members who may be dispersed among multiple, often small organizations, or parts of organizations. Network designs have existed throughout history, but multiorganizational designs are now able to gain strength and mature because the new communications technologies let small, scattered, autonomous groups to consult, coordinate, and act jointly across greater distances and across more issue areas than ever before."[108]

Swarming is a netwar tactic that "allows for continual interactions among the agents, as they form and reform in fluid, shifting networks…. [that] may persist for some time, or may break down and recombine into others opportunistically."[109] As we have noted, Ronfeldt and Arquilla are convinced that "in netwar, attacks will come in 'swarms' rather than in more traditional 'waves.'"[110]

Smart Mobs

> "On January 20, 2001, President Joseph Estrada of the Philippines became the first head of state in history to lose power to a smart mob – more than 1 million Manilla residents, mobilized and coordinated by waves of text messages…."[111]

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[103] John Arquilla et al., *The Advent of Netwar* (Santa Monica, CA: RAND, 1996), vii.
[104] Ibid., 1.
[105] Ibid., 5.
[106] Ibid., 9.
[107] "Panarchy" is a term increasingly associated with the study of networked governance; for an overview see http://www.panarchy.com.
[108] David F. Ronfeldt, *Tribes, Institutions, Markets, Networks* (Santa Monica: RAND, 1996), 11-12. The connection between technology and the rise of political and social networks is also explored in Howard Rheingold, *Smart Mobs: The Next Social Revolution* (Cambridge, MA: Perseus Publishing, 2002).
[109] John Arquilla et al., *Swarming & the Future of Conflict* (Santa Monica, CA: RAND, 2000), 48-49.
[110] Arquilla et al., *The Advent of Netwar*.
[111] Rheingold, *Smart Mobs: The Next Social Revolution*, p. 157.

Social theorist and technology oracle Howard Rheingold clarifies: "'Mobile ad hoc social network' is a longer, more technical term than 'smart mob'. Both terms describe the new social form made possible by the combination of computation, communication, reputation, and location awareness."[112] Not only have connective technologies increased the breadth of influence of agents in the network, they have also severely increased the *speed of propagation*. Smart mobs are essentially a rapid cascade of coordinated action. "Whenever a new communications technology lowers the threshold for groups to act collectively, new kinds of institutions emerge…. We are seeing the combination of network communications and social networks."[113]

Examples are legion. "On November 30, 1999, autonomous but internetworked squads of demonstrators protesting the meeting of the World Trade Organization used 'swarming' tactics, mobile phones, Web sites, laptops, and handheld computers to win the 'Battle of Seattle.'"[114] Rheingold also notes the "use of the Internet and mobile communications by organizers and participants in worldwide protests against the Bush administration's war plans" towards Iraq.[115] Smart mobs changed the outcome of the recent Korean elections: "When Roh Moo-Hyun's organizers wanted supporters to vote on election day, they simply pressed a few computer keys. Text messages flashed to the cellphones of almost 800,000 people, urging them to go to the polls."[116] In Kenya, too, connective technologies were influential in insuring electoral fairness.[117]

But we should not assume that smart mobs will be on the side of justice. "The cutting edge in the early rise of a new form may be found equally among malcontents, ne'er-do-wells, and clever opportunists eager to take advantage of new ways to maneuver, exploit and dominate."[118] We can include terrorist organizations and transnational criminal networks as well as corporate cartels and power elites in our list of potential sources of network cascades. Nonetheless, it is also worth clarifying that not all netwars are terrorism, and not all terrorists are 'netwarriors.'[119]

Expecting the Unexpected

"Networks constitute the new social morphology of our societies, and the diffusion of networking logic substantially modifies the operation and outcomes in processes of production, experience, power, and culture."[120] Furthermore, now that those

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[112] Ibid., pp. 169-70.
[113] Howard Rheingold, *Smart Mobs and Antiwar Protests* (2003 [cited February 22 2003]); available from http://www.smartmobs.com/archives/000706.html.
[114] Rheingold, *Smart Mobs: The Next Social Revolution*, p. 158.
[115] Rheingold, *Smart Mobs and Antiwar Protests* ([cited).
[116] Howard Rheingold, *Korean Electoral Smart Mob Story Corroborated* (2003 [cited January 03 2003]); available from http://www.smartmobs.com/archives/000494.html.
[117] Howard Rheingold, *Electoral Smart Mobs in Kenya?* (2003 [cited January 02 2003]); available from http://www.smartmobs.com/archives/000490.html.
[118] Arquilla, Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense., *Networks and Netwars : The Future of Terror, Crime, and Militancy*, pp. 310-13.
[119] For a recent analysis of terrorism and its netwar potential see Ian O. Lesser et al., *Countering the New Terrorism* (Santa Monica, CA: Rand, 1999).
[120] Manuel Castells, *The Rise of the Network Society*, 2nd ed. (Oxford ; Malden, Mass.: Blackwell Publishers, 2000), p. 501.

networks are global, "cultural expressions are abstracted from history and geography, and become predominantly mediated by electronic communication networks that interact with the audience and by the audience in a diversity of codes and values."[121] Rosenau believes that "actors in the state-centric and multi-centric worlds… will become increasingly responsive to world-wide norms…."[122] Finnemore and Sikkink, too, note the role networks play in norm diffusion.[123] Paul Wapner suggests that we are witnessing the emergence of "world civic politics."[124] In addition, John Meyer, et al, call upon the forces of a "stateless world society" to explain global actors' behavior.[125] Significantly, world civil society exhibits the "*networking, decentered form of organization and intervention, characteristic of the new social movements*…."[126] Fritjof Capra adds, "It is created by a social network involving multiple feedback loops through which values, beliefs, and rules of conduct are continually communicated, modified, and sustained. It emerges from a network of communications among individuals; and as it emerges, it produces constraints on their actions."[127] Sociologist, Hans Geser contends that "boundaries are likely to become much more fluid, modifiable and unpredictable than in the past.…"[128] Keck and Sikkink suggest three primary categories of "transnational advocacy networks" organized around human rights, the environment, and women's issues.[129] Castells reminds us, "their impact on society rarely stems from a concerted strategy, masterminded by a center."[130]

