

Measuring National Borders on
the World Wide Web

by

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Introduction

The Internet trumpets the demise of the nation-state, or so many would have us believe. They argue that the Internet exists outside of physical space, where national borders have no place. They say that as more and more of our social relationships move from the physical world to cyberspace, the nation plays a decreasingly important role in our affairs and in our identities. There are supporters of this process: those who claim that national government is a thing of the past and only those institutions fit to exist in an informatized world should survive. There are others who worry that the homogenization and de-spatialization that the Internet brings with it will do irreversible harm to local culture and world-wide diversity of thought and custom, all the while increasing the gap between rich and poor.

What is more difficult to find is a sensible critique of the idea that the Internet is by nature globalizing, and that it leads inevitably to the demise of the nation. That computer networking favors the global over the physically local, that it destroys borders rather than reinforcing them, seems to be a forgone conclusion. Given the importance of some of these arguments not only to the future of nations but to the future of the world system, it is vital that the connection between this new medium and the globalization of society rest on more than pure conjecture. The pages that follow are an attempt to show both what that connection is thought to be as demonstrated by the academic and popular literature, and to demonstrate the process by which we may gain some understanding of how the Internet actually relates to national and territorial borders.

To probe the relationship of this new medium to the global social changes now underway, I will rely on two perspectives. The first of these questions the relationship of space to the "space-adjusting technologies": transportation and communication. Does space retain any meaning when subjected to social and technological forces? Is the socially constructed idea of space changing, and if so, what is it becoming? What do the metaphors for computer networking tell us about popular conceptions of this created

space? How does the "infostructure" presented by the Internet and the World Wide Web relate to the physical infrastructure of copper and silicon that supports it? All of these questions relate to how we organize our view of the Internet spatially.

That organization brings to the fore a second perspective that has recently been gaining wider acceptance. Many have noted that the modern revolution in information technology has done more than extend the spatial reach of traditional institutions. The emergence of networked communications has supported an increase in networked structures in society. This is a fundamental shift in social organization. Just as bureaucracy was the social cornerstone of the industrial revolution, dynamic social networks have become the basis of many of the successful organizations of the informatization era. Hierarchical organization of information processing, epitomized by the mainframe computers that ruled the seventies and much of the eighties, have given way to distributed and dynamic network-based processing. The idea of networks is intimately tied to *the Net*, but the social transformations taking place are far more chthonic. The "PC Revolution" of the 1980s in many ways foreshadowed the emergence of organizations in which the technology was distributed rather than centralized—where the idea of keeping information localized actually led to increased networking. Likewise, identity has moved to being more individual and at the same time more heavily reliant on the relationships among individuals.

These two perspectives work well together. It is difficult for us to think of a network without imagining a space in which that network is inscribed. Likewise, "space" does not exist outside of an arrangement of objects or ideas. It is what comes between objects and is therefore key in describing relationships and arrangements. Throughout the course of this thesis, the ideas of space and of structure commingle, providing an interstitial foundation. But this foundation is only visible through the tensions it creates with earlier social regimes. We recognize that concepts of space have changed for large groups of people through anecdotal tales of trans-oceanic friendships and business relationships. We see the evidence of a more networked society in guides to becoming

a "free agent" in the business world and observations that we are "bowling alone." Just as a Bronze Age metallurgist must have judged his own progress against his isolated Neolithic neighbors, we only see the inklings of a new age within an élite "net set," which bears much in common with the "jet set" that came before it. It is in this difference that we might identify the diffusion of a new social structure. This difference also creates the stresses of a complex social system in the midst of a state change.

I have enlisted these two perspectives as an aid to uncovering latent structures and their inherent tensions within an important domain. The idea of a "nation" underlies much of our social theory—particularly during the course of the present century. Social organization, exemplified by the electronic communication networks that knit it together, has presented a challenge to traditional state institutions. These institutions rest their identity on particular spatial and structural relationships and are, by design, resistant to rapid adaptation. As the early swellings of a sea change have made themselves felt in these two areas, those who guide state institutions face the daunting task of recreating themselves for a new era. While they may recognize some of the potential difficulties entailed, by and large those institutions and individuals who have traditionally led nations now find themselves without the tools they need to measure and to affect society.

The discussion and observations that follow are intended to highlight the need for such tools, and provide a working example of how one such methodology is applied. A discussion of spatial and structural relationships is used as an introduction to the possibility of measuring the extent to which social structure has superseded the institutions of the modern state. The answer to this question comes to us through a body of communication research: communication networks provide both the means and an indicator of the vast social changes that are now taking place. The survey described in chapter three provides an example of such an analysis and the answers (and questions) it can provide.

Organization of the Thesis

As the above discussion indicates, this thesis attempts to describe a need and provide the first small steps to fulfill that need. By taking careful note of the spatial and structural dimensions of the Internet's relationship to the governance of society, it is hoped that deficiencies in both theory and method can be revealed and a course for further development can be elaborated.

Chapter 1 introduces and provides examples of the spatial and structural changes now taking place. It is vital that we discover how these changes relate to their historical context. While the changes underway are certainly "new" in the sense that they have begun to reach a much wider audience, historical precedents and pre-cursors exist and should be relied upon to provide some clue as to the development of these concepts.

In **chapter 2** the ideas presented in chapter 1 are elaborated upon within the context of the relationship of media to social structure. Of course, the scholars noted in chapter one also discuss the role of media and networked communications. Here, however, we will examine the relationship between the two and conjecture that communication networks can act both as an indicator of social structure and to influence that structure. While chapter one introduces the spatial and structural perspectives, chapter 2 provides some idea of how they might be used, particularly within the context of the Internet.

Chapter 3 describes a survey undertaken of the structure of Web linkages between and within various countries. It reveals that the web is both more internationalized than other networked media, but that borders on the web still have a clear and strong correlation to territorial borders. Moreover, it is found that the web is highly U.S.-centric, and as such provides a challenge to the autonomy of many of those who use it to support social networks.

Finally, the thesis concludes in **chapter 4** with some preliminary remarks on the future of the state and social control and management. This serves to wrap up discussions of the first three chapters and provide some organizing points for needed future research in this area. Bringing together the perspectives of space

and structure, and the communications toolbox of the social scientist, a path for future social research is described.

CHAPTER I
Global Social Networks

With the popularization of the Internet we are, as a society, changing the way we communicate. Three or four years ago, such a comment might have been seen as pure hyperbole, but phenomenal growth of international networking over the last few years gives us every reason to believe that the Internet will play an increasing role in our lives¹. It is customary to speak of "improvements" in communication technology, but this is hardly a very useful descriptor. The Internet provides us with both an indicator of and a causal agent for rapid changes in the way we view social space and the way our institutions and relationships are organized.

This chapter examines how ideas of space and of structure permeate theories of the information society. Because recent changes often affect the global system, and because as scholars we are often socially located on or near the leading edge of such changes, it is difficult for us to discern and to measure the evolution of spatial and structural dynamics in the social system. These relations only come into view within a historical frame of reference. Recent claims of an "information revolution" are only the latest in a stream of proclamations that we are entering a new era; the "space age" and "atomic age" of earlier decades have given way to information-related revolutions. The technological labeling of these "revolutions" belies the reality that revolutions are about how societies make themselves societies, how they think about themselves and others, and what that means in terms of customs and institutions.

While many claim that history is cyclical in nature, revolutions entail not only a turnover in who occupies certain positions of influence (and influenced), but a significant alteration of how those positions relate. Just as physical and social boundaries led to the coexistence of the Neolithic and Bronze Ages in much of the world, changes in communication and transportation technology can take generations to "trickle-down." A telephone in every home is beyond comprehension for most of the world, including pockets

within the territorial United States that are either too remote or too poor to justify the provision of necessary infrastructure. The changes underfoot are more than superficial, and it is this fact that makes them most interesting.

While these transformations are far from universal, they are geographically global. It is no longer credible nor effective to compare "advanced" nations with "developing" nations in an attempt to chart an information revolution. Besides tautological overtones (that is, deciding which countries are developing often relies on a self-enforcing suite of attributes), such an approach fails to recognize that many of the changes underway are about what constitutes a good unit of social analysis. As we shall see in chapter three, while territorial borders might once have approximated a division in social structure, that is gradually changing. In large part because of the increasingly permeable nature of national boundaries, we must begin with a perspective that does not presume the *ab ovo* existence of nation-states.

Thinking About Space

Part of the confusion over what constitutes a social unit is due to shifting conceptions of social space. To explore why this transformation is taking place, we must examine the role of spatial metaphors in describing complex systems. We will dismiss the view that spatial metaphors extend elements of the "real" physical world to social situations. I suggest instead that the spatial tools we use to think about the physical world are applicable to other domains.

The nature of space is one eagerly taken up by the philosophical tradition, and has a rich and varied literature that I can only begin to touch upon here. Philosophers recognize that the idea of space is something of an epistemological conundrum. The concept of space most familiar to us has been passed down from Plato through Newton and Descartes. This is a conception of space as dimension and distance, existing without recourse to an observer. Although this remains the most familiar definition of space, it has been attacked by philosophers and scientists alike.

The latter group, with the acceptance of Einstein's theory of relativity and Heisenberg's uncertainty principle, found the theory of absolute space embattled. The former often has a wider conception of space that has clear ties to what we call "place."

Plato had an early rival in his description of space. Aristotelian space was defined by its boundaries. Space was something contained. It is interesting to compare these two views of space. The first, vector space, implies movement through its absence. That is, direction and distance are most easily judged by how long it would take to move from one point in space to another at a certain velocity. Likewise, Aristotelian space implies containment through escape. Space only exists to the extent that a point or points within the space do not move beyond a certain boundary; which, of course, can only exist as a boundary once it is crossed. This second view of space as finite in dimension is akin to topological space as the term is used by mathematicians. Topological space is defined by a set of homeomorphic functions. For mathematicians, space is defined by a continuous relationship, and discontinuity marks the edge of a space. The characteristic of space being defined by movement beyond its boundaries applies to all conceptions of space, and as we shall see, this is an attribute that can be exploited in the investigation of social spaces.

Aristotelian space also contained the seeds of the conception of space as a category. Kant argued that while distance and dimension existed, they did so differently for each observer. The idea of space as dimension and distance is still valid. However, it is valid not as an observable truth, but rather as a set of structural relationships. Expanding "space" to generally mean bounded objects in relation to one another allows us to speak of spaces other than physical space. "Social space" describes the structured interaction of cohesive groups in a society and "knowledge space" describes a set of facts and beliefs within a web of (sometimes hierarchical) relationships.

Henri Lefebvre (1991) suggests that what is needed is a general theory of space that might be applied to the various spaces modern scholars take for granted. He writes that social space is a product of society². Society (re)produces this space in part from

the present state of that space (i.e., it exists both in relation to the social environment and in a historical context). Silber (1995) while noting the wide and often misuse of spatial metaphors in the social sciences, fails to identify their lure as a heuristic device. Even Einstein (1954) dismisses traditional thinking about space, indicating that the "psychological origin of the idea of space" belongs to the pre-scientific tradition, and must be carefully redefined to be useful to the modern scholar.

It is the role of space as a universal signifier that has stymied explanation of spatial metaphors, despite their wide and almost unavoidable use. These metaphors fulfill the need described by Shakespeare to give "to airy nothing a habitation and a name": providing a vocabulary for discussing relationships. We need such a vocabulary both "to *place* and to *label*" the complex new global social networks (Leary, 1995:270). Spatial reasoning, contrary to intuitive explanations, is applied to the physical world as much as it is extracted from it. The recognition that social space is a social and cognitive product allows us to understand that as a society, we have the power to alter space.

Social space is increasingly global space. While global space is certainly not uniform, it is growing more difficult to find absolute discontinuities that differentiate one group from another. While I have no close friends in Guyana or in Nepal, I have friends and relatives that do. As this web spreads outward, it encompasses all the people in the world at an increasing rate. It still makes sense to talk about society in the United States or in Seattle, but increasingly, it also makes sense to talk of a global society. This global society exists within a global space of relationships and structures (Harasim, 1993). Discerning those structures will remain a challenge to the social scientist in the decades to come.

Here, early on in the thesis, I would like to make a passing gesture over the dialectic so often raised in work about "cyberspace": namely, the contrast of the real and the virtual. No doubt, concentrating on this point of tension in computer-mediated communication has yielded worthwhile results and criticism from many scholars (e.g., Baudrillard, 1988; Eco, 1986; Woolley, 1993).

Such a distinction is not explored in the work that follows. The social is very much real, and yet is not necessarily physical. It remains a product of the collective imagination, but this does not make it any less real; as Lévy-Strauss writes, "in my mind models are reality, and I would even say they are the only reality," (1953:115) or as Appadurai has it, "the imagination has become a collective, social fact" (1996:5). The study of the social is very much the study of what is *real to us*.

The "Global Perspective"

If we are to question the new role of global space in social interaction, it would be wise to examine some of the ideas behind globalization. Given the frequency with which the term "globalization" arises in the literature, it would seem natural to assume that there are a group of central theorists to whom we might turn for an explanation of the main tenets of the process. Although lists of one form or another do appear, there is little agreement among these lists. Often, the meaning of the word is left undefined by those who use it. Instead, it is presented as the mysterious *causa sine qua non* of everything from cultural hegemony to rational international markets. Exploring the ideas surrounding globalization leads us to an understanding of how culture and communication technology now provide the terrain on which social networks depend.

To identify the conditions of globalization, we must first take a global perspective. That is, restricting our unit of analysis to the nation-state, or a comparison between nation-states, often overlooks patterns that are global in nature. A few scholars stand out as pioneers of the world perspective and we will begin by discussing some of their work.

Certainly among political scientists, the most familiar world-system view is that of Immanuel Wallerstein. Wallerstein's division of the world into "core" and "periphery" regions became the cornerstone of many theories of international political economy. Wallerstein's contribution was to recognize that nation-states were not the most important unit of analysis (Wallerstein,

1976:229-31). Regional alliances and systemic relationships between groups of states within the world system had greater impact. That is to say, the most important problem of international relations was not uncovering decisions made by the governments of sovereign states, but rather the underlying international structure that led them to those decisions in the first place (Wallerstien, 1979).

Fernand Braudel elaborated Wallerstien's model, making it less "international" and more amenable to flexible regional boundaries—and applicable to world systems in which the nation-state had yet to become a cohesive entity³. Rather than being defined by clear national boundaries, the world system is "a sort of jigsaw puzzle, a juxtaposition of zones interconnected, but at *different levels*."⁴ These different levels describe a complex, multidimensional space of flows. The level Braudel is most concerned with is the space in which capital and goods are exchanged, and the physical geography of the region that supports these exchanges. Ports on the Mediterranean might be considered "closer" to one another because of the transportation opportunities provided, while the Sahara remains a buffer zone even today. Drawing from the interaction of space and movement, Braudel extracts three "ground rules" of a world economy: boundaries within the system tend to change only slowly, a dominant city lies at the center, and there is always a hierarchy or structure that relates the sub-zones within the system.

Along with Wallerstien, Braudel draws on an analogy made by the economist Johan Heinrich von Thünen. Thünen asks the reader to imagine a city on a plain, with no river or canal, with equally fertile land throughout. Under such conditions, a city would grow, concentrated in the center and tapering off to undeveloped areas along the periphery (Thünen, 1966). Real cities differ from this ideal because natural occurrences (for example, rich soil, waterways, or uneven terrain) change the way that goods and people circulate. Not only natural features, but artificial constructions affect these flows. The walled city, for example provides a distinct break in this gentle progression from city center to undeveloped surroundings. Furthermore, the space of the city is af-

fectured by non-physical elements. Those of a particular class or belief system are likely to cluster together, raising social boundaries that can be as difficult to cross as physical ones. Because these levels of interaction also affect one another, structures tend to be isomorphic at each level⁵. Recalling that borders are the basis of what we often refer to as "space" we might say that uncovering these boundaries is vital to describing social space(s).

In the modern world, physical boundaries are decreasingly important, while social boundaries become vital. This is not a process that has occurred over the last few decades, but over a period of thousands of years. While the Rio Grande may no longer be an important physical impediment, it has left an institutional, social, and cultural legacy. El Paso and Juarez have much in common in terms of culture and (to some extent) language, but accidents of history have left their residents with more than a river dividing them ("Deep," 1998).

Those who take a global perspective recognize that while national borders still remain important, there is a class of transactions—a level of interaction—occurring outside the constraints of national borders. These "transnational practices," as Leslie Sklair (1995:6) terms them, are the "remainder" of international relations theories: what is often paved over in the interest of providing a workable model. They are the interactions that resist categorization as international trade or international exchange. And in the modern world, these transactions are becoming far too important to continue to ignore.

John Burton notes that traditional international relations theory centers on the "billiard-ball model," in which sovereign states are taken as greater or lesser powers that act on and react to other states in the system⁶. He goes on to suggest that such a model, while useful in some respects, fails to account for interactions that occur across national borders and between groups or individuals. He suggests that we might take different levels of transactions (he gives the network of flows between post offices as an example of one possible level) and represent them as maps on clear sheets. If these maps were laid one upon the other, the

world could be represented not as the geographic/political map that comes most easily to mind, but rather as a "cobweb" of interconnections and transactions (Burton, 1972:35-51; Gould, 1991).

This idea of transnational society as a cobweb is even more useful today than it was when Burton first introduced it. Before continuing, it is wise to pause for a moment to recognize that the idea of global networks is a not really a theory, in that it does not explain why transnational interactions take place; it is, as Burton (pp. 43-45) indicates, a perspective or an approach. By applying this approach, we come up with answers that are different than those that rely on the nation-state as the unit of analysis in a system of power-relations. The cobweb model simplifies the analytical endeavor when one "set" of relationships is sought; if, for example, a pattern of global consumption of television programming is the object of study. However, when that level is then combined with other levels of interaction that are related (language-use, migration patterns, tourism) the model becomes increasingly complex. Of course, complexity alone need not be a deterrent, but when we consider reintroducing national borders into a network of connections, we should not expect simple answers to complex questions⁷.

Space-Adjusting Technologies

As an alternative to Thünen's city, we might imagine a world in which physical transportation is rendered entirely obsolete⁸. What would be the overall structure of such a world. Would you be on equally good terms with everyone alive? Certainly not! At the very least, there are limitations to human attention, cognition, and communication that would make a global conversation with several billion of our closest friends impossible. In the absence of physical boundaries, what then would determine the organization of this world?

This hypothetical world is much harder to imagine than is Thünen's city. In part, this is because it is almost impossible to come to grips with any non-spatial arrangement. "Distance" will always exist, though the physical element is increasingly irrel-

evant. What determines distance in this world is not how long it takes to physically move from one place to another (the "measure of man"), but rather how easily an idea is communicated from one person to another (the "measure of mind"?). Among our closest friends, little effort is needed to communicate an idea or a feeling. The same idea or feeling may be extremely difficult to explain to a stranger, if it is possible at all. While communication may be diminishing the effects of physical boundaries, other boundaries are becoming increasingly important.

The idea that there are "distances" other than those we are most familiar with is the basis of a topological description of social networks. In Thünen's city, these distances are only influenced by natural features: for example, the existence or absence of navigable waterways, the elevation and grade of the area, and the amount of arable land. In the real world, these distances are also influenced by how groups become communities, by the "imagined" boundaries that arise. In addition, these distances are affected by what Donald Janelle has called *space-adjusting technologies*, those advances in "transportation and communication that reduce the significance of distance." (1991:49) If we are to assume that distance, along with other spatial ideas, is a social construct, adjusting space seems very natural. It refers to a shift in collective ideas about structure.

Outside of physical boundaries—both natural and artificial—that we are familiar with there are also borders inherent to certain technologies (boats and cable television both exclude large regions, for example), and borders that are enforced entirely by social and cultural structures and institutions. That is not to say that the technological boundaries are clearly distinct from cultural impediments, in fact the two affect each other every step of the way (see Nord, 1986). Rather, we might more easily associate certain boundaries with these two categories. Cultural boundaries tend to have a strong historical component, and have surprising staying power in the face of technological change. Included within this group are language differences, differences in social organization, and (the most difficult to define or observe) differences in group identity. All three of these have been

changing recently. Some languages are quietly becoming extinct, while the most popular international languages (especially English) gain new speakers. Social organization is also undergoing change. Overall, as Manuel Castells (1996) suggests, this is a change toward the "network society"; however, at the same time there is an upswing of local experiments and revivals in social organization⁹. Changes in identity, particularly a diminution of the "legitimizing identity" Castells writes of, are far from complete, and these changes have been occurring for many years. We may reiterate Braudel's first rule of the world system and note that it applies equally to cultural borders as to physical borders: boundaries tend to change only very slowly.

While cultural boundaries may change slowly, technology seems to move in revolutionary bursts, as groups of innovations reach a critical mass. Breakthroughs in technology during the Industrial Revolution led to exponential increases in the speed of travel and communication, bringing a change in both economic and social organization. Advances like the telephone had important effects on the structure of society, and foreshadowed the present "information revolution." Although we can now send a message from New York to London in a fraction of the time it took in 1866, after the first trans-Atlantic telegraph cable was completed, does a question of minutes and seconds really make that much difference? Telephone, radio, satellites, and fiber optics do little to increase the speed with which our ideas circle the globe. The major change that has occurred over the last few decades is the increase in networking—that is to say, how these communications devices are connected and switched and hence their ability to support and to shape social networks.

Traditionally, strong social networks only came into being within a relatively limited geographic area. Face-to-face meeting was a prerequisite for forming communities and institutions¹⁰. These earlier communities might be *supported* by letter-writing¹¹, but local ties were likely to capture most of one's attention. Computer networking has for the first time rendered nearly invisible the hierarchies imposed by earlier electronic media, and as a result is far better able to support the *creation* of social net-

works, even in the absence of face-to-face meetings (Jones ,1997; Parks, 1996; Rheingold, 1993). The telephone was at one point best suited for one-to-one, synchronous voice communication between individuals in fixed locations. Although it was eventually extended over time to carry images (facsimile) and data (modem), to include more than two people (exchanges, 3-way calling, teleconferencing) and to allow for disjunctions in time (voice messaging) and space (cellular), these changes were gradual and often required great resources to achieve. The convergence brought on by the digitization of mass media makes the telephone infinitely expandable. It is no longer as easy as it once was to discriminate between a telephone, a television, a radio, or a computer. Just as the programmable computer has the potential to perform any calculable function, networked digital computers are becoming a universal communication medium: acting as telephone, television, radio, and other forms not yet imagined. As a result, at least within a growing privileged group¹², one set topological limitations once imposed by technology are gradually being lifted. As geographical and technological boundaries begin to diminish, we are left with cultural boundaries retaining primacy.

Globalization and localization are artifacts of thinking internationally, and of thinking in terms of physical space. Thinking nationally and thinking in terms of space makes sense, as these continue to be the predominant factors influencing most social organization—where we are, if not where we are headed. Even as the physical becomes less important to how society is organized, the historical inertia of society will continue to express the geographies of our past in social formations. Who we are has a great deal to do with who we were.

Of course, this geographic approach hints strongly at a structural description of world society. While we may speak in terms of physical space, and specifically in terms of distance, we are defining structures of social relation. In the next section, I discuss what it means to take a structural approach and what that tells us about the process of social globalization.

The Study of Structure

The study of structure, as I propose it, has certain affinities with "structuralism" as a school of thought. However, the two should not be equated. In particular, I take issue with the idea that empirical analysis cannot lead to the discovery of structure. Clearly, some model building is necessary to make the jump from communication networks to social structures, but I hope to make this jump as narrow as possible.

Early structuralists including Saussure and Lévy-Strauss focused on the synchronic structures of language and culture. When examining global social structure, it becomes necessary to rely on the historical progression of the structure as well. While global social structure remains a system of differences (Appadurai, 1996:13), it is impossible to measure or discern that system of differences without recourse to its earlier configurations. This reality is what drove Braudel to focus on the *longue durée*. A world system, by definition, leaves us without a present-day system with which to contrast it.

Of course, the diachronic study of world society (which in practice becomes a history of world orders or of empires) is not a structural approach without being balanced by an examination of the synchronic system of differences. In other words, a structural approach differs from narrative history in that it focuses mainly on how subgroups evolve in terms of membership and exclusion. Using this approach, the French Revolution could be defined not by the rhetoric, but by the social reality of *liberté*, *égalité*, and *fraternité*—that is, how social groups emerged that challenged the hierarchical structure then in place. The messages of individual leaders and expressions of collective will are set aside, and the fact that there were individual leaders and the composition of groups that could express a collective will is emphasized. A trend toward this form of structural study can be seen in the recent rise of historiography. Habermas (1989) also in some ways exemplifies the synchronic in a historical context by analyzing points of communicative convergence (the *salon*) over time, though he does so within a deliberately restricted geographical and cultural domain.

The focus on structure can be contrasted with an emphasis on processes. While the two certainly rely upon one another, it is the former that is the basis of social theorizing. In approaches to the idea of information, it is often the latter that is stressed (Arquilla & Ronfeldt, 1998). It is only relatively recently that interest in "infostructure," or a structured information and communication environment, has garnered serious attention from academia. The slant toward information processing is the legacy of Shannon and Weaver's (1949) information theory, as well as much of the communication effects research that went on in the infancy of this field. Such research studied the process of communication, hoping to eventually formulate theories about the structure of the society in which such processes took place. In many cases, however, understanding process became a goal unto itself.

The question becomes how to describe such a structure. This is particularly difficult when the structure itself is constantly undergoing change. Perhaps one of the reasons structure has been so long ignored is that institutions all seemed to be moving toward the preeminent form of social structure of the industrial age: rationalized bureaucracy. Bureaucracy moved seamlessly into business affairs, government, education, and even leisure (Crozier, 1963; Ellul, 1964). Recent social innovation suggests that hierarchical structures based on categorized records are no longer the most desirable nor the most efficient institutional form. Instead, in many areas of social life, we have seen the rise of the distributed network.

From Cybernetics and Systems Theory to Chaos and Networks

The emergence of hypermedia and the Web presents an opportunity to test recent ideas about complex systems in a communications environment (Munnecke, 1994). Many will argue that an understanding of non-hierarchical, chaotic systems has been around for some time. Michel Serres (1980), for example, in an effort to understand the role of noise in the structure of communication suggests that ideas about random processes can be drawn from the second law of thermodynamics and that the stochastic models at-

tempting to describe entropy have application in the arts and humanities. Serres, among others, has brought about a re-examination of the Bourbaki group who gathered to think about a mathematics of everything (Beaulieu, 1993). The mathematical ideas that later became chaos theory (and the theories of social organization that have flowed from it) were also strongly influenced by the work of Gödel (Hofstadter, 1979; Lyotard, 1984: 42-43), who demonstrated that a coherent and complete model of everything was impossible.

While mathematicians were describing the interaction of sets and complex, seemingly random formations, others were attempting to describe how seemingly simple processes and systems yielded complex results. The field of cybernetics, pioneered by Norbert Wiener (1948), followed by General Systems Theory both attempted to define models that described a range of natural and social systems (Ackoff, 1994; Boulding, 1956). Fundamental to these models were the idea of feedback and self-modification. Cybernetics and General Systems Theory described processes that proceeded from one state to another to produce "intelligent" behaviors.

Early in the eighties, a combination of stochastic techniques and systems theory began to coalesce around a theory of chaos. Chaos theory drew from a number of sources—non-linear dynamics, fractals, cellular automata, neural networks—and attempted to apply these ideas to a wide range of disciplines (Gleick, 1987). The Santa Fe Institute now centers much of its research around modeling complex social and natural phenomena (Waldrop, 1992). Their work depends on the idea that a large number of actors behaving very simply can combine to create complex and "intelligent" patterns. Rather than just providing feedback, these patterns act upon themselves, constantly evolving new structures and rules (Kauffman, 1995). The invisible hand is seen as an actor not only in economics but in all large social organizations.

The natural way to approach the analysis of any system in which there are a number of actors is to treat it as a network. By discovering the relationship of each node in the network to each other node, any existing hierarchical structure will emerge. Rather than a top-down approach to model-making, this allows the

steady accumulation of local data to provide some kind of a global picture. The advantage to beginning with a complete network is that it does not presume any strong hierarchical structure. Moreover, beginning with a network approach allows us to discover and explain both evolutionary and revolutionary changes to a social system. Chaos theory contends that many complex systems are susceptible to both slow changes and cataclysms.