Extending the notion, Paul Wapner emphasizes that "activist organizations are not simply transnational pressure groups, but rather are political actors in their own right."[131] Again, they embody a "complex network of economic, social, and cultural practices based on friendship, family, the market, and voluntary affiliation."[132] "International civil society can be understood as networks of knowledge and interaction created by decentralized non-state actors across juridical borders."[133] Wapner defines the resulting "civic power" as "the forging of voluntary and customary practices into mechanisms that govern public affairs,"[134] what Ougaard and Higgott term a burgeoning "world polity."[135]

As an example, we can look at the decline of purely domestic political parties because they are tied to national state-structure. Because the rise of global civil society operates through new global social norms, politics comes to rely on ideas that are

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[121] Ibid., p. 507.
[122] Rosenau, *Turbulence in World Politics : A Theory of Change and Continuity*, p. 449.
[123] Finnemore and Sikkink, "International Norm Dynamics and Political Change."
[124] Wapner, "Politics Beyond the State: Environmental Activism and World Civic Politics."
[125] John W. Meyer et al., "World Society and the Nation-State," *American Journal of Sociology* 103, no. 1 (1997).
[126] Manuel Castells, *The Power of Identity*, 2nd ed. (Malden, Mass. Blackwell,: 2003), p. 362.
[127] Capra, *The Hidden Connections : Integrating the Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability*, p. 87.
[128] Geser, *Towards a Sociological Theory of the Mobile Phone* ([cited).
[129] Keck and Sikkink, *Activists Beyond Borders : Advocacy Networks in International Politics*.
[130] Castells, *The Power of Identity*, p. 362.
[131] Wapner, "Politics Beyond the State: Environmental Activism and World Civic Politics," 312.
[132] Ibid.: 313.
[133] Bruce Cronin, *Institutions for the Common Good : International Protection Regimes in International Society*, *Cambridge Studies in International Relations ; 93* (Cambridge, UK ; New York, USA: Cambridge University Press, 2003), 26.
[134] Wapner, "Politics Beyond the State: Environmental Activism and World Civic Politics," 337.
[135] Morten Ougaard and Richard A. Higgott, *Towards a Global Polity* (New York: Routledge, 2002).

globally and locally instantiated.[136] For example, the Green Party exists and acts at the global level but also at the local level. This is distinctly different than the mere international coordination of many national Green Parties. In addition, Green Party affiliates do more than just engage politically; they also boycott products, protest, and recruit others.

NETWORK CULTURE

Avoiding the Unavoidable

Per Bak's work with self-organized criticality, has enabled him to conclude that "fluctuations and catastrophes are unavoidable."[137] Insofar as these cascades are redistributions of "stress" in a complex adaptive system, they are a systemic necessity. In addition, his models have shown that *interfering with the system to eliminate a cascade merely causes a different cascade*.[138] For better or worse, once complexity sets in, it only compounds. As network culture scholar Mark Taylor asserts, "self-organizing systems can be understood as following a teleonomic trajectory tending toward increasing complexity… Since development is punctuated [by cascades] rather than continuous, the growth of complexity is episodic as well as unpredictable."[139] Attempting to avoid the unavoidable wastes time and resources and in the end avails us nothing. The main problem in trying to predict and avoid cascades is that, as Watts declares, "no one will know which one is which until all the action is over."[140]

Nonetheless, there are ways to *respond and adapt* to cascades, even if we cannot predict them. As we have noted, systems that achieve this kind of robust resilience are called complex adaptive systems, and include natural systems – brains, immune systems, ecologies, societies, weather – as well as many artificial systems – neural networks, power grids, evolutionary programs. Because the emergence of a global information society leaves us with "a Byzantine mishmash of overlapping networks, organizations, systems, and governance structures, mixing private and public, economics, politics, and society,"[141] our governance systems must learn to embrace chaos, and become a complex adaptive system, which means focusing on *responsive adaptation* over *predictive avoidance.* Next we turn to an examination of some examples of just such kinds of complex networks that demonstrate the recent change in world politics.

Network Governance Cases

Next, we shall review a few cases where the ability to use networks was crucial in helping groups to meet their goals. In the case of the Zapatista social netwar, a

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[136] Castells, *The Power of Identity*, pp. 360-61.
[137] Bak, *How Nature Works : The Science of Self-Organized Criticality*, p. 258.
[138] Ibid., p. 191.
[139] Taylor, *The Moment of Complexity : Emerging Network Culture*, p. 193.
[140] Watts, *Six Degrees: The Science of a Connected Age*, p. 244.
[141] Ibid., p. 291.

revolutionary group used transnational networks to both legitimate their cause as well as to garner physical support. In the second case, activists protesting at the WTO meeting in Seattle were able to swarm and avoid containment and marginalization by the opposing hierarchies. In the third case, the Toyota network of companies was able to quickly recover from a supply chain disaster by effectively "routing around" the damaged sections of the network.

In a longer treatment of the hypothesis, I would also include exceptional cases where 1) networks were not able to succeed against hierarchies, and 2) cases where success was generated not from leveraging the power of networks but from some other form of power such as financial or military strength. Suffice it to say that such cases certainly exist, but those cases are increasingly rare phenomena. For this reason, in this paper I focus merely on showing examples of network successes. Also, I have not restricted myself to merely political examples of network activity. The reason I have not done so revolves around the causal arrow of the network phenomenon itself: the reason networks will revolutionize politics is not because they are occurring *within* politics, but because they are 1) part of a general shift in human organization that 2) takes places both *within and without* the political sphere. Because networks allow for problem-solving and collective action outside of politics, the political sphere becomes one actor among many. To present merely examples of networks in politics reinforces and reifies the notion that the political sphere is the arena of consequence.