Despite their explanatory power, the study of social networks remains on the fringes of many disciplines. Even though the communications discipline has pioneered many of these approaches, often they are left as a last resort. Historically, these approaches were seen in studies of rumor transmission (Allport & Postman, 1964), diffusion of innovations (Rogers & Kincaid, 1981), and the distribution of news and opinion (Katz, 1957). Often these studies dealt with messages that were generated outside the social groups being studied and then diffused through a social network of varied composition. It has not been until fairly recently that the study of social networks has been brought once again to the fore, and this has been in many ways a result of studying networked media like the telephone and now the Internet (Garton et al, 1997).

The application of social network analysis is beginning to gain ground during an era in which the idea of a networked society is taken for granted. Manuel Castells (1996) makes the argument that networks lie at the heart of present-day social arrangements, and that power and economy are reliant on how social networks evolve (pp. 470-472). In my view of a network approach, strictly hierarchical relationships can also be represented as a network. That is to say, disproportionate flow of messages, goods, or power from one part of the net to another does not, in my mind, make it any less a network. However, when Castells and many others speak of a network society, they mean something more dynamic than the bureaucratic structures that characterized the Industrial Revolution. Rather than stable hierarchical systems, Castells sees many modern institutions as distributed and changing networked organizations in which it is difficult to find any center or central control. In this estimation, the network society is seen as the

latest step in the movement away from traditional, family-structured life toward a more dynamic and cosmopolitan way of connecting to others.

While Castells' investigation is set within a clear framework focusing on the network approach, his evidence (like that of many other scholars) too often represents the effects and prerequisites of these networks rather than an examination of the networks themselves. When he does describe the operation and importance of the networks his evidence is often anecdotal, in stark contrast to the macroeconomic data that demonstrates effects. While providing an exciting (if uneven) conceptual base, his analysis reveals an apparent lack of tools available for the investigation of networked society, and the potential insights that might be gained through such an investigation.

In providing evidence of the effects of a networked society on globalization, Castells is in good company. Most of those who are identified as theorists of globalization make their arguments in terms of describing trends, rather than demonstrating the source of those trends. One of the books often included within the globalization canon is Robert Reich's *The Work of Nations*. Reich claims that business is less and less concerned with national borders, and shows how the need for labor is changing to meet these new concerns. As Castells does, Reich relies on a combination of case studies and economic data to support his argument. And, as Castells does, Reich finds that global networking is at the heart of these changes. Where once only finished products were traded over national borders, now the traded good is often "problem solving, ...problem-identifying, ...and brokerage." (1991:113) Reich goes on to argue that the international networks increase a gap between "symbolic analysts" who exist within a web of global relationships and those who may be less educated, have far less access to new communications media, and work in positions that are not information-intensive. This is the same dialectic that Castells suggests (the "Net and the Self," p.6) extended to the social sphere. Both authors agree that there is a tension between national identity and relationships that have little to do with national borders.

The tension between national identity and global networking is also cited by Kenichi Ohmae, who discusses the role of the "equidistant manager" (1990:17). Ohmae illustrates this idea by relating the experiences of the Japanese CEO of a multinational corporation who cancels an important meeting to attend the funeral of a Japanese department head. The manager must weigh the demands of culture and tradition against the demands of the global network of business relationships. Physical and cultural proximity contribute to the CEO's decision to attend his employee's funeral. Ohmae recommends that the CEO mend his ways and treat his employees equally, whether they live down the street or on the other side of the planet. What Ohmae overlooks is that networks exist not only in space, but in time as well. The face-to-face meeting will continue to take place, and more importantly, it will always exist in a historical sense as the prototypical relationship. Ohmae overlooks Braudel's warning that borders move very slowly.

The idea that social identity is increasingly one of the Net rather than being based in traditional institutions is hardly one without historical footing. This split can be traced to the sociology of the twenties and thirties that defined a movement away from family groups as the primary unit of social organization, and toward networks of personal relationships (Tönnies, 1957). By 1969, without having witnessed the recent explosion of communication technologies, Orrin Klapp had already drawn the relationship between identity and information technology:

The paradox... is that with increasing knowledge modern societies have not gained in self-knowledge and assurance, that the knowledge explosion of modern times is associated with an increase in identity problems... As the number of potential reference points has multiplied, the ability to refer oneself to those points has declined. (1969:21)

This brings us to the "Self" Castells positions in contrast to global networks of interaction. Indeed, the second book in Castells trilogy, *The Power of Identity* (1997), is devoted to detailing the demise the institutions that have supported collective identities in the past, and the rise of resistant identities.

Taking a cue from Anthony Giddens, Castells argues that modern identity is formed within the dialectic of global and local¹³. No longer can the institutions of a Gramscian civil society be relied upon to form collective identities. As these "legitimizing identities" lose their support, only resistant identities remain and resistant collective organizations become far more significant. Castells examines a number of these communal or resistant forces—religious fundamentalism, nationalism, ethnic groups, and territorial groups—and concludes that these are symptoms of the new identity, an identity based on communal ties in the absence of a dominating and inclusive civil society.

Giddens and Castells are not the only two who have brought forth this tension between global and local. Perhaps the author most often associated with this dialectic is Benjamin Barber, who's article in *the Atlantic* entitled "Jihad vs. McWorld," brought the idea into the mainstream. For Barber, and for many others who write about globalization and localization, the trend seems to indicate a paradox (Barber, 1995; Drucker, 1993:chap. 7; McPhail, 1989; Mattelart, 1994:213). Communication and transportation technologies (i.e., the substructure upon which global networks are built) have led to both globalization and localization at the same time, or as Barber puts it "Jihad via McWorld." (1995:155) Systems theorists find this kind of tension between increased global structure and local differentiation in a variety of complex systems. This differentiation is the result of a change in the factors that influence groups and cliques. Increased globalization does not necessarily imply homogenization and may, indeed, lead to further localization and the creation of new identities. Such formations are increasingly dictated by cultural and technological rather than physical boundaries.

Castells argues convincingly that resistant identities are a characteristic of the information age. What he seems to miss is that resistant identities, as a product of resistant social groups, are themselves dependent on social networks. How can social networks be the source of seemingly contradictory social changes? This question brings us back to the issue of topology. Recalling the discussion at the beginning of this section, Thünen

suggested that there is a natural core to a city and that cities become more and more sparse as they move away from this core. Global networks, like real cities, are made up of uneven links and evolutionary cliques. Social networks rely on communication networks. As those communication networks have become increasingly aspatial, so too have social networks. Where mountains and rivers might have been influential in the past, social boundaries and the limitations of technology now define where networks are concentrated. This means that while societies are increasingly interdependent, that interdependence has also allowed for differentiation. How specific technological and cultural factors affect that differentiation is a topic that has been studied far too little.

We will treat this phenomenon in more detail in the next chapter, particularly in the context of communication technologies. For now, let us conclude that the network approach, while it may make use of communication technologies as a source of data, is an attempt to come to some understanding of *social* structure. Social structures may be simple within a limited range of contacts and over a limited period of time. When these relationships are aggregated, however, the result is a social system that behaves with only partial predictability. The spread of social networks to the global scale makes those networks all the more complex and difficult to observe. In later chapters, we examine some tools we might use to measure these complex networks, and detect the patterns of organization that emerge from them.

The Scientist and Policy-Maker: Why Should We Care?

Given the complexity of the global social system, it is tempting to restrict our view to a limited domain. Attempts to come to an understanding of global social behavior are often seen as a futile striving for a "Unified Theory of Everything." On the contrary, recognizing that the global social system is complex saves us from the errors, often grave, caused by assuming too much. One of those assumptions is that international relations are an accurate representation of the world system. Another is that interdependence naturally leads to both homogeneity and a reduc-

tion in conflict. Neither of these are necessarily true.

In recent decades, policy-makers have been forced to find solutions to increasingly complex problems. The most notable of these have been environmental concerns and the provision of health care. Not only is the best way to regulate these problems unknown, it is not altogether clear what the end goal is, or if a *summum bonum* even exists. From the management of the economy to guiding technology toward ethical uses, the choices faced by government are increasingly ambiguous and the power they have to effect change is diminishing quickly.

The development of a world-wide infostructure presents one of the most complex challenges to what are effectively local governments. They are faced with the choice of attempting to create an equitable world regime or pass ineffective local laws. Part of the problem in designing regulation for communication networks is a lack of information about these networks, and a failure to understand the processes by which structure emerges and evolves in global communication networks. Without this basic information, policy-makers are unable to provide any reasonable approach to managing these problems.

Social scientists must study social networks in order to provide traditional institutions with a schematic for change. Some argue that the new communication networks are a new space, apart from the institutions and traditions of the "physical" world—that cyberspace is the new lawless frontier (Barlow, 1996). Such proclamations wrongly assume that it is the technology that produces social space rather than the converse. In fact, technology both affects and is affected by social structure. Social networks existed before the Internet, and remain intact—within a historical context—when carried by this new medium (Brown, 1972). The Herculean labor of uniting traditional institutions with social networks that are in a state of flux rests heavily on the shoulders of social scientists. Just as environmental scientists and doctors have made information available to help with the design of just policy, communications researchers and other social scientists must provide parsimonious descriptions of the process of change in global social networks (McChesney, 1996). Chapter three

provides one example of how we might "observe" the structure of the Internet and provide policy-makers with a empirical basis on which to make decisions.

Endnotes

¹ A recent survey (June 1998) by the Strategis Group, for example, found that half of Americans see the Internet as important to their day-to-day lives. (<http://www.strategisgroup.com/press/Internetuser.htm>)

² But "it is not just that the spatial is socially constructed; the social is spatially constructed too." (Massey, 1984)

³ This movement beyond the national border was not one Wallerstien was ready to make: "It makes no epistemological sense whatsoever to distinguish a 'logic' of the world-economy from a 'logic' of the interstate system." (Wallerstien, 1983:305)

⁴ Braudel (1992), p.39. Original italics. Here Braudel is speaking of a world-economy (*Weltwirtschaft*), however, it applies to the modern world system as well (see pp. 619-620).

⁵ For example, physical attributes may determine the location of social boundaries (in many cities, the wealthy live on a hill, the less wealthy live on "the wrong side of the tracks"). The converse may also be true, as greenbelts or parks are often located in wealthier areas, or neighborhoods are physically separated by walls (as in Belfast or in wealthy "communities" in the United States). This diachronic interaction is often overlooked by those who study the effects of social networks.

⁶ Burton (1972:28-32). While Sklair agrees with Burton's dismissal of the billiard-ball model, he dismisses (or rather, fails to discuss) Burton's "cobweb" model, claiming this model is too ambiguous (Sklair, 1991:3).

⁷ "Somewhere... between the specific that has no meaning and the general that has no content there must be, for each purpose and at each level of abstraction, an optimum degree of generality." (Boulding, 1956:197)

⁸ As in the world described in E. M. Forster's 1909 story, *The Machine Stops*.

⁹ This includes new experiments in communalism, as well as a new appreciation for localized knowledge contexts brought on by postmodern inquiries. In "Common Sense as a Cultural System," Geertz compares the "discovery" of local knowledge by anthropologists to exploring a city: he claims that we "have only lately begun to wonder how the suburbs, which seem to be crowding in more closely all the time, got built, what connection they have to the old city... and what life in such symmetrical places could possibly be like" (1983:74). Moody (1995) explores a different local social organization: that of Microsoft's multimedia development culture.

¹⁰ As Aristotle warned of democracies that grow too large: "who will serve as its herald, unless he have the lungs of a Stentor?" (*Politics*, book VII, part 4).

¹¹ Examples of world-wide networks using written letters are not difficult to find. Restricting ourselves only to the religious world, we might cite Paul's epistles or letters from far-flung Jesuit missionaries. We might turn also to the trans-Atlantic communiqués of the Quakers during the early part of the eighteenth century, used to maintain a sense of community despite a lack of physical proximity (see OTA, 1990:183n15).

¹² It would be foolish to ignore the fact that these technologies still affect only a élite minority of the world's population. Those who tend to be the most "wired" also "occupy the strategic command posts of the social structure," to borrow a phrase from C. Wright Mills (1956:4).

¹³ "In conditions of late modernity, we live 'in the world' in a different sense from previous eras of history. Everyone still continues to live a local life, and the constraints of the body ensure that all individuals, at every moment, are contextually situated in time and space. Yet the transformations of place, and the intrusion of distance into local activities, combined with the centrality of mediated experience, radically change what 'the world' actually is. This is so both on the level of the 'phenomenal world' of the individual and the general universe of social activity within which collective social life is enacted. Although everyone lives a local life, phenomenal worlds for the most part are truly global." (Giddens, 1991, p.187)

CHAPTER II

Communication Technology and World Orders

In the first chapter, I suggested a network approach to world society. This approach aims at discovering structure, particularly the topology of the groups that make up global society. Social cliques are affected by various kinds of boundaries: physical and geographic boundaries, social and cultural boundaries, and boundaries occurring as a result of communication and transportation technologies. It is this final sort of border that chapter two discusses. How do these "space-adjusting" technologies affect the structure of society?

Boundaries created by communication technologies are a natural topic for study by communication scholars and, as we shall see, a number of authors have treated the issue of social restructuring as a result of the introduction of new communication media. However, the approach of most researchers when presented with a new medium is to concentrate on the degree to which it encourages social discourse rather than the converse. Neil Postman (1992) suggests that the story of King Thamus in Plato's *Phaedrus* might be instructive. In the story, the god Theuth is demonstrating each of his inventions to Thamus and comes to the invention of writing:

"This invention, O king," said Theuth, "will make the Egyptians wiser and will improve their memories; for it is an elixir of memory and wisdom that I have discovered." But Thamus replied, "Most ingenious Theuth, one man has the ability to beget arts, but the ability to judge of their usefulness or harmfulness to their users belongs to another; and now you, who are the father of letters, have been led by your affection to ascribe to them a power the opposite of that which they really possess. For this invention will produce forgetfulness in the minds of those who learn to use it, because they will not practice their memory. Their trust in writing, produced by external characters which are no part of themselves, will discourage the use of their own memory within them. You have invented an elixir not of memory, but of reminding; and you offer your pupils the appearance of wisdom, not true wisdom, for they will read many things without instruction and will therefore seem

to know many things, when they are for the most part ignorant and hard to get along with, since they are not wise, but only appear wise." (Plato, 1998:274e)

The inventors of new media, from books to the Internet, naturally see the promise of their technology and not the threat. As each new communication technology extends communication over time and space, it leads to atrophy in other areas. No communication medium (no matter what the *digerati* might claim) is perfect. While they may provide an improvement or an extension of the ability to communicate, by doing so they often impede other channels and media in which social communication might take place (see Neuman, 1991:48).

If we are to take a realistic look at media, and the Internet in particular, we must recognize that they build as well as remove walls. Many claim that the footprint of a satellite transmission pays no heed to national boundaries. While that may be true, new boundaries quickly form, connecting those with the money and influence to acquire receivers and excluding the majority of those within the footprint that are unable to receive messages. While communication media change boundaries and make them more difficult to detect, they do not necessarily remove them. It is time we move beyond electronic media as simply annihilators of space¹ and recognize that, rather, they alter our spatial and structural relationships.

Communication and World Orders

One of the results of research into self-organizing systems is the recognition that complex systems naturally differentiate themselves into cohesive groups. Those who work with computerized models suggest that this self-organizing complexity is a valid reflection of the process of social differentiation in the real world (Axelrod, 1997). In other words, removing physical boundaries to communication does not remove the factors (chiefly a limit to attentive capacity) that lead to the formation of groups and sub-groups. While the aspatialism facilitated by new media may

work to disrupt present social boundaries, it does not necessarily work to homogenize society. Rather, it provides a topological terrain that supports or disrupts different kinds of mass social organization.

Several scholars have taken up the role of technology in social change over a period of centuries and millennia rather than the myopic ranges of those who focus solely on the "information revolution." None are so notorious as Harold Innis. Innis, and those who followed in his tradition (for example, Marshal McLuhan and Elizabeth Eisenstein), are often called technological determinists. Although the authors in this section discuss the relationship between communications innovations and social structure, none considers technology to be the only or even the main source of these changes (Innis, 1972:34). Rather, technology is one of a number of contributing or enabling factors². On the other hand, technology gives us something of a point of departure when looking at social systems, a point that seems less nebulous than many social indicators.

It would be a large error of omission not to discuss the work of Harold Innis in the context of communication and social organization, or as he has it, empires. On the other hand, I do not wish to adopt his latent but overarching theoretical framework, something even his protégé did with only limited success. Let me instead say that Innis takes the view of communications technology as a perspective with which to better understand how empires arise and change over time. *Empire and Communications* is more than anything a history of empires and how these were governed through the use of various communication technologies. That Innis brings us only as far as the printing press should not be seen as a shortcoming. As we shall see when we come to Eisenstein, the social orders associated with the printing press have a number of interesting commonalties with new communication media. Moreover, Innis places technology within a framework of social space and time. No doubt he would agree with Janelle's characterization of communications technologies as "space-adjusting." The ability to distribute or restrict knowledge is for Innis the defining element of empires, and that ability is directly related to the

types of communications media used. By taking this viewpoint, his work foreshadows that of many of those who more clearly described the relationship of communication topology to social organization.

James Beniger (1986) is one of the few theorists of the "information revolution" that identifies modern innovations in technology as only the latest step in a long process of social change. In seeking the origin of the information society, Beniger draws on what he calls a history of control throughout the last few centuries. Beniger's approach is valuable in that he links the question of power with that of communication; a linkage both Innis and Herbert Schiller (1992) would approve of, no doubt. Beniger argues that the acceleration of the "control revolution" in the last few decades is the result of new computers and digital communications devices, but that we should see these inventions "not as causes but as consequences of societal change, as natural extensions of the Control Revolution already in progress." (1986:7) Throughout *The Control Revolution*, Beniger addresses the problem of control at a distance. But when it comes to the possibility of distributed control, Beniger leaves us with little in the way of explanation. As convincing as Beniger's ideas may be, present-day computer networks have little semblance to the data processing machines within bureaucratic structures that he writes about. Does anyone have control when everyone has control?

The idea that there is a "natural history" of communications technologies that progress evenly from one to the next is faulty³. In fact, the modern distributed Internet seems to be in many ways a return to earlier media rather than being a continuation of the centralized computer systems that spawned it. It seems to resemble some sort of combination of telephone and printed book. Not incidentally, these two media (and their influence on social structure) have suffered from a lack of academic interest until recently. While the television, radio, and even the telegraph have attracted the attention of historians and communication theorists, the ubiquitous book and telephone seem to have been somewhat overlooked until the first shots were fired in the information revolution.

When we examine some of the trends in society that have been

tied to the emergence of the printing press, there is a surprising correlation with what we might expect from the Internet and World Wide Web. Elizabeth Eisenstein (1979) highlights a suite of social changes that accompanied the printing press: the *dissemination* of ideas, a *standardization* in thought and form, a *reorganization* of data (e.g., the emergence of alphabetizing and cataloging), an increase in *data collection*, more interest paid to *preservation* and a change in thinking about "history," and what she calls *amplification* of a set of common ideas. Each of these led to changes in knowledge and, if we are to accept the claim that control and dissemination of knowledge are key features of social orders, they also led to changes in the structure of society.

Though the words Eisenstein uses to describe these trends may not be familiar, once we look at her explanations and examples it becomes clear that she is describing the emergence of a spatially independent network society. Montaigne suggested that the works he consulted contained greater "conflict and diversity" than those of earlier commentators. This increase in available work encouraged an upswing in the popularity of citation, with authors able to assume that readers could access other works. Feedback among authors led to a community of intellectuals. Of course, the effects of the relatively low-cost book extended beyond the world of nascent academia. The most common example is the role an inexpensive, authoritative version of the vulgate (and translations and bastardizations of the same) in undermining the structures and dogma of the Roman Catholic church. The ability to convey ideas among groups and not just individuals facilitated the expansion of fashion and culture. For example a book of dress patterns printed in Seville in the 1520s "made 'Spanish' fashions visible throughout the far-flung Habsburg Empire." It should not be assumed that the book was simply a factor leading to the homogenization of the "known" world. Rather, "a fuller recognition of diversity was indeed a concomitant of standardization." These observations of sixteenth century Europe could easily apply to what many consider the very recent trend of globalization (Eisenstein, 1979:74-127).

A second medium that bears examining is the telephone. The telephone system remains one of the oldest electronic media, and

has not only survived, but continues to be a source of innovation. Additionally, a substantial part of the physical infrastructure of the Internet is made up of the network provided by this century-old device. Yet compared to broadcast media and other technologies, scholars have virtually ignored the telephone (Pool et al, 1977). The little work that has been done often places an emphasis on the relationship between social networks and communication networks—precisely the approach taken in this thesis. According to one author, the telephone differed from other inventions of the industrial revolution (the spinning jenny or steel rolling mill, for example) in that the telephone did not make a *product*. Instead, it was used to produce efficient human organizations (Cherry, 1977).

What allowed the telephone to alter human organization? Telephone networks did not restrict the user to a particular topography or geography of connection in the same way that, for example, the telegraph did. Thus the impact of the telephone is much less a result of the device demonstrated by Bell, or the machine that sits on your desk. It is rather the telephone *network* that has led to social change. That network came about with the development of quick and efficient telephone exchanges. It was the use of telephone exchanges "that led to the growth of endless new social organizations, because it offered *choice* of social contacts, on demand, even between strangers, without ceremony, introduction, or credentials, in ways totally new in history." (Cherry, 1977:114) Moreover these social networks could be distributed far beyond the area within which face-to-face meetings could occur on a regular basis (Aronson, 1971:161). These observations seem eerily prescient as we witness the birth of another new media.

The Internet can be characterized in terms once applied to the media that came before it. The recent convergence of telephone, publishing, television, radio, and networked computing demonstrate the degree to which this is true⁴. The vast and yet difficult to quantify social changes the printing press and telephony brought about give us reason to believe that the Internet is far more than a passing fad. In fact, we can see how some of the changes that began with these two media will be accelerated by the

introduction of networked computing. These changes come with a medium that allows space-independent social networking freer reign. At the same time, there are clear indications (as we shall see in the next chapter) that the Internet is showing signs of the broadcast, one-to-many model as well.

The birth of printing made it possible to share knowledge across a continent, the telephone brought those ideas around the world. The Internet dismisses not only the space between two connected individuals, but lowers the barriers to making that connection in the first place. This is where the Internet is most likely to change the way our society communicates, relates, and thinks about itself. When we discuss some ways to measure social networks on the Internet, we must recognize that hypertext and computer networking represent a culmination in distributed media more than a discontinuity.

New Utopias

C. Wright Mills writes that "the more the antagonisms of the present must be suffered, the more the future is drawn upon as a source of pseudo-unity and synthetic morale." (1963: 302) Indeed, it seems that the most celebrated utopian visions were crafted during periods of collective social change and uneasiness (Andrews, 1901). These utopian visions were often generated by élite groups who sought to defend their social ascendancy; first the clergy, then the intelligentsia and literati, now the so-called *digerati*.

In retrospect, these utopias seem not plans of action as much as arguments for what an ideal society might resemble. Perhaps it is only in the long view that these utopias seem unachievable. There is a new resurgence of technophilic utopianism that is gaining ground in circles that should be more skeptical. What makes this techno-utopianism all the more unusual is that it is often presented as fact more than fancy. The writings of Peter Schwartz, perhaps distilled to their most utopian in an article in *Wired* magazine (Schwartz & Leyden, 1997), present the current information revolution in glowing terms suggesting that

...historians will look back on our era as an extraordinary moment. They will chronicle the 40-year period from 1980 to 2020 as the key years of a remarkable transformation. In the developed countries of the West, new technology will lead to big productivity increases that will cause high economic growth—actually, waves of technology will continue to roll out through the early part of the 21st century. And then the relentless process of globalization, the opening up of national economies and the integration of markets, will drive the growth through much of the rest of the world. An unprecedented alignment of an ascendant Asia, a revitalized America, and a reintegrated greater Europe—including a recovered Russia—together will create an economic juggernaut that pulls along most other regions of the planet. These two metatrends—fundamental technological change and a new ethos of openness—will transform our world into the beginnings of a global civilization, a new civilization of civilizations, that will blossom through the coming century.

This unbridled optimism already seems dated, as does the confidence in the then-popular, now doubtful "Asian Century." In fact, Schwartz represents a moderate view of the power of the market-technology nexus to provide a new golden age when compared to many of the more radical optimists. Trans-humanists of different stripes, including the extropians and those proposing a new social "hive" (e.g., Stock, 1993), provide a Panglossian view of the future in which the man-machine distinction, as well as the distinction between individual and group, fades away.

That such positive visions of the role of technology exist is hardly surprising. Indeed, similar euphoric visions accompanied the introduction of each new electronic media, along with warnings of their evils (Czitrom, 1982; Carey, 1983, 1989). What is somewhat more surprising is that this vision is shared not only among the popular press (like *Wired*), but also by those who are responsible for developing new media. Of course, the professional and financial future of many on the leading edge of new media rest upon the success or failure of the technology they develop. Nonetheless, the lack of critical perspective observed by the developers of new media is at times frightening. We could take *The Road Ahead*, a

bubbly tale from Bill Gates (1998) that details some of the educational and market improvements that are to be had in the near future, but perhaps Gates is too easy a target. In fact, popular books from two of the high-priests of the information age, Michael Dertouzos (1997) and Nicholas Negroponte (1995), while certainly taking into account the vastness of the social changes that will occur and the growing pains that will accompany them, remain positively ebullient over the effects of new communication technologies. In the epilogue to his *Being Digital* (aptly entitled "An Age of Optimism"), Negroponte acknowledges that "bits are not edible" and "computers are not moral," but goes on to claim that these are problems somehow outside the pure realm of information, somehow part of our savage past. Negroponte concludes that:

While the politicians struggle with the baggage of history, a new generation is emerging from the digital landscape free of many of the old prejudices. These kids are released from the limitation of geographic proximity as the sole basis of friendship, collaboration, play, and neighborhood. Digital technology can be a natural force drawing people into greater world harmony. (p. 230)

The need for control, for management, for social action, is strikingly absent from the screens of the *digerati*. Unlike Alexander Graham Bell, who recognized that the greatest benefits of the telephone would come only with universal service, today's creators seem to create for the sake of the creation. When challenged that they share some of the social responsibility for their creation, they often point to the benefits technology has provided thus far, and shift responsibility for guiding its use to governments or users (Florman, 1994: 18-41). When those who have such a cheery view of technology are leading its development and introduction, we must wonder what social concerns are being left aside in favor of a purely technological approach.

At the same time, there are a number of dystopian views of what new communication and information technologies might mean to a future society. The cyberpunk genre, centering on the writings of William Gibson, Bruce Sterling, and Philip K. Dick among oth-

ers, see the world of the future as a caricature of the first Industrial Revolution, a world where new robber-barons create a life of luxury while an underclass exists in the lawless margins. Many of the less fictional criticisms of the information revolution differ very little from this view.

The computer, even when networked, does not have the power to save or condemn society. The utopian and dystopian visions both rest much of the responsibility for the future on networked communication. The irony is that it is not computer networking that drives the new social changes. Distorted views of the power of computer networking, and blindness to the role of social institutions in these changes, allows for a "natural" progression of social networks that may be far from what the collective desires.

Media Imperialism and the "Control Revolution"

Perhaps we can briefly continue the discussion of on-line utopianism in the context of media topologies. The promise of distributed computer media is most clearly seen in the work of Ithiel de Sola Pool. Pool remains wholeheartedly convinced of media's emancipatory power--particularly in the global setting. Though it is referred to throughout his work, the tie between electronic media and democracy is most clearly explained in *Technologies of Freedom* (1983). More exactly, and more appropriate to the discussions that follow, Pool sees unregulated computer networking as a necessary facet of a free and democratic society. Regulations promulgated in response to the natural oligopolies of broadcasting technologies are proving to be ill-suited and over-restrictive when applied to newer media.

It is important to note that when compared to the sometimes outlandish optimism of some of today's most prominent commentators on the information society (a fair number of whom hail from Pool's illustrious university), Pool is demonstrably more circumspect. While he insists that "dispersed, decentralized, and easily available" media--like the printing press and microcomputers--lead to freer societies, he recognizes that some media (broadcasting, for example) can lead to totalitarian societies and that cross-owner-

ship can restrict the social use of media (1983: 5). The problem, Pool insists, is that as media technologies converge, policy will suffer from historical inertia. While a balanced analysis, Pool still clearly sees media, and especially modern distributed digital networks, as promoting democracy when left unfettered.