The Zapatista Social Netwar

The Zapatista National Liberation Army (EZLN) in Chiapas, Mexico is in fact not a traditional army at all. Rather it is a multilayered network conisisting of a "tribal" layer, the *indigenas*, a layer of educated leaders, and a layer of local and transnational NGOs all of which network and collaborate to achieve their shared goals.[142] Although the EZLN began as a local insurgency, soon "a broad array of peace, ecumenical, trade, and other issue-oriented NGOs joined the mobilization."[143] In fact, in a short amount of time, "the Zapatista movement gained an unprecedented transnational presence on the Net, and that presence endures and grows to this day."[144] It is this presence in the global media and online that put the EZLN in the forefront of the news and allowed it to win its struggle for legitimacy.

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[142] John Arquilla and David F. Ronfeldt, "Emergence and Influence of the Zapatista Social Netwar," in *Networks and Netwars : The Future of Terror, Crime, and Militancy*, ed. John Arquilla, David F. Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense. (Santa Monica, CA: Rand, 2001), 174.

[143] Ibid., 180.

[144] The best general guide is Harry Cleaver's web site, *Zapatistas in Cyberspace: A Guide to Analysis and Resources, http://*www.eco.utexas.edu/faculty/Cleaver/zapsincyber.html.

> "The NGOs formed into vast, highly networked, transnational coalitions to wage an information-age *netwar* to constrain the Mexican government and support the EZLN's cause."[145]

In Chiapas:

> "Activism was made possible by networking capabilities that had emerged only recently as a result of the information revolution. In this conflict, global civil society proved itself for the first time as a key new actor in relations between states and vis-à-vis other nonstate actors."[146]

Ronfeldt explains the following about the EZLN network:

> "The collectivity has no central leadership or command structure; it is multi-headed, impossible to decapitate. Their behavior may look uncontrolled, even anarchic at times. But in fact it is shaped by extensive consultation and coordination, made feasible by rapid communications among the parties to the swarm."[147]

He explains that the EZLN network "had no formal organization, or headquarters, or leadership, or decisionmaking body" and was instead "a sprawling, swirling, amorphous collectivity…."[148] Nonetheless:

> "There was impressive solidarity and harmony when a swarm took shape around a hot issue, such as demanding a halt to military operations or pressing for the release of an imprisoned Zapatista. At the same time, there was never complete solidarity and harmony among all members of the Zapatista networks at all times."[149]

The ability of the EZLN to win its war around the world *before* wining it at home is a fascinating testament to the power of the new networks.

> "In short, the NGOs' activism altered the dynamics of the confrontation in Chiapas and helped convert a military confrontation into a political one. It assured that what might once have remained a provincial event became a national and international event."[150]

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[145] David Ronfeldt and Armando Martinez, "A Comment on the Zapatista "Netwar"," in *In Athena's Camp : Preparing for Conflict in the Information Age*, ed. John Arquilla, et al. (Santa Monica, Calif.: Rand, 1997), 371.
[146] Arquilla and Ronfeldt, "Emergence and Influence of the Zapatista Social Netwar," 189.
[147] Ronfeldt and Martinez, "A Comment on the Zapatista "Netwar"," 387.
[148] Arquilla and Ronfeldt, "Emergence and Influence of the Zapatista Social Netwar," 187-88.
[149] Ibid., 186.
[150] Ronfeldt and Martinez, "A Comment on the Zapatista "Netwar"," 381.

The fact that the EZLN was able to bring the Mexican government to a standstill and achieve its goals is no small feat. Ronfeldt further articulates the lessons in the Zapatista social netwar case.

> "The Mexican case instructs that militant NGO-based activism is the cutting edge of social netwar, especially where it assumes transnational dimensions. A transnational network structure is taking shape, in which both issue-oriented and infrastructure-building NGOs are important for the development of social netwar."[151]

> "The case of Chiapas instructs that netwar depends on the emergence of 'swarm networks.'"[152]

> "The Mexican case shows that social netwar is an organizational and technological phenomenon; it depends on the growing presence both of activist NGOs and of all manner of information and communications technologies."[153]

The EZLN is an example of a prolonged "smart mob" (or series of them). It utilizes networking and information warfare to achieve its goals by swarming (or cohering rapidly) around issue areas to maximize attention and activism, and then disbanding, leaving nothing for the opponent to counter. Although the EZLN was the first and most often cited case for some time, eventually a second case occurred that took the media spotlight and demonstrated an even more powerful example of swarming networks versus hierarchical authority.

Seattle: WTO Protests

In 1999, a loose network of organizations called the Direct Action Network (DAN) swarmed upon Seattle to protest at the meeting of the World Trade Organization (WTO). Steve Johnson notes:

> "The Seattle protests of 1999 were characterized by an extraordinary form of distributed organization: smaller affinity groups representing specific causes -- anti-Nike critics, anarchists, radical environmentalist, labor unions – would operate independently for much of the time…"[154]

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[151] David F. Ronfeldt and Arroyo Center., *The Zapatista "Social Netwar" in Mexico* (Santa Monica, CA: Rand, 1998), 118.
[152] Arquilla and Ronfeldt, "Emergence and Influence of the Zapatista Social Netwar," 193.
[153] Ronfeldt and Arroyo Center., *The Zapatista "Social Netwar" in Mexico*, 116.
[154] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 225.

In "Netwar in the Emerald City: WTO Protest and Tactics" Paul de Armond has performed an extensive analysis of the DAN and its methods.[155] Despite the breakdown and chaos of the protests de Armond points out that:

> "As is often the case in netwar conflicts, victory goes to the side that decontrols most effectively. As each of the strategies collapsed into confusion and disarray, the DAN strategy proved to be the one that survived the chaos."[156]

Three waves of protesters massed and converged, "swarming the protest target from all directions."[157] The network of protesters explicitly and deliberately used specific netwar and swarming tactics.

> "The decentralized command and control structure allows rapid shifts of strategic targeting, resistance to "decapitation" (attacks which target leadership), and the disruption of communication channels. All three of these features were present during the WTO protests. The diffuse communications network allowed all participants to continuously adapt to changing conditions. The consultative form of decision-making enhanced the ability to coordinate large-scale actions. Thus attempts to arrest "ringleaders" on Wednesday were fruitless, since leadership was widely shared throughout the network of protest groups. The communications network was continuously being expanded and modified."

Interestingly, not all protesters were equal. Journalist John Sullivan recounts how the Seattle protest was used – or abused – by a group of anarchists called the N30 Black Bloc.

> "The Black Bloc refers more to a tactic employed by loosely organized, fluid, and dynamic groups that come together in shortterm affinity groupings, than to any defined, regular group. This loosely organized coalition, embracing network organization and tactics, frustrated police efforts to gain the situational awareness needed to combat the seemingly chaotic Seattle disturbances."[158]

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[155] Paul de Armond, "Netwar in the Emerald City : Wto Protest Strategy and Tactics," in *Networks and Netwars : The Future of Terror, Crime, and Militancy*, ed. John Arquilla, David F. Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense. (Santa Monica, CA: Rand, 2001).
[156] Ibid., 209.
[157] Ibid., 210.
[158] John P. Sullivan, "Gangs, Hooligans, and Anarchists -- the Vanguard of Netwar in the Streets," in *Networks and Netwars : The Future of Terror, Crime, and Militancy*, ed. John Arquilla, David F. Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense. (Santa Monica, CA: Rand, 2001), 121.

Therefore, "what we see again and again with the new wave are images of disparate groups: satirical puppets, black-clad anarchists, sit-ins and performance art – but no leaders."[159] What we see is the swarm. And the swarm is surprising us: by winning.

> "The violent street demonstrations in Seattle manifested all the conflict formations discussed earlier – the melee, massing, maneuver, and swarming. Moreover, the demonstrations showed that information-age networks (the NGOs) can prevail against hierarchies (the WTO and the Seattle police), at least for a while."[160]

> "By approximately 3 p.m. Tuesday, the battle was decided and the Direct Action Network prevailed in its goal of shutting down the [WTO] conference."[161]

> "The WTO protests in Seattle were… the most successful American political demonstrations of the decade, if success is measured by the degree of congruence between the protesters' goals and the effect on public policy issues."[162]

Toyota/Aisin

Let us now turn to a different kind of network success story, one in the economic world. The company Aisin, one of the two hundred companies in the group responsible for manufacturing Toyota cars, manufactured a crucial part that no one else in the group did. When the Aisin plant burned to the ground in February 1997, the other firms in the network enacted "an astonishing coordinated response by over two hundred firms… with very little direct oversight."[163] Because "companies in the [Toyota] group, even those companies that compete with each other for Toyota's business, cooperate to an extent that almost seems counter to their interests"[164], the Toyota network "could make use of lines of communication, information resources, and social ties that were already established."[165] As a result, although an individual agent in the network suffered a catastrophic failure, *the network as a whole was able to rapidly adapt and overcome*. In fact, "the Aisin case is different in that the system subsequently recovered almost as rapidly as it had succumbed, and with little centralized control."[166] The Aisin incident "demonstrates the benefits of clustered firm networks of the kind that Toyota and its partners have constructed… [and] reveals the capacity of these networks not only for self-organized, flexible responses to a crisis but also for routine problem solving that

[159] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 225.
[160] Arquilla et al., *Swarming & the Future of Conflict*, 51.
[161] de Armond, "Netwar in the Emerald City : Wto Protest Strategy and Tactics," 203.
[162] Ibid., 231-32.
[163] Watts, *Six Degrees: The Science of a Connected Age*, p. 257.
[164] Ibid., p. 255.
[165] Ibid., p. 258.
[166] Ibid., pp. 259-60.

leads to incremental improvements in firm and group performance."[167] *Adaptive response networks succeed*; therefore, building and maintaining these networks should be the first priority for governance: this includes networks of allies, trade partners, businesses, banks, humanitarian groups, and disaster relief organizations.

Fortunately, there exists the possibility of optimal network connectivity, i.e. a balance between control and autonomy, a panarchy. A lower threshold exists where a network has too *little* connectivity, as well as an upper threshold where the network exhibits too *much* connectivity. Axelrod and Cohen suggest that organizations can learn to **explore** and **exploit** the governance landscape between these two thresholds[168], and Watts calls this model "multiscale connectivity" [panarchy]. Theorists are encouraged to think about governance systems "as *networks of information processors*, where the role of the network [is] to handle large volumes of information efficiently and without overloading any *individual* processors."[169] When communicative groups are required to pass information upward through hierarchies before that information can reach other groups in distant sections of the hierarchy, the result is *information congestion* in the core (top) of the hierarchy, and *information delay* at the periphery (bottom).[170] The solution is to reroute communication from nodes to other nodes on all levels of the hierarchy. For example, when an agent realizes that it is spending too much time acting merely as an information conduit between two other agents, it can form a direct link between them laterally and drop out of the communication loop. In this way, "the burden of any particular node can be relieved by the greatest possible amount by connecting the two neighbors for whom it relays the most messages."[171] Also, "because the strategy always selects the most congested node to relieve, and because the nodes that it connects were handling those messages anyway, the effect is always to reduce overall congestion without increasing any individual's burden."[172] This kind of deflection effectively redistributes traffic and avoids congestion by rewiring a very structured hierarchy into a small-world network and creating multiscale connectivity.

In such a panarchy there are no longer any 'critical' nodes whose loss would disable the network…. Essentially one can remove chunks of almost any size from a panarchy, and it will remain connected, and thereby continue to function. A panarchy 1) realizes network efficiencies from distributed parallel processing, and 2) minimizes the effect of failures when they *do* occur by simply routing around any obstacles. Systems of this type are referred to as "ultra-robust."[173]

The point of all this is that hierarchical structures may no longer be the best choice for effective governance, particularly when a network is able to achieve an optimal level of connectivity which is ushered in by technological advances in communications. At the very least, it is no longer the *only* choice. The nation-state may

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[167] Toshihiro Nishiguchi and Alexandre Beaudet, "The Toyota Group and the Aisin Fire," *Sloan Management Review* 40, no. 1 (Fall 1998): 56.
[168] Axelrod and Cohen, *Harnessing Complexity : Organizational Implications of a Scientific Frontier*, pp. 43-50.
[169] Watts, *Six Degrees: The Science of a Connected Age*, p. 273.
[170] Ibid., pp. 278-84.
[171] Ibid., p. 279.
[172] Ibid.
[173] Ibid., p. 284-86.

have been an effective solution to the challenges of governance in previous eras, but it is made obsolete by the current opportunities for self-organized governance networks.