Increasingly, the spread of communication technology, democracy, and capitalism have been strongly linked⁵; so much so that the terms "Information Society" and "Information Economy" are often used interchangeably. However, the discourse surrounding the expansion of the Internet has moved slowly but inevitably away from one centered around political issues and toward economic questions⁶. The United States has remained at the forefront of the push to take a market-oriented approach. From supporting extended intellectual property rights of electronic media in the World Intellectual Property Organization to championing free trade in cyberspace, the US has sought to create an environment favorable for its cultural exports (Caruso, 1998; Maggs, 1998; Schiller, 1995). A policy that promotes the homogenization of world culture (following an American model, of course) has even been suggested as being in the best interests of the United States and the world at large (Rothkopf, 1997). Those in favor of a world sharing democratic and capitalist ideals often view their battle as one against regulation and against national control.

While it sometimes seems that commentaries on new media are overwhelmingly optimistic, there is a body of criticism attacking the economic externalities of the information economy, the cultural and political results of global homogenization, the dilution of "traditional" local values, the lack of cultural and political autonomy, and the loss of "authenticity" in an increasingly hyperreal world. However, unlike the more positive take on technology that seems prevalent, it is difficult to find those who fault communication technologies for the world's ills. Theodore Roszak's *Cult of Information* (1994) and Neil Postman's *Technopoly* (1993) are often cited as examples of neo-Luddite thought. Both authors, however, admit to being technophiles—technophiles who feel that communication technology must be managed to ensure that it remains a tool of society rather than society becoming a tool

of tools.

To find a voice clearly suspect of the unregulated expansion of global communication, we may turn to Herbert Schiller, who in 1981 was already suggesting a "go-slow" approach and careful regulation of the process of computerization in corporate America. Schiller argues that "the fusion of economic strength and information control or image-making, public opinion-formation, or call it what you will, is the new quintessence of power, international and domestic" (1992:45). For Schiller, it is impossible to separate communication technology from the corporations that control that technology. Because the economics of broadcasting require an agglomeration of mass audiences, the communication industry becomes a natural monopoly. American television and film companies, as the originators of communications technologies and organization, have an insurmountable advantage. The barriers to entry (in terms of infrastructure, equipment, and "talent") mean that even countries with a history of producing cultural products are quickly becoming "Americanized." Moreover, because large American business interests are often in alignment with American political and military interests on the world stage, America's cultural industries can be seen as a tool for American domination of markets and peoples.

Schiller's argument, well supported empirically, seems particularly strong within the world of broadcast communication. Also of particular interest is Schiller's linking of the economic and technological. While film, as a medium, places no particular restrictions on how it is distributed, because film-making is such a capital-intensive process the economies of scale that arise promote a centralized pattern of distribution--just the sort of distribution Pool warns against. Schiller's argument at times seems dated--which it is: *Mass Communication and American Empire* was first published in 1969. But at the same time, many of the problems he predicted have come to pass: the U.S. remains by far the dominant cultural exporter. And the promises of Pool and those who follow in his footsteps remain just that: promises.

Schiller continues to defend his original thesis, even during a period when the Internet is growing at a rate unprecedented for a "new media." In an updated introduction to the 1992 re-print

of his book, Schiller suggests that the intervening decades have served to demonstrate his thesis rather than refute it. The Persian Gulf War, covered almost exclusively by CNN, serves as the perfect example of the extent to which broadcasting has become an oligopoly in the service of American interests. In answer to those promoting the new computer networks, Schiller suggests that we ask where these networks came from, who is using them, and what are they being used for. The economic orientation of these new networking technologies, part of the "internationalization of the corporate perspective," means that these networks, though they may be distributed from a technological point of view, fit within the framework of a cultural industry that thrives on economic oligopoly/oligarchy. Already, we are beginning to see large media conglomerates beginning to colonize the web. The sites they design are clearly means to reach millions; media giants need giant audiences and the result is naturally a broadcasting model for their web presence. Even if new technologies and globalized economic structures begin to eat away at the US-centric global media structure, Schiller insists that the cultural effects of this structure—the worldwide acceptance of English as the *lingua franca* being the most obvious—will remain important well into the coming century.

While Schiller is perhaps one of the most outspoken and steadfast of those who suggest technology poses a problem as much as a solution, there are a host of others who, in Daniel Dennett's words, feel that technology "is today poised to *ruin our lives*." (1998:368, orig. ital.) It can do this by outmoding earlier, more culturally-based, ways of doing things. Dennett worries that technology, because efficiency demands its adoption, is gradually eroding the "art" of living. In other words, culture (and politics and other "non-technological" processes and organizations) are being pressed aside by the increasing use of technology in society. One of Dennett's proposed answers to this problem is designing systems that open possibilities rather than close them. He suggests we build machines that are more like pianos and less like toasters, machines that encourage virtuosity and continued states of learning. When applied to the realm of communication technolo-

gies, such an approach seems very appealing. There are naturally limits to the degree these systems may be guided into creative directions, but these self-organizing networks can still be influenced. As we shall see in chapter four, for the social benefits of networked communication to be realized, we must learn to guide the development of the network without centralizing control.

Dennett's idea—that technology is supplanting culture—is echoed in the work of Neil Postman. In *Technopoly*, Postman suggests that we are increasingly becoming "tools of our tools" (Thoreau, cited by Postman, 1992:3). That is, technology is adopted simply because it is new, and the focus remains exclusively on the benefits of new technology without discussion of the possible problems it will bring. For Postman, technologies are cultural and ideological insofar as they have cultural and ideological effects. The only way to ensure that technology is adapted in a sensible way, Postman claims, is to turn to history and recognize that ideas and societies are linked not only across space, but across time as well. In linking technology to ideology and social practice, Postman joins forces with an array of critiques of technology.

Many of the those who recognize that with technology comes danger, also point out that one of the most dangerous aspects of technology is its ability to render opposition mute. One need only note the irony of Web-based neo-Luddites, or the distribution of Ted Kazinski's manifesto on the Internet to recognize the difficulty in distributing discordant views of new communications media. Moving criticism of new communication media out of the "sphere of legitimate controversy"⁷ makes it all the harder to resolve the tensions between new media and traditional institutions. A century ago, Alexis de Tocqueville noted that the supremacy of the technological and the novel was a hallmark of American society (1991:esp. v.2, pp.35-47). Perhaps it is time that this view be balanced by a healthy dose of skepticism.

Pool and Schiller are often seen as belonging to opposing camps. Given that, perhaps what is most stunning is the degree to which these two authors agree. We see, for example few arguments that technology doesn't make any difference, or that it makes all

the difference. Rather, with the exception of the extremely optimistic view of the technological élite, it seems that both camps agree on a certain form of "soft determinism" (Pool, 1983:5). They both recognize that technology has an impact on culture, and agree that regulation should be shaped that controls some uses of that technology. Rather than being representative of polarized groups these views strike me as being different points on a continuum. Pool clearly sees a role for regulation of certain communication technologies: namely, those which are centralized and lead to domination. Schiller is also in favor of restraining communication technologies that are homogenizing and used in the interest of furthering an American empire, while he promotes putting media in the hands of the many. The question, then, is how as a society we might be able to encourage the development of distributed communication and avoid the centralization of these networks. Before being able to control these characteristics, if controlling them is possible, we must find a way to measure their relative distribution or centralization.

Communication Flows as Boundaries: Autonomous Networks

The physical infrastructure that makes up the Internet is relatively decentralized and distributed⁸. The communication and social networks it supports, however, are far more plastic in terms of homogenous and distributed or exclusionary and hierarchical networks. Despite the potential of the World Wide Web to provide a voice for the individual "publisher," in reality the time and expertise required to produce an appealing web page is contributing to a professionalization of the Web. In fact, the World Wide Web is hardly as distributed as, for example, the telephone. That is to say, the designer of a site hopes that her or his message will reach a large number of others. In this respect, it is in part a narrowcasting medium. Of course, e-mail, IRC, MUD/MOOs, and other applications of the Internet reinforce the view that the Web is a many-to-many medium. But it is the static Web that has become the most popular, and perhaps the "killer app" of the Internet. Moreover, the Web is quickly embracing and consuming

other applications. That is to say, applications like e-mail and IRC are becoming extensions of the Web (e.g., Hotmail and ICQ) rather than stand-alone applications. The latest web browsers are no longer limited to HTML/HTTP, but can be extended to encompass any of a number of functions.

This "webification" of the Internet, in and of itself, is not worrying. It does, however, demonstrate the degree to which the Internet as a whole falls somewhere between the distributed networks supported by one-to-one telephone systems and the one-to-world film production of Hollywood. While the physical infrastructure of the Internet is fairly decentralized, it is possible to name the central sites of the Internet. The *Yahoo!* search engine receives more hits than any other web site on the Net. Along with other popular sites, what have come to be called "portals", it could be said to form the core of the Internet, a core that not coincidentally is created and maintained in the United States.

I introduce this idea of the Web as a less than distributed communication network, an idea explored more concretely in the coming chapter, to provide an example of how communication networks might be used to indicate the shape of global social networks. Examining patterns of communication to determine social organization is hardly a new idea. While social network analysis has often relied on subjective measures of networking ("List your three closest friends."), some have recognized the potential of measuring contacts directly by observing patterns of communication. The emergence of hypermedia provides a particularly abundant source of information about the existence of social networks and how these networks evolve. The use of media to measure public opinion is far from unknown in the communication discipline (Fan, 1988; Pool, 1970), but measuring social structure remains a less developed area. Herbert Casson noted that the telephone system could be used as an indicator of social and economic networks early in the development of that medium. In 1910, Casson suggested that the Bell Company's "foresight department," then used to predict demand for telephone infrastructure, might one day become a tool for studying social networks:

It may, if a leader of genius appear, become the first real corps of practical sociologists, which will substitute facts for the present hotch-potch of theories. It will prepare a "fundamental plan" of the whole United States, showing the centre of each industry and the main runways of traffic. It will act upon the basic fact that *wherever there is interdependence, there is bound to be telephony*; and it will therefore prepare maps of interdependence, showing the widely scattered groups of industry and finance, and the lines that weave them into a pattern of national cooperation. (Casson, 1910:96-97, orig. ital.)

When compared to the telephone network, the Internet provides a better indicator of the social ties among those who use it. Chapter three offers an example of measuring the structure described by web links instead of telephone wires. Like the society that supports it, clusters on the Web "arise, exist, and disintegrate," in a dynamic pattern of association (Chelnokov & Zephyrova, 1997). The establishment of web links is far more elastic and transient (and requires infinitely less resources) than the building of physical infrastructure. The Internet provides an excellent source of data for the social scientist attempting to map communication flows and the social structures they support, and attempting to measure how these patterns change over time⁹.

The idea of measuring social and political groups by studying their communication patterns appears influentially in the work of Karl Deutsch. Deutsch suggests that most analysis of political structure describes the institutions of government and the practice of power within these institutions. While these elements might be described as the "bones" and "muscle" of political structure, often less attention is paid to the "nerves" of government (Deutsch, 1966). An analysis of social communication flows "can separate the factors which men cannot change, or can change but a little, and it can thus show the limitations which they pose to what men can do in the future; and second, by contrast, it can single out the most promising areas for action" (Deutsch, 1953:163).

While Deutsch's early work drew heavily from the ideas of

cybernetics, and was especially interested in the "steering" of social groups, the foundation he prepares gives us a good basis for measuring group cohesion by observing communication. Deutsch suggests that groups at any level—including the national level—can be measured by the degree to which they communicate. Thus, group borders can be drawn by observing the flow among individuals.

Once the degree of group cohesiveness has been determined, we can move on to investigating the degree to which a group is autonomous. For Deutsch, autonomy is the most significant measure of a just and good government. We must ask to what degree the messages of control are generated from a diverse selection within the group itself. The increase of messages of control that are distributed within a social group gives rise to a collective will or "consciousness." The approach taken throughout this study relies heavily on the work of Deutsch. However, through much of Deutsch's work runs the idea of relatively binary group inclusion. The measurement and analytical tools available to Deutsch made discerning the complex interaction of groups difficult. Moreover, that complexity is far more pronounced today than it has been in recent decades, and group membership often overlaps and intertwines (Conner, 1972; Deibert, 1997:20).

This idea of an internetworked world has been taken to an extreme recently with the concept of the "global brain," the idea that an increase in global communication will lead to increased complexification of social structure¹⁰ and result in a new global consciousness. An early mention of the idea of a global brain came from H.G. Wells, who in 1937 discussed the effects of contemporary global communication advances, which had brought about "a complete revolution in our relation to distances" (1938:42). He proposed a "permanent institution—untrammelled by precedent, a new institution—something *added* to the world network of universities, linking and coordinating them with one another and with the general intelligence of the world" (p. 68). More recently, Marvin Minsky has theorized that the autonomous social group can be a good metaphor for how the brain behaves (1985).

The distributed network as implemented in the Internet has

renewed interest in the idea of a global brain. Though the idea of a adaptive collective social system has existed for some time (Dyson, 1997, discusses threads of such thoughts throughout the philosophical tradition), the Internet has provided a focus point for supporting and studying the evolution of collective self-organization (Johnson et al, 1998). A number of researchers have suggested that the Internet, and especially the World Wide Web (Heylighen & Bollen, 1996; Berners-Lee, 1997), is capable of supporting clear and flexible communication that is topologically analogous to the human brain (Mayer-Kress & Barczys, 1995) and other complex biological systems. Pierre Lévy's recently translated *Collective Intelligence* (1997) has brought many of these ideas out of the complex systems arcana and presented them in a readable, if sometimes confusing, style.

Of course, this conception is not without problems. The human brain does not operate in a vacuum, and has little success in acting on itself (despite the thriving "self-help" trade). Can we really describe the global brain as autonomous if it is also universal? Perhaps what is most of value in the global brain analogy is the idea that a global network can be interconnected, yet not homogenous. Just as intelligence in the human brain is both distributed and at the same time differentiated (Springer & Deutsch, 1981), the evolving global communication system has and will continue to evolve into an increasingly complex system of interdependencies. Moreover, as an analogy the "global brain" immediately conveys the idea of searching for structure in an interconnected world.