PANARCHY

Governance by Cooperative Networks

So, where is all of this leading us? How does all of this result in panarchy? Admittedly, the rise of global network governance is a process that is to some extent shaped by states, but it is not controlled by them, and it is also shaped by corporations, individuals, non-governmental organizations, and other groups. It is as yet unclear if any one of those entities trumps the others, although realists would claim the state holds the trump card, and Marxists would claim that it is capital that is in the driver's seat. History has shown that ultimately it is the people who are in charge, and the new connective technologies have only increased their power and ability to organize collective action. James Rosenau likens the resulting panarchy to "mobius-web governance," noting that "interactions that are elaborate and diverse enough to constitute a hybrid structure in which the dynamics of governance are so overlapping among the several levels as to form a singular, web-like process that, like a mobius, that neither begins nor culminates at any level or at any point in time."[174] He concludes that "Given the ever greater complexity of our… epoch, mobius-web governance may well… become the dominant form of governance in the future."[175]

David Ronfeldt observes:

> "The construction of transnational and global networks (e.g., among corporations, governments, non-governmental organizations, international and multilateral organizations, elite coalitions) may have an equally profound effect on the nature of the new order…. cutting across public and private sectors and national borders and interests… [and will] increasingly take precedence over nation-states as the driving factor in domestic and foreign affairs."[176]

Moreover, he suggests "in day-to-day diplomacy, that networked nonstate actors, particularly those associated with a nascent global civil society, may raise political and social challenges and opportunities that differ radically from those we have traditionally confronted, or desired."[177] As these global networks utilize increasingly advanced

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[174] James N. Rosenau, "Governance in a New Global Order," in *Governing Globalization : Power, Authority, and Global Governance*, ed. David Held and Anthony G. McGrew (Cambridge ; Malden, MA: Polity, 2002), 81.
[175] Ibid., 83.
[176] David F. Ronfeldt and Rand Corporation., *Cyberocracy, Cyberspace, and Cyberology : Political Effects of the Information Revolution* (Santa Monica, CA (1700 Main St., P.O. Box 2138, Santa Monica 90407-2138): RAND, 1991), 77-78.
[177] Arquilla et al., *Swarming & the Future of Conflict*, 3.

technologies to mobilize and swarm, some kind of response will become vital. "Power is migrating to actors who are skilled at developing networks, and at operating in a world of networks."[178]

> In this view, power and influence depend less on one's personal attributes (e.g., resources, attitudes, behaviors) than on one's interpersonal relations—the location and character of one's ties in and to the network. The "unit of analysis" is not so much the individual as it is the network in which the individual is embedded. Not unlike complexity theorists, social network analysts view a network as a systemic whole that is greater than and different from its parts. An essential aim is to show how the properties of the parts are defined by their networked interactions, and how a network itself functions to create opportunities or constraints for the individuals in it.[179]

Social theorist Manuell Castells contends that "networks constitute the new social morphology of our societies, and the diffusion of networking logic substantially modifies the operation and outcomes in processes of production, experience, power, and culture."[180] He also notes that success in the next era will fall to the "*networking, decentered form of organization and intervention, characteristic of the new social movements*…."[181] These movements, taken as one, are so potentially threatening to the old order that Harvard fellow James Moore refers to them as "the second superpower." "There is an emerging second superpower, but it is not a nation. Instead, it is a new form of international player, constituted by the 'will of the people' in a global social movement."[182]

Lipschutz, too, claims "governance replaces government; informal networks of coordination replace formal structures of command…. There is reason to think that a governance system composed of collective actors at multiple levels, with overlapping authority, linked thorough various kind of networks, might be as functionally-efficient as a highly-centralized one."[183] Governance occurs through both "*function* and *social meanings*, anchored to particular places but linked globally through networks of knowledge-based relations. Coordination will occur not only because each unit fulfills a functional role where it is located but also because the stakeholders in functional units share goals with their counterparts in other functional units."[184] As a result, actors "will have to become participants or stakeholders in a complex network of resource regimes

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[178] Arquilla et al., *The Advent of Netwar*, 43.
[179] John Arquilla and David F. Ronfeldt, "What Next for Networks and Netwar?," in *Networks and Netwars : The Future of Terror, Crime, and Militancy*, ed. John Arquilla, David F. Ronfeldt, and United States. Dept. of Defense. Office of the Secretary of Defense. (Santa Monica, CA: Rand, 2001), 317.
[180] Castells, *The Rise of the Network Society*, p. 501.
[181] Castells, *The Power of Identity*, p. 362.
[182] James F. Moore, *The Second Superpower Rears Its Beautiful Head* (Berkman Center for Internet & Society, Harvard University, 2003 [cited April 2005); available from http://cyber.law.harvard.edu/people/jmoore/secondsuperpower.html.
[183] Lipschutz and Mayer, *Global Civil Society and Global Environmental Governance : The Politics of Nature from Place to Planet*, 252.
[184] Ibid., 254-55.

and institutions, helping to coordinate among them, and foster the creation of large numbers of 'mediating organizations' whose purpose is to act as a buffer and filter between local contests and these bureaucracies."[185]

Ronfeldt and Arquilla's conclusions are instructive: [186]

1. "*The information revolution favors and strengthens networks, while it erodes hierarchies*."
2. "*Hierarchies have a difficult time fighting networks*."
3. "*It takes networks to fight networks.*"

Ronfeldt and Arquilla have consistently urged policy-makers that we must *use networks to counter networks*. The cause of their point stems from the nature of netwar itself. Ronfeldt sums up the purpose of a swarm attack as an autonomous convergent assault on a target designed to disrupt the cohesion of the adversary.[187] Therefore, the target that is *already dispersed* becomes in effect, *no target at all*. As the Seattle WTO protesters discovered, "there can be power and intelligence in a swarm, and if you're trying to do battle against a distributed network like global capitalism, you're better off becoming a distributed network yourself."[188]

> "What operational behavior may in fact be most effective for small, dispersed, mobile forces that are joined in networks? The short answer is swarming…. If the optimal organizational form for netwar is the dispersed network, the corresponding doctrine must surely consist of swarming. Swarming may well become the key mode of conflict in the information age."[189]

In addition, Steve Johnson asserts that:

> "the needs of most progressive movements are uniquely suited to adaptive, self-organizing systems: both have a keen ear for collective wisdom; both are naturally hostile to excessive concentrations of power; and both are friendly to change. For any movement that aims to be truly global in scope, making it almost impossible to rely on centralized power, adaptive self-organization may well be the only road available."[190]

Swarm Diplomacy

> "Although, as noted above, swarming is a natural outcome of information-age, network-centric conflict, it should be a deliberately developed dimension of doctrine and strategy, not just a happenstance."[191]

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[185] Ibid., 46.
[186] Arquilla et al., *The Advent of Netwar*, 81-82.
[187] Arquilla et al., *Swarming & the Future of Conflict*, 21.
[188] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 225-26.
[189] Arquilla and Ronfeldt, "What Next for Networks and Netwar?," 335.
[190] Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 224.
[191] Arquilla and Ronfeldt, "Emergence and Influence of the Zapatista Social Netwar," 194.

Diplomatic analyst Jamie Metzl suggests that:

> "the struggle to affect important developments across the globe is increasingly an information struggle. Without winning the struggle to define the interpretation of state actions, the physical acts themselves become less effective. . . . [T]he culture of foreign policy must change from one that along with protecting secrets and conducting secret negotiations recognizes that openness—achieved through the development of broad information networks and multiple temporary mini-alliances with both state and nonstate actors—will be the key to foreign policy success."[192]

Interestingly, "this may give presumably weaker actors, like NGOs intent on social netwar, a soft-power edge in dealing with presumably stronger actors, like states.[193] The trend towards "soft power" in international relations is increasingly pre-eminent in recent literature.[194] Moreover, it has been suggested by neo-Marxists that a global network of capitalists, whether individuals or corporations, constitute a new "transnational capitalist class" that is using soft-power and networking to achieve its goals.[195] In addition, Peter Haas' work on the soft-power influence of transnational "epistemic communities" is relevant.[196]

There are steps that we can take to create and maintain networks. One suggestion is that "government expand its contacts w/ civil society, NGOs, and other actors, and establish new forums to engage new voices, even potentially those not already considered."[197] In addition, like the Zapatistas, as we reach out to other networks, we also need to adapt our internal hierarchies into networks.[198] Both types of networks, social and technological (such as peer-to-peer systems), feed back into each other to enhance connections and increase effectiveness.[199]

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[192] Jamie F. Metzl, "Popular Diplomacy," *Daedalus* 128, no. 2 (1999): 178.
[193] Arquilla and Ronfeldt, "What Next for Networks and Netwar?," 332.
[194] See for example, Leigh Armistead, Joint Forces Staff College (U.S.), and United States. National Security Agency/Central Security Service., *Information Operations : Warfare and the Hard Reality of Soft Power*, 1st ed., *Issues in Twenty-First Century Warfare* (Dulles, Va.: Brassey's, 2004), Joseph S. Nye, *Soft Power : The Means to Success in World Politics*, 1st ed. (New York: Public Affairs, 2004).
[195] See for example William I. Robinson and Jerry Harris, "Towards a Global Ruling Class? Globalization and the Transnational Capitalist Class.," in *Science & Society* (Guilford Publications Inc., 2000), Saskia Sassen, *Cities in a World Economy*, 2nd ed., *Sociology for a New Century* (Thousand Oaks, Calif.: Pine Forge Press, 2000), Saskia Sassen, *The Global City : New York, London, Tokyo*, 2nd ed. (Princeton, N.J.: Princeton University Press, 2001), Leslie Sklair, *Sociology of the Global System*, 2nd ed. (Baltimore: Johns Hopkins University Press, 1995).
[196] Peter M. Haas, "Epistemic Communities and International Policy Coordination," *International Organization* 46, no. 1, Knowledge, Power, and International Policy Coordination (1992).
[197] David F. Ronfeldt, *North America in the Era of Citizen Networks: State, Society, and Security* (Santa Monica: RAND, 1996).
[198] There are a number of extant examples of how governance is already moving in this direction. The U.S. military has already experimented successfully with networked units in its Landwarrior force. See Jim Lai, "The Future of Infantry," *Mindjack*, January 28 2002.
[199] "Bob Anderson of RAND observes that peer-to-peer computing can enable its users to prevent censorship of documents, provide anonymity for users, remove any single point of failure

However, not all networks are alike. Thus, Metzl suggests that "if governments must behave more like networks but cannot fully participate in them at every level, they need to determine what aspects of government foreign policy activity can be better networked."[200] Understandably, this is a source of anxiety for hierarchists and bureaucrats. In fact, "the primary impediment to this type of engagement is the culture of insularity and secrecy that pervades U.S. foreign policy institutions."[201] In his book The Transparent Society, David Brin explores the role of increased transparency in overcoming these obstacles.[202] Nonetheless, on the whole, the threat of changing models of organization and diplomacy is overrated, relying, as it does, on obsolete models of command and control.[203]

> "Understanding control as the ability to influence values and standards in a decentralized system, not as the need to maintain absolute authority over every component of the policy process, will pose a fundamental challenge to governments. The networked global environment of the information revolution, however, not only distributes control, but also punishes those who attempt to hoard information and rewards those who share it. In the Information Age, you have to give up control in order to get it back, but it returns in a different form. Old control was about hierarchy, monopoly, and aggregation. New control is about flexibility, decentralization, and networked specialization."[204]

Again Metzl urges that "enhanced transnational civil society and issue networks may challenge government authority in some cases, but more often they can serve as invaluable tools for sharing information, developing mutual understanding, and solving problems."[205]

Diplomacy, then, takes on a new role, what Arquilla and Ronfeldt have termed "noopolitik," or the politics of ideas, with possibly unintended consequences:

> "Finally, states could actively embrace and nurture favorable nonstate actors and their networks, encouraging their growth, enhancing their potency, and working with them in a coordinated manner. This may prove a boon to statecraft, when the goals of both coincide. But the risk of such a strategy is that states might unwittingly assist in the creation of a new,

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or control, efficiently store and distribute documents, and provide plausible deniability for node operators." Arquilla and Ronfeldt, "What Next for Networks and Netwar?," 339.