The Nation and the State In a Networked World: Whither Sovereignty?

It is time, once again, to briefly take up the problem of sovereignty before exploring questions of the nation and state in more depth in the final chapter. In particular, it is necessary to describe the relationship of traditional views of sovereignty to the ideas of autonomy put forward by Deutsch. Relating these two concepts will be made much easier by drawing a distinction between

the concept of "nation" and that of the "state." I have in mind two particular and distinct meanings for these words. The nation corresponds to a group among whom communication flows are strongest and differentiated from other nations by a relative lack of communication. The state, on the other hand, corresponds to the institutions and systems of control and power. Ideally, these two systems should be isomorphic. That is to say that the institutions and systems of control and power should be distributed evenly across a nation of like-minded souls. However, the nation-state in reality is always an approximation of this isomorphism. The degree to which the state and nation coincide is at the core of Deutsch's arguments of autonomy in social groups.

Autonomous social networks exist within a space of communication flows, areas in which communication among members is more frequent. These clusters can be said to have "borders": areas around which communication is less frequent. This leads to a collective understanding of what and who is part of the nation, or an "imagined community," to use Benedict Anderson's (1991) familiar term. Appadurai (1996), following those with a structuralist bent, defines culture by its boundaries, as a system of differences rather than a substantive attribute. We can extend this idea to that of nations, defining them in terms of how they culturally and communicatively differentiate themselves from other nations. Measuring communicative flows on a large scale should provide some cues as to where national borders are being drawn in the collective imagination (Janelle, 1991).

This concept of the nation stands in contrast to the institutions of the state, which defend the borders of the state within a context of proffered universal values. This seeming prerequisite of statehood—exclusive control of a claimed territory—is what is commonly referred to as "national" sovereignty (Goodwin, 1974:100). However, it is the state, and not the nation, that claims sovereignty over a people within a territorially defined area. The history of state control is one of drawing and re-drawing borders, and the state is indeed threatened by movements in the collective imagination that run counter to these enduring political lines. As nationality is decreasingly tied to physical

location, state institutions have failed to make similar changes. While nations rely on "deep, horizontal comradeship," (Anderson, 1991:6) states rely on coercion delivered through a hierarchical bureaucracy (Crozier, 1964). As the centrally controlled state becomes increasingly estranged from the autonomous nation, the stresses of statehood are becoming apparent. The movement from a dependence on power relationships to a dependence on networks has been a long-standing process. The continuing trend toward deregulation and the end of centralist state in the Eastern Block has led many to insist that "the forms of legitimacy of the centralized state have crumbled" (Mattelart & Strourdze, 1985:18).

We have come to accept that the nation is more than the government and people of a territorially defined area. Territoriality exerts itself most often as a historical force than a present reality. The ease of relocating around the world and the growth of transnational corporations are increasingly calling into question how to decide who is American. Does meeting the strictly legal requirements of citizenship qualify one as an American? Or does being American have more to do with sharing a common culture, language, and belief system? The answer is that the two ideally should coincide.

We should be able to come to a decision of where one nation ends and the next begins by measuring flows of information. In other words, Americans talk mostly to other Americans. In the modern world, such a definition would lead to an amorphous view of nationality. Someone might be American one day and German the next, depending on the projects he or she was working on. Moreover, this does not correspond well to our commonsense idea of what a nation is. Instantaneous individual communication flows cannot accurately measure an individual's nationality. That is to say, it is impossible to determine cliques in a network by examining only one member of that network at only one time. For example, in terms of identity, someone raised in Korea who has lived in the United States for many years often has difficulty choosing one nationality to the exclusion of another.

On the other hand, the administrative state requires a clear view as to jurisdiction. The idea that someone could be American

one day and French the next is not a particular difficulty. In some respects this is the situation of a traveler who by crossing an international border comes under the jurisdiction of a different state. However, the possibility that an individual's nationality could be indeterminate at a given time or location creates an administrative nightmare. This difficulty has been provisionally managed by declaring that jurisdiction is determined exclusively (or nearly so) by physical location. However, the increased transactions across these administrative borders has called into question the practice of determining jurisdiction through territorial boundaries.

In addition to questions of jurisdiction, the type of problem to be managed has changed. The form of the modern administrative state, that of bureaucracy, differs from emerging structures in other parts of social life. As we will discuss in chapter four, this is slowly changing, in part due to changes in the business world. However, institutions of government were designed to resist just the kind of rapid restructuring that is now necessary.

Although the issue of national borders is often couched in terms of "sovereignty," this term often clouds rather than clarifies the issues at hand (see Winter, 1970:148-151). Sovereignty, or the operationalized form thereof, has been under attack for some time¹¹. In order to manage the coming information society governments must alter the ways in which they control society and the ways in which they manage themselves. In order to determine the degree to which territoriality remains a valid measure of nationality I will, in the following chapter, provide a measurement of communicative flows across national borders on the World Wide Web. Through this example of a methodology for investigating the structure of the Internet, I hope to encourage other scholars to focus on the role of communicative borders in the global society, and at the same time provide policy-makers with the tools to understand the new social borders that are emerging.

Endnotes

¹ This phrase "the annihilation of space," can be traced back to the first telegraphed news story (Postman, 1985:64) and is echoed frequently in pronouncements on the Internet. In the words of Goodwin (1974:108), "distances have lost much of their terror—and their charm." See also Cairncross (1997), Carrey (1983), Czitrom (1982) .

² For an interesting account of how technological factors alone do not cause social orders to change, see He (1994) or Levinson (1997:22-25), who contrast the adoption of printing technology in Europe and China.

³ The idea that there exists just such an evolutionary "natural history" of communications technology is the premise of Levinson's (1997) book.

⁴ That is, a host of technologies merging the media have gained some notoriety of late: TV based Web content (WebPhore, InterCast), Web-based streaming audio and video, Internet telephony, and on-line newspapers among them.

⁵ Perhaps no more famously than in Francis Fukuyama's *The End of History* (1992).

⁶ A move that endangers the existence of "public space" in cyberspace according to Cees Hamelink ("The Future Governance of Cyberspace: Reflections on Human Rights in the 21st Century," a lecture at the University of Washington, 4 May 1998.)

⁷ Hallin (1989:116-118) uses this phrase to describe areas of journalistic inquiry that challenge the status quo. Suggestions that new technologies *not* be adopted move beyond acceptable criticism and into the "sphere of deviance."

⁸ Although one could argue that there are points of convergence and centrality. For example, one can measure the distance between servers and determine the degree of centrality or proximity to a backbone of a particular server. One could fairly say that a computer connected to the Internet via a 2400 bps modem is on the periphery of the network. The introduction of Internet II will bring further degrees of centrality and hierarchy to the physical infrastructure.

⁹ Once again, I should note that technology brings about certain social organization just as social organizations affect the creation of tech-

nology. "Soft determinism" suggests that technology still affects society, but that the relationship is definitely reciprocal. This is perhaps more true of the Internet than it is of earlier media, simply because the Web is continuously recreated by millions of authors. Nonetheless, I do not want to give the impression that technology is wholly determined by social organization.

¹⁰ There are a number of technical descriptions of what "complexity" means (e.g., Wolpart, 1997). Here I am using the term loosely. Returning to Burton's cobweb model, think of how social networks have changed with the advent of new communications technology and institutional structures. In the "company town" networks for work, leisure, and family often came down to fairly similar connections. Even earlier in this century, those networks were likely to be more or less geographically restricted. Recent networks are likely to vary according to activity and interest and have much wider (or worldwide) geographic distribution.

¹¹ "... the extent to which the capacity of states to exercise the rights that derive from their sovereignty has been so circumscribed by the increasing pressures of the modern world and by the growing interdependence and interpenetrating of states that in practice sovereignty itself has become something of an anachronism..." (Goodwin, 1974:101)

CHAPTER III
A Measure of Trans-border Linkages on the WWW

The previous two chapters have argued that the most relevant measure of nationality in the rapidly informatizing world is a measure of aggregate communication flow among and between groups. A valuable way to measure the existence of national borders (as we have defined them) would be to take a communication medium and determine where cliques have formed. My objective, however, in the survey that follows is to determine the degree to which territorial boundaries correspond to flows of communication. To do so, I have analyzed a sample of sites on the World Wide Web to determine the degree to which they link to other international and domestic web sites. This is hoped to be a much-needed contribution to the question of how we might approach an empirical investigation of the structure of the Web.

Hypermedia and World Society

Before going on to describe an example of measuring the structure of world society by examining communication linkages on the Internet, it makes sense to briefly discuss the salient aspects of this new medium with regard to social organization. This is a continuation of the discussion found in chapter two about communication media and world orders. You will recall that we found much of Eisenstein's taxonomy of the social effects of the printing press pointed in the direction of what we might expect from the Net: that is, a new convergence and commonality in world culture, but at the same time challenges to overarching hierarchical structures. We will see the localization of knowledge and culture within cliques, yet that knowledge and culture will remain accessible from points throughout the network. This will occur through a further flattening of the network topology that began with the introduction of earlier more or less distributed media: the printing press and the telephone exchange.

However, many argue that the Internet and especially the World Wide Web are more than just the latest evolutionary step in distributed communication networks, that they will instead usher in a new Renaissance. Ronald Deibert (1997) presents very convincing argument that the changes underway—both distributional and to what he refers to as "social epistemology"—are on the scale of the rapid social changes that accompanied the diffusion of the printing press. The reason for this is the character of the new *hypermedia*, by which he means both the convergence of various technologies (those that might be contained within the military rubric C³I: Command, Control, Communications, and Intelligence),

and the hyperlinking among these disparate media. Deibert sees hypermedia as the next step in the information revolution, a revolution that is being held back only by corporate interests and governmental regulation. He refers to the present world as a "web of webs," and suggests that the World Wide Web, which since the time he wrote the book has increased in size more than a hundred fold, is the "paradigmatic" hypermedia (p.133).

Diebert—along with Couch (1996) and Levinson (1997) who share Diebert's approach to "medium theory"—describe certain social and organizational changes that will be encouraged by these new media. These changes that meet the "fitness" test for hypermedia are precisely the sort we encountered in the first and second chapters. As communication becomes more distributed we have a greater degree of choice as to what relationships we want to pursue. The result is that networks of relationships that once coincided relatively well with the geography in which we lived are now quickly becoming stitched together in ever-increasing patterns of complexity. The face-to-face relationship retains primacy, and will for some time; but in a number of areas, relationships have a strong tendency to be aspatial in nature. Some of these environments under which aspatial relationships prevail have long sought to counter the encumbrances of geography. The diplomat and politician, the artist and scholar have all fought to establish networks of relationships across expanses of physical space. Then there are those who work in telephone call centers who are forbidden by policy to reveal their geographic location, amateur genealogists who draw family nets over space and time, members of minorities who find that they are among a majority in some groups that are not defined by space, and a host of other social networks that make use of (and perhaps come about because of) the explosion of space-adjusting technologies.

These aspatial networks have already reached a critical mass, and soon will be the norm rather than the exception. The changes that are taking place are as insidious as they are complete. Innis suggested that these sea changes in world order occur when the control of knowledge shifts. Just such a shift is occurring today. The new communicative environment will not be a one-dimensional homogenous world, but rather a planetary collective of localities that are linked into such complicated cobwebs that disaggregation will be an almost impossible task. But that is tomorrow, what of today's Net?

A Structural Approach to Studying the Internet

Researchers have been quick to see the Internet as a potentially rich field for exploring questions of social organization

and communication. Marketers have also seen the potential of the Internet and made attempts to measure its profit-making potential. The study that follows differs from the bulk of work on the Internet in that it attempts to arrive at a structural description of the environment of the Web, on the assumption that hypermedia is a communication system in which structure plays an especially important role (Nürnberg et al, 1997).

One of the most often employed approaches to the Internet stems from studies in Human Computer Interfaces (HCI). Early work in HCI was interdisciplinary in nature, applying the work of psychologists and cognitive scientists to design for more efficient communication between the machine and user (Card et al, 1983). With the emergence of computer-based communication networks, work in HCI began to move into more social issues, and gradually gave way to the study of Computer-Mediated Communication (CMC). While CMC is often considered inclusive of any investigation of computer networks for communication, the interface is often emphasized in many of these studies (Johnson, 1997; Turkle, 1995).

Attempts at measuring the Web thus far have been focused on who uses the Internet (Harkness et al, 1996; Kehoe and Pitkow, 1996), why they use it (Pitkow, 1996), the emergence of community and friendship on the Net (Jones, 1997; Parks & Floyd, 1996; Rheingold, 1994; Walther, 1996), efficiency of distributed computer-supported collective work (Wellman et al, 1996), and similar foci for which the structural peculiarities of the medium take a back seat to how it is used. All of these studies are, of course, valuable to an understanding of the medium. However, the structure of the new communication environment remains relatively unexplored.

One way of uncovering the structure of the Internet would be to examine the flow of information transversing the network. An ideal measure of communicative flow would not measure only the transmission of a message between nodes, but the content of those messages. Measuring simply the existence of a message does not tell us anything about how that message might be received. We can assume, for example, that an email from a close friend carries more "weight" than an e-mailed advertisement for an egg slicer. However, measures of flow alone give us some approximation of the communication going on. Attempts to record the flow or traffic of information on the Internet as a whole is the project of the Cooperative Association of Internet Data Analysis (Press, 1997). The main use of this data is technological (planning for the development of infrastructure) rather than social. Difficulties in mapping data traffic to users or machines makes applying this information challenging. On a smaller scale, a variety of logging options are available, but these fail to provide a global sample of

traffic, and restrict information to domains of varying sizes (Abrams, 1998; Catledge & Pitkow, 1995). Certainly data flow statistics represent an exciting resource, but, at least for now, difficulties in collecting these data lead us to seek out other alternatives.

On the other end of the spectrum is the possibility, as Casson suggested, of measuring physical infrastructure (Press, 1997). We might say that, for example, because the Ivory Coast has only a third as many servers as Jamaica that it is a third as engaged in the totality of the Internet. In fact, this may not be the case at all (see Morland, 1998). The servers in the Ivory Coast may host a great number of pages or be used far more frequently than computers elsewhere. Or they may not be connected to the greater Net in any meaningful way—through, for example, widely interlinked web pages. The problem in measuring infrastructure alone is that it tells us little about how that infrastructure is being used. Moreover, it tells us more about government and business planning than it does about the social self-organization of the network.