[200] Jamie F. Metzl, "Network Diplomacy," *Georgetown Journal of International Affairs* Winter/Spring (2001).

[201] Ibid.

[202] David Brin, *The Transparent Society : Will Technology Force Us to Choose between Privacy and Freedom?* (Reading, Mass.: Addison-Wesley, 1998).

[203] MIT's Thomas Malone suggests that the hierarchical mode of "command and control" is being replaced by the network mode of "coordinate and cultivate." Thomas W. Malone, *The Future of Work : How the New Order of Business Will Shape Your Organization, Your Management Style, and Your Life* (Boston, Mass.: Harvard Business School Press, 2004).

[204] Metzl, "Network Diplomacy."

[205] Ibid.

> networked fabric of global society that may, in the end, be strong enough to constrain states when there are conflicts of interest.
>
> What will occur is a transformation, where some states will emerge stronger than ever because of a capacity to work conjointly with NGOs and other civil nonstate actors. As this process unfolds, there will be a rebalancing of relations among state, market, and civil-society actors around the world—in ways that favor "noopolitik" over realpolitik."[206]

As Arquilla and Ronfeldt point out, "Sweden, a good friend to nonstate actors, has not been in a shooting war for 200 years."[207] Thus, like individuals, who must often face a dilemma between changing their behavior versus achieving their goals, so too, nation-states are faced with a similar crisis. Their choice is to change in order to stay effective, or to preserve our hierarchies and become increasingly marginalized in the age of networks.

> "*Power, as the capacity to impose behavior, lies in the networks of information exchange and symbol manipulation, which relate social actors, institutions, and cultural movements....*"[208]

CONCLUSION

In this paper, I have shown that the convergence of processes crosses a critical threshold to create new possibilities for governance. The result is a new system. The key distinction between the *old* system and the *new* lies in the fact that governance in the old system was achieved *through* states, whereas in the new system it is not only achieved *outside of* hierarchies through horizontal networks, but is in fact often achieved *in spite of* hierarchies. Wapner states that we are able to observe this condition whenever agents "work to change conditions without directly pressuring states."[209] What is significant is not that the EZLN sought to oppose the state, but rather that they sought to delegitimate it *outside of the state system*. Similarly, the Seattle protesters sought to delegitimate the forces of globalization.

We have opened the door on the notion 1) that the state could participate in the new networks as a legitimate actor, or 2) that the state could decentralize to the point of being a network itself. Certainly states participate in networks already, but for many global networks the impetus to their formation is the failure of the state to adequately address their interests. The result is a general antipathy toward the state, a resistance to its inclusion, and an oppositional attitude. On the second point, the primary characteristic of statehood is an embrace of hierarchy (at least one), i.e. that the state is the supreme legitimate representative of the collective will and that all others must be ultimately subject to it. This fundamentally at odds with the "plurilateralist" nature of networks.

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[206] Arquilla and Ronfeldt, "What Next for Networks and Netwar?," 351-52.
[207] Ibid., 353.
[208] Castells, *End of Millennium*, p. 379.
[209] Wapner, "Politics Beyond the State: Environmental Activism and World Civic Politics," 312.

Therefore, in both instances, it may be that for the state to continue to participate effectively it would have to overcome its own nature, or state-ness, and in so doing would no longer *be* a state in any real sense.

Hopefully this paper's contribution to international relations is twofold:

1) to place state action within a broader context of global social governance, and
2) to highlight the change of agents and processes presently occurring with an eye towards how these changes are resulting not merely of a change *within* the system but a change *of* the system.

These two contextualizations should provide opportunities for richer theorizing and better understanding of global governance in the age of networks.

There is some value in possible tests of my contention above that these changes are not merely change *within* the system but change *of* the system. The key test concerns *how* transnational networks pursue goals. If transnational networks pursue their goals *through* states, i.e. by pressuring states, then current change is merely the addition of transnational "interest groups" acting on domestic institutions (even if they are addressing those institutions through international forums). This is not systemic change. However, if, as Wapner, myself, and others contend, transnational networks are more than simply state-focused pressure groups, then when they act *in parallel* with states – without regard to them, or in some cases in spite of them – then we have a stronger case for systemic change of the kind that results in the transformation of the territorial Westphalian system into a panarchy of simultaneously operating spheres of authority, many of which are not territorially defined.[210] Moreover, the shift to networks constitutes a "relationship revolution,"[211] and and as Patrick Jackson has urged, an understanding of networks encourages us to see "relations before states," particularly to analyze systemic change.[212]

Certainly, not all scholars of complexity and the social sciences would agree with my post-modern interpretation.[213] A shrinking world creates new conflicts by bringing parties with sharp differences into closer contact.[214] There is also the realist critique: power *does* play a role in networks.[215] Adherents of Morgenthau's "perennial forces"[216] will have plenty to study. Being an ontology, realism will continue to be able to assert

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[210] John Gerard Ruggie, "Territoriality and Beyond: Problematizing Modernity in International Relations," *International Organization* 47, no. 1 (1993).
[211] Michael Schrage, "The Relationship Revolution," in *Merrill Lynch Forum on Technology and Society*. (Merrill Lynch, 1998).
[212] Patrick Thaddeus Jackson and Daniel H. Nexon, "Relations before States: Substance, Process and the Study of World Politics," *European Journal of International Relations* 5, no. 3 (1999).
[213] D. S. Byrne, *Complexity Theory and the Social Sciences : An Introduction* (London ; New York: Routledge, 1998).
[214] Bull, *The Anarchical Society : A Study of Order in World Politics*, 263.
[215] In fact, one of the anti-egalitarian polarizing dynamics embedded in networks is a mathematical law known as a "power law." Albert-Laszlo Barabasi, *Linked : How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life* (New York: Plume, 2003).
[216] Hans Joachim Morgenthau and Kenneth W. Thompson, *Politics among Nations : The Struggle for Power and Peace*, Brief ed. (New York: McGraw-Hill, 1993).