The approach used in the study below falls somewhere between these two extremes. It is the approach most often used by the new geographers of the Net (e.g., Batty & Barr, 1994; Dodge, 1998), who attempt to measure what is sometimes called the "infostructure" of the World Wide Web: the way web sites are connected to one another. In some respects, this is similar to a study of physical infrastructure in that it represents a relatively long-term connection (compared to, for example, a single e-mail), and favors a view of the Internet from the perspective of the "builders," a subset of Web users who have the expertise and desire to establish a web site. Such an analysis does not measure how this established "infostructure" is used. For example, the *Yahoo!* site, though it is the most visited site on the Net, as a portal it may not figure as prominently in an analysis of links. Despite these difficulties, linkage analysis presents an exciting resource for the researcher interested in the structure of the Web (Jackson, 1997).

Though certainly not as common as other investigations of the Internet, linkage structure is increasingly becoming a key component of understanding the ecology of the Web (Pirolli et al, 1996; Spertus, 1997). A number of studies have attempted to examine a corpus of web sites to determine some combination of structure and content characteristics. The approach taken by Fagrell and Sørensen (1997) most closely resembles the current work. Fagrell and Sørensen's study, however, is primarily an investigation into methodology, examining the way in which automated crawlers can be used to accumulate various structural and statistical

information from the Web. Others concentrate on the content of a group of web pages (Bray, 1996; Ho, 1997), or on the structure of their linkages (Larson, 1997) or some combination of both (Chen, 1997). Although the nature of a link can be debated (Bardini, 1997; Jackson, 1997; Kolb, 1996), it is clear that it represents a pathway directly between one site and another. Treating these links as a binary indicator is, I think, a reasonable abstraction. The present study is the first work to my knowledge that attempts to use linkage information to discover the degree to which national borders appear on the Web.

There is some work currently underway that aims to catalog linkage data as a heuristic device to better search or browse the web (Bharat et al, 1998; Chakrabarti et al, 1998). Such information can be used to create a map of the topology of the web, indicating the most linked-to, and thus more "important" sites (Carrière & Kazman, 1997). Much of this stems from pre-Internet studies of hypertext topology. However, as has been suggested above, this information about the structure of the Internet can also be used as a kind of indicator of the social and knowledge networks it supports. This latter use of linkage data has been little explored, and the following survey of web sites is meant to serve as a small step in that direction.

The Sample

The first, and in many ways the most difficult problem facing the researcher interested in the Web is obtaining a valid sample. A truly random sample of web pages, or even a reasonable approximation thereof, is unobtainable within the foreseeable future. The addressing system of the web resists the kind of random sampling available, for example, in a telephone or mailed survey (Semeria, 1998). This is in large part because there is no index of the Web that comes even close to telephone or mail directories. Estimates show that as little as five percent of the web is indexed (Lawrence & Giles, 1998). That five percent makes up what we might call the "public" web. The only way search engines can know that a web site exists is if that site is in some way made known to the rest of the web by its author. Some search engines, including *Yahoo!* and *Excite!* rely upon the site administrators to submit their sites for consideration. Even those that employ heavy use of exploratory spiders will only arrive at a site if it is referenced via a hyperlink somewhere else on the Web. This leaves a large number of HTML pages that remain, for all intents, not connected to the Web as a whole. The reliance on a set of indices that were collected with a variety of biases makes any sample dependent on their (often proprietary) methodology.

The sample used in this survey consisted of 4000 sites drawn from Excite's *Webcrawler* search engine, using its web-based "roulette" page. *Webcrawler* is an engine that combines submitted, edited sites and those obtained using, naturally, a web-crawler. Using a randomizer provided by the engine, while certainly a flawed approach, is a relatively simple way of obtaining a reasonably good sample, and a method suggested by at least one statistician for those interested in studying the Web (Lock, 1997). The size of the *Webcrawler* index is quite small compared to many of the other available indices (Lawrence & Giles, 1998). However, given the added difficulties of querying a more extensive site and the status of this study as a proving grounds for future research, the sample seems adequate. The sample provided may be skewed toward American, English-speaking web sites, though lacking anything approaching a census of the Web, it is difficult to estimate how biased the sample is in this regard. One possibility is to compare the worldwide distribution of registered web domains and host addresses with the distribution of sites in the sample. Table 1 summarizes how the sample compares in these terms. Overall, we would expect to see more web sites in the U.S. (given its first-in advantage of several years), and the percentages demonstrate that the sample is fairly representative in terms of geographic distribution. There is still a possibility however, that the *Webcrawler* base represents a strong English-language bias. In order to mitigate some of the distributional issues, note that the findings are averaged to groups in the following work. For example, rather than describing the total number of links from a given country, the average proportion of links for sites in a given country are re-

Table 1 - Sample compared to the world wide distribution of domains and hosts.

<u>Country</u>	<u>Domains</u>	<u>% of Total</u>	<u>Hosts</u>	<u>% of Total</u>	<u>Sites in Sample</u>	<u>% of Total</u>	<u>Links to</u>	<u>% of Total</u>
United States	2,768,476	73.7%	20,623,323	69.5%	2,874	78.0%	41,209	77.2%
Germany	147,431	3.9%	994,926	3.4%	101	2.7%	1,166	2.2%
United Kingdom	130,750	3.5%	987,733	3.3%	157	4.3%	1,586	3.0%
Sweden	54,538	1.5%	319,065	1.1%	62	1.7%	623	1.2%
Australia	50,938	1.4%	665,403	2.2%	43	1.2%	861	1.6%
Netherlands	37,926	1.0%	381,172	1.3%	49	1.3%	546	1.0%
Japan	37,157	1.0%	1,168,956	3.9%	27	0.7%	410	0.8%
Canada	37,157	1.0%	839,141	2.8%	88	2.4%	1,241	2.3%
Switzerland	34,832	0.9%	114,816	0.4%	18	0.5%	288	0.5%
Brazil	29,111	0.8%	117,200	0.4%	9	0.2%	123	0.2%
Italy	29,074	0.8%	243,250	0.8%	37	1.0%	357	0.7%
New Zealand	22,747	0.6%	169,264	0.6%	7	0.2%	63	0.1%
South Africa	19,515	0.5%	122,025	0.4%	8	0.2%	98	0.2%
France	19,353	0.5%	333,306	1.1%	25	0.7%	262	0.5%
Norway	16,133	0.4%	286,338	1.0%	20	0.5%	1	0.0%
Others	319,778	8.5%	2,303,693	7.8%	161	4.4%	4,533	8.5%
Total	3,754,916		29,669,611		3,686		53,367	

ported.

Other approaches to obtaining a sample of the Web for specific research have been varied. For certain uses, a domain-specific sample may be obtained from the search engines (Larson, 1996). Given that this survey is aimed at a global view of the Web, such an approach would be inappropriate. Bharat and Broder (1998) obtained their sample by first assembling a sample of Yahoo! pages to determine the frequency of given words in web documents, then used those words to query different search engines. While certainly a reasonable approach for their objectives, such a process would yield very little in the way of a better sample for the survey undertaken here. Finally, many attempts to determine the character of the "average" web page are based on incomplete but extensive samples provided during the construction or operation of a search engine (Bray, 1996; Woodruff et al, 1996). Because of the competitive nature of the search engine business, complete indices are considered proprietary and not normally available to the researcher. The sample of seed URLs remains the weakest point of this study, and future samples might be gathered through a systematic sampling of a range of search engines.

It should be noted that a fairly narrow definition of a "site" was taken: only links that were proximate to the "base URL" of the page indexed in the sample were included. This represents a compromise between choosing an individual page as a unit and restricting the analysis to a given domain. The former, the more popular choice for surveys of web content, ignores the intent of the author that the pages be bound together as a whole. An analysis of these top-level pages alone would likely contain far less links than were found by digging down into the hierarchy of each site. Likewise, domains were not selected, as they often contain more than a single web site and these sites may or may not be interconnected. This is particularly true of personal home pages at a business or university which may not be connected to other sites in the same domain. As a result, the sample contains several hundred sites within large domains like Geocities, Tripod, AOL, and Angelfire.

The Spider and Analysis

A web spider is a program that is designed to mimic a user's behavior, automatically transversing a section of the web by following links. After trials with several commercial spiders (*MacroBot*, among others), it was decided to construct a spider designed specifically for the study. The spider was written in the Python scripting language, which provides excellent string han-

dling, quick prototyping, and good portability. While problems still remain—particularly with reading and crawling some image maps, frames, and dynamic pages—the spider is able to process most pages it encounters.

For each URL in the sample, the crawler accessed the first 30 pages of a breadth-first crawl. All of the links on a given page were recorded and divided between those internal and external to the site, depending on the base URL of the original page listed in the sample. The first 15 Kbytes of text was also recorded for each page at the site. Of the 4000 sites, 304 (or just under 8%) could not be extracted by the crawler for various reasons, a proportion consistent with that reported by Pitkow (1998). The total number of pages accessed was 45,457, and in total 53,367 external links were recorded.

The URLs from both the sites in the sample and the list of external links were processed to determine location. In most cases, the top level domain (TLD) was used to determine the country of location. Those TLDs that were registered through Internic (.com, .org, .edu, .net, and .int) were checked against the registry database to determine the physical location of the registering party. Roughly 6% of these domains were located outside of the United States. The registered location of the domain supporting a given web site is only an approximation of the actual location of each web site. Sites are sometimes hosted by servers outside their home country. This is particularly true of many of the large servers that offer free web space. As Quarterman (1996), demonstrates, a site may be authored, maintained, hosted, and registered all in different countries. Given these caveats, the domain registration appears to be the best approximation of physical location for a medium that does not privilege such information.

A number of alternatives for categorizing the text sample into topics and languages were considered, including hand-coding and using one of a number of text analysis systems. Because categories were broad, and sizable text samples were available for each site, it was decided that categorization could be based directly on statistical comparisons, without disambiguating or lemmatizing the text (see Alexa, 1997). This alleviated the difficulties of constructing a categorization dictionary, an unnecessarily time-consuming process (Stone et al, 1966). A method was devised to compare each of the text samples against a list of keywords accumulated from a group of model pages. Though imperfect (a number of sites required hand-coding), the categorization scheme was relatively successful.

A total of 20 sample pages for each of 19 topic categories in the *Yahoo!* directory were collected. A frequency analysis of words found in these pages was completed, excluding a list of

words appearing frequently across all categories (articles, prepositions, "welcome," etc.) and words that appeared less than three times. The model pages were run through on-line dictionaries and translators to create model frequency lists in French, German, Spanish, and Swedish. A frequency analysis was done for each site in the sample and scored against the model frequencies for each of the categories. Each page was also checked for language identifiers to help find multi-lingual sites. Those pages with low scores across the board (often foreign language sites) were checked by hand, as were sites with an ambiguous winning score (i.e., with the runner-up within 10% of picked category). Those flagged either for low scores overall or occurrences of language names were checked to determine whether they were multi-lingual. Several categories were eventually combined, resulting in the 15 appearing in table 5.

In terms of method, the approach was moderately successful. The spider requires further refinement, but should continue to be useful in the future. The text categorization scheme was time consuming and could probably, in retrospect, be better accomplished using an established system like *TextPack*.

The Findings

The country in which a site is hosted is clearly a factor in how likely it is that the site will link internationally (see fig. 1). Table 2 shows the percentage of links from the top twelve countries represented in the sample to each of the other countries among the twelve. Note that this table includes only those sites that have external links, excluding 1,662 "dead-end" sites. The table demonstrates that the United States remains the preeminent provider of content for the World Wide Web. We may assume that this is due in large part to the sheer volume of American sites available. Moreover, the U.S. "consumes" (i.e., links to) more of its own web sites than those of any other country.

Sites in the UK, Canada, Sweden, and Italy are roughly as likely to link to a site in the United States as they are to link to another site domestically. Were this relationship reciprocal, we might say that there are no borders (that is, no clear disturbance in the uniform flow of information) between these countries and America. However, this is not the case. Sites in the United States are far more likely to link to other American sites than they are to link to sites in any of these countries. Japan, and to a lesser extent France, remain relatively isolated from other countries both in terms of linking to or being linked to from a foreign site.

Table 2 represents how the Web of today is linked

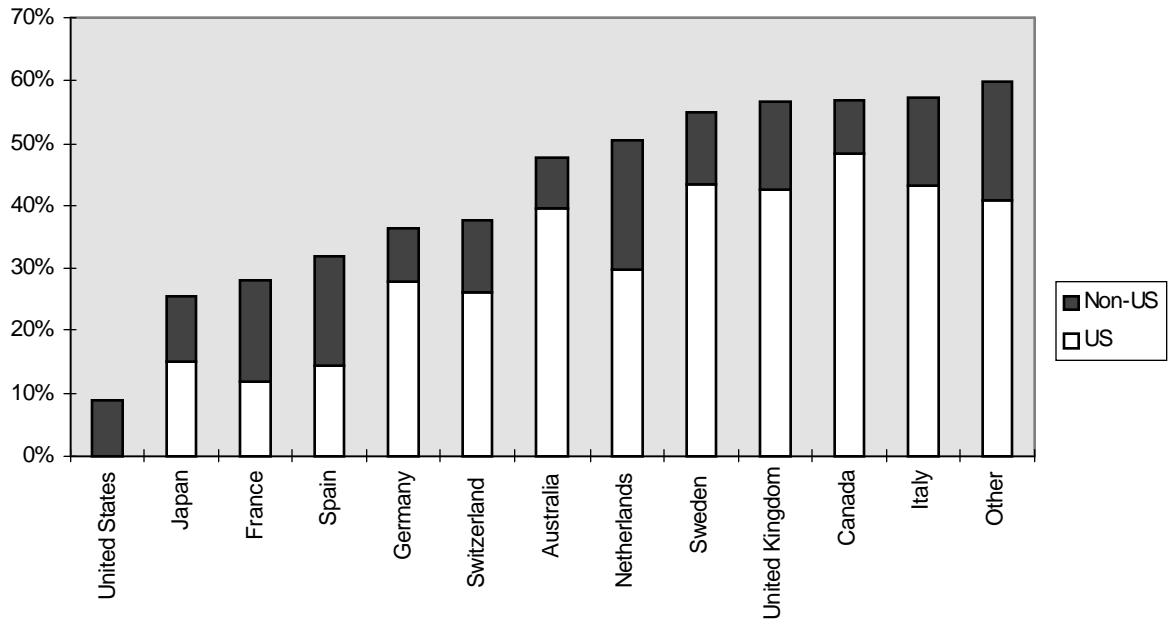


Figure 1 - International hyperlinks as a percentage of total links

transnationally. The centrality of the United States in terms of the proportion of web pages around the world that link to it is striking. However, these percentages may be misleading. Because the United States makes up such a large proportion of the entirety of the web, it is difficult to determine how much of this imbalance is due to a numerical dominance. Consider for a moment what we would expect to see in terms of linkages if the Web, distributed as it is today, had no social or topical boundaries. Given the concentration of web pages in the United States—about 78% of the total—we would expect that the likelihood of a given link anywhere in the world referring to an American page would be about 78%. Table 3 (and figure 2) weights the distribution of links in terms of these expected percentages, and provides us with a very different picture of how the Web might be linked if the distribution were spread evenly over the countries listed. France and Switzerland, while still very isolated, are now net exporters of web materials. The United States, on the other hand, appears to be comparatively outward looking. Weighting the distribution, while providing an acute demonstration of the degree to which the web is international despite US dominance, does not provide a very realistic picture of today's Web.