that although the mechanisms are changing, nothing fundamental is happening.[217] Some scholars wisely caution that because "networks are just one of a number of governance and coordinative mechanisms," where power asymmetries provide coercive dominance, whether overt or covert, a "shadow of hierarchy" threatens network operations.[218] But even Carr acknowledges, "before considering the role of power in any new international order, we must first ask what will be the unit of power. The current form of international politics is due to the fact that the effective units are nation-states."[219] Were nation-states to lose their monopoly on global governance then "international relations would be supplanted by a new set of group relationships."[220] Understanding the replacement of an old set of relations with a new set of relations is crucial to being able to "get along" in the new arena. As a result, the systemic critique against hierarchy then "is based not on the idea that these things are 'bad' per se, but rather on the knowledge that they will ultimately lead to the degeneration of the system in question."[221] Kratochwil illustrates, "thus, the challenge of the 'second move' consists in building not only networks, but *political institutions* that can manage the present dislocations and channel them into avenues of peaceful change."[222] Jervis notes that the point of "acting in a system" is not to replace agency with determinism, but to acknowledge the system dynamics that act on agents.[223] This can enable *aware* agents to leverage systemic forces to reach their goals, or to contend against the current system to induce system-level change and a new set of dynamics. Thus some scholars' contention that states will become irrelevant is not a foregone conclusion. States, or territorialities, of some kind may remain powerful players, but it's a choice: adopt new means and stay relevant, or fail to adapt and get replaced by other means of governance.

The shift to networks is, in effect, a new more powerful way of mobilizing social capital for good or ill.[224] To date there has been little adequate effort to formulate a "research programme" around social movements and networks.[225] Nonetheless, there is a growing consensus "that scholars of international relations should pay more attention to network forms of organization – characterized by voluntary, reciprocal, and horizontal exchanges of information and services."[226] Unfortunately, some writers are quick to whitewash the moral and normative challenges of networks as a new form of social and

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[217] Robert Gilpin, *War and Change in World Politics* (Cambridge ; New York: Cambridge University Press, 1981).
[218] Thompson, *Between Hierarchies and Markets : The Logic and Limits of Network Forms of Organization*, 224.
[219] Edward Hallett Carr, *The Twenty Years' Crisis, 1919-1939; an Introduction to the Study of International Relations* (London,: Macmillan & co. ltd, 1946), 226.
[220] Ibid., 229.
[221] Paul Cilliers, *Complexity and Postmodernism : Understanding Complex Systems* (London ; New York: Routledge, 1998), 111.
[222] Friedrich Kratochwil, "Politics, Norms and Peaceful Change," *Review of International Studies*, no. 24 (1998).
[223] Jervis, *System Effects : Complexity in Political and Social Life*, 253-95.
[224] Marleen Huysman and Volker Wulf, *Social Capital and Information Technology* (Cambridge, Mass.: MIT Press, 2004).
[225] Mario Diani and Doug McAdam, *Social Movements and Networks : Relational Approaches to Collective Action* (Oxford ; New York: Oxford University Press, 2003), Keck and Sikkink, *Activists Beyond Borders : Advocacy Networks in International Politics*.
[226] Keck and Sikkink, *Activists Beyond Borders : Advocacy Networks in International Politics*, 200.

political organization, and the result is a "pollyanna" polemic about the revival of democracy or the "wisdom of crowds."[227] Thankfully, political theory has appropriately and intellectually inquired into hierarchies and networks from Plato to Rousseau.[228] There are undeniable moral complexities in the networking of a new global civil society. Howard Rheingold cautions that new network technologies could be used as easily to create a global panopticon as they could to amplify cooperation and collective action.[229] Treating "civil network society" as a new public sphere that enacts its own transnationality in the absence of a transnational government, or world state, has shown some promise in helping scholars to frame the appropriate questions.[230]

Carr reminds us that "there is a stage where realism is the necessary corrective to the exuberance of utopianism, just as in other periods utopianism must be invoked to counteract the barrenness of realism…. Sound political life will be found only where both have their place."[231] In a network age, as in previous eras, balancing systemic operations with normative concerns is the real perennial challenge. Even Thucydides acknowledged that "when one is constantly being faced by new problems, one has also to be capable of approaching them in an original way."[232] Global networks increasingly permeate our daily lives, interpenetrating across previously sacrosanct national boundaries. Localization makes close what once was far, and binds us together in a new emerging system. Ultimately, because nothing is "distant" any longer – all global events are potentially local events – we must internalize Duncan Watts' entreaty:

> "When it comes to epidemics of disease, financial crises, political revolutions, social movements, and dangerous ideas, we are all connected by short chains of influence. It doesn't matter if you know about them, and it doesn't matter if you care, they will have their effect anyway. To misunderstand this is to misunderstand the first great lesson of the connected age: we may all have our own burdens, but like it or not, we must bear each other's burdens as well."[233]

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[227] James Surowiecki, *The Wisdom of Crowds : Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations*, 1st ed. (New York: Doubleday :, 2004).
[228] Plato, *Republic*, trans. G. M. A. Grube and C. D. C. Reeve, 2nd ed. (Hackett Publishing Company, 1992), Jean-Jacques Rousseau, "On the Social Contract," in *Modern Political Thought : Readings from Machiavelli to Nietzsche*, ed. David Wootton (Indianapolis, Ind.: Hackett Pub., 1996).
[229] Rheingold, *Smart Mobs: The Next Social Revolution*, 183-215.
[230] Douglas Schuler and Peter Day, *Shaping the Network Society : The New Role of Civil Society in Cyberspace* (Cambridge, Mass.: MIT Press, 2004).
[231] Carr, *The Twenty Years' Crisis, 1919-1939; an Introduction to the Study of International Relations*, 10.
[232] Thucydides, Rex Warner, and M. I. Finley, *History of the Peloponnesian War*, Rev. ed. (Harmondsworth, Eng., Baltimore: Penguin Books, 1972), 77.
[233] Watts, *Six Degrees: The Science of a Connected Age*, p. 301.

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