Another way of demonstrating the degree to which sheer num-

Sites in:	Linking to:												
	us	uk	ca	de	au	nl	se	jp	it	fr	es	ch	other
United States (us)	90.7%	1.9%	1.6%	0.5%	0.8%	0.5%	0.5%	0.3%	0.3%	0.4%	0.1%	0.4%	1.1%
United Kingdom (uk)	42.6%	43.4%	1.1%	1.3%	1.0%	1.3%	2.6%	0.1%	0.5%	0.6%	0.5%	1.0%	3.1%
Canada (ca)	48.2%	2.4%	43.1%	0.2%	1.7%	0.1%	0.5%	1.5%	0.0%	0.2%	0.0%	0.1%	1.9%
Germany (de)	27.7%	1.7%	0.4%	63.5%	0.0%	0.3%	0.4%	0.0%	0.4%	0.2%	2.3%	0.7%	2.2%
Australia (au)	39.7%	0.6%	0.5%	0.4%	52.5%	0.5%	0.5%	0.2%	0.5%	0.1%	0.0%	0.3%	3.6%
Netherlands (nl)	29.7%	7.3%	1.0%	4.3%	0.7%	49.4%	0.4%	0.1%	0.1%	0.1%	0.0%	0.3%	5.9%
Sweden (se)	43.3%	2.8%	1.0%	1.8%	1.0%	0.7%	44.9%	0.4%	0.1%	0.2%	0.0%	0.6%	2.5%
Japan (jp)	15.1%	0.3%	0.4%	0.0%	0.9%	1.0%	0.0%	74.6%	0.0%	0.1%	0.0%	3.1%	0.9%
Italy (it)	43.0%	5.6%	0.1%	0.3%	0.2%	2.8%	1.8%	0.0%	42.7%	0.3%	0.0%	1.8%	0.8%
France (fr)	11.8%	2.1%	11.0%	0.2%	0.0%	0.5%	0.0%	0.0%	0.7%	71.9%	0.0%	0.0%	1.7%
Spain (es)	14.3%	1.2%	0.1%	0.0%	0.1%	0.3%	0.0%	0.0%	0.4%	10.0%	68.1%	0.3%	1.2%
Switzerland (ch)	26.1%	6.2%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	62.2%	1.3%
Other Countries*	40.9%	1.7%	0.8%	1.8%	1.8%	1.1%	0.8%	0.3%	0.2%	0.3%	0.0%	1.4%	40.3%

Table 2 - Distribution of links by country (12 largest countries in sample)

Sites in:	Linking to:												
	us	uk	ca	de	au	nl	se	jp	it	fr	es	ch	other
United States (us)	19.6%	7.7%	9.5%	3.3%	9.9%	6.1%	6.3%	3.9%	5.3%	8.2%	3.8%	12.5%	3.9%
United Kingdom (uk)	2.6%	49.5%	1.9%	2.3%	3.6%	4.7%	10.0%	0.4%	2.6%	4.1%	5.1%	9.8%	3.3%
Canada (ca)	3.0%	2.8%	74.0%	0.3%	6.0%	0.2%	2.0%	6.4%	0.1%	1.4%	0.3%	1.4%	2.0%
Germany (de)	1.1%	1.2%	0.5%	73.0%	0.1%	0.8%	1.0%	0.1%	1.3%	0.9%	14.3%	4.5%	1.5%
Australia (au)	1.2%	0.3%	0.4%	0.3%	90.4%	0.9%	0.9%	0.4%	1.2%	0.4%	0.0%	1.7%	1.9%
Netherlands (nl)	0.9%	3.9%	0.8%	3.6%	1.1%	83.6%	0.7%	0.2%	0.2%	0.3%	0.1%	1.6%	3.0%
Sweden (se)	1.4%	1.6%	0.9%	1.6%	1.7%	1.3%	85.2%	0.9%	0.3%	0.7%	0.2%	2.9%	1.4%
Japan (jp)	0.3%	0.1%	0.2%	0.0%	0.9%	1.0%	0.0%	88.3%	0.0%	0.2%	0.0%	8.8%	0.3%
Italy (it)	1.0%	2.5%	0.1%	0.2%	0.2%	4.0%	2.6%	0.0%	81.1%	0.8%	0.0%	7.2%	0.3%
France (fr)	0.1%	0.5%	3.7%	0.1%	0.0%	0.4%	0.0%	0.0%	0.7%	94.1%	0.0%	0.0%	0.4%
Spain (es)	0.1%	0.2%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.3%	9.0%	89.6%	0.4%	0.2%
Switzerland (ch)	0.2%	1.1%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	96.1%	0.2%
Other Countries	3.0%	2.3%	1.7%	3.7%	7.5%	4.6%	3.8%	1.4%	1.3%	2.0%	0.1%	17.2%	51.3%

Table 3 - Distribution of links by country, corrected for skew in distribution of pages

* Those with external links in sample: Norway, Mexico, Belgium, Ireland, Finland, South Africa, Brazil, Austria, New Zealand, Singapore, South Korea, Denmark, Slovenia, Thailand, Venezuela, Poland, Turkey, Indonesia, Macau, Colombia, Dominica, Malaysia, Hong Kong, Kuwait, Micronesia, Bermuda, Czech Republic, Egypt, India, Greece, and Uruguay.

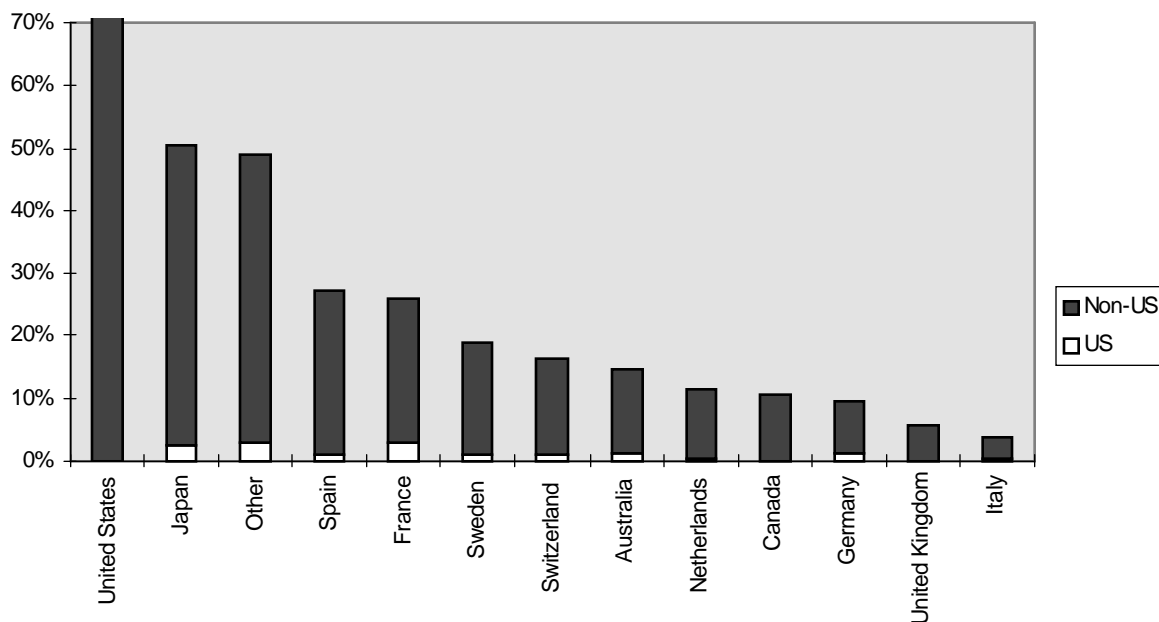


Figure 2 - Foreign hyperlinks weighted by expected percentages

ber of pages influence the distribution is to look at all international linkages, regardless of origin. Because the US also represents a very large proportion of the international linkages, its position as a recipient of hyperlinks is somewhat less overwhelming, as figure 3 demonstrates. In fact, the large proportion of links to "other countries" (a category that encompasses a total of 85 countries even in this relatively modest sample) is perhaps a demonstration of how world-wide the web can really be.

What we might conclude from this is that the web is surprisingly international for being so dominated by the United States. This sounds a bit like a back-handed compliment. The fact of the matter is that the Web remains dominated by American content. While the fastest growing regions of the web are outside the US and often non-English (Bloomberg, 1998), it is unlikely that the numerical dominance of American web pages will be challenged in the near future. However, the normalization of the data as presented in table 3 suggests that parity in the number of web sites is not necessarily a prerequisite to challenging US dominance. Already, the web is more internationalized than would be expected by the relatively small fraction of non-US sites. As this fraction increases, we might predict an exponential increase in the diversity of international linkages present.

Topic also seems to be a factor in how likely a site is to

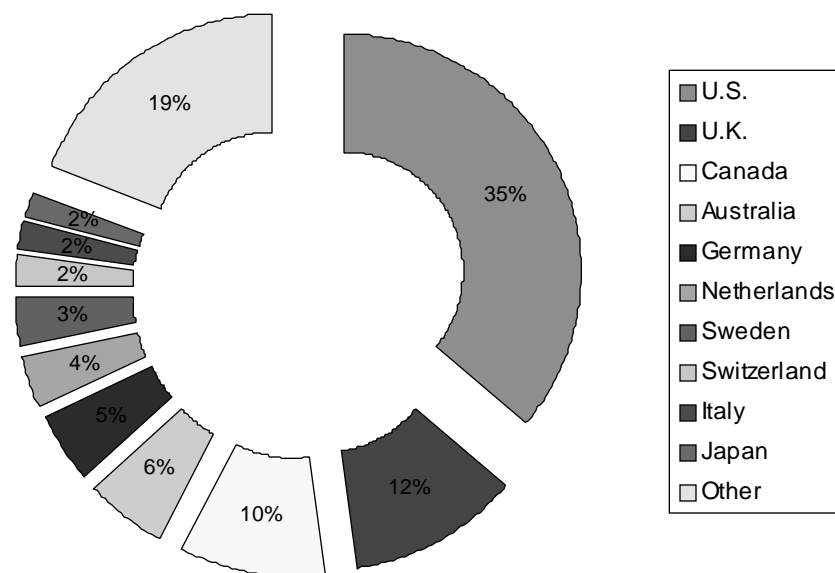


Figure 3 - Distribution of international hyperlink targets

cross international boundaries. The small number of sites in several of the categories makes drawing inferences dangerous; however, we find few surprises. That the scholarly community is relatively international is expected. The relative lack of international linkages from government sites (especially compared to the high number of international links from political sites) provides an illustration of the stress governments put on the local even in a global network. Bear in mind that this category includes sites devoted to city as well as national government, though we should not assume that city governments are any more or less "international" than national agencies.

Finally, the language of each site was coded (table 5). The sample conformed to the widely-held belief that English is the *lingua franca* of the Web, though the source of the sample must be considered. Sites that contained multiple languages were three times as likely as English-only sites to link internationally, which is to be expected. What this means, however, is that while English is used widely on the Web, it does not necessarily imply internationalization. Indeed, those sites that deliberately set out to cross language borders also create links to sites across state borders, while those who restrict themselves to English are more likely to provide links within the country of origin.

Table 4 - Percentage of foreign links by topic area

<u>Topic Area</u>	<u>Foreign Links</u>	<u>Total Sites</u>
Science & Research	38%	75
Internet & Computers	34%	95
Political	32%	24
Recreation	28%	122
Personal	27%	310
Business	25%	515
Education	24%	142
Arts & Entertainment	24%	247
Social & Religious Groups	21%	128
News	20%	77
Sports	19%	90
Travel	19%	63
Health	19%	46
Regional	17%	48
Government	9%	52

Table 5 - Percentage of foreign links by language

<u>Language</u>	<u>% of Total</u>	
	<u>Sample</u>	<u>Links</u>
Only English	92%	23%
Some English	95%	24%
Single non-English Language	5%	32%
Multiple Language	3%	75%

The Resilience of National Borders on Today's Web

This survey was undertaken with the intention of determining the degree to which political borders have been reproduced in cyberspace through collective structuring of the medium. If the world of cyberspace were indeed free of national boundaries (boundaries being areas in which communication flows are absent or dampened), we might expect to find a distribution of links that roughly matches the worldwide distribution of web sites. This is far from the case. In fact, as the shaded figures in table 2 indicate, web sites exhibit a relatively strong tendency to link domestically.

On the other hand, the Web appears to be far more international in nature than other networked media. To obtain some kind of perspective, we can compare the transnational communication

Table 6 - International communication as a percentage of total (Source: UNESCO, 1989)

	<u>Web Links</u>	<u>Postal</u>	<u>Telephone</u>
United States	9.3%	0.5%	0.1%
United Kingdom	56.6%	4.1%	N/A
Canada	56.9%	0.4%	0.1%
Germany	36.5%	3.1%	1.6%
Australia	47.5%	3.8%	0.5%
Netherlands	50.6%	10.2%	2.2%
Sweden	55.1%	N/A	N/A
Japan	25.4%	0.6%	N/A
Italy	57.3%	5.2%	0.7%
France	28.1%	2.3%	9.2%
Spain	31.9%	5.7%	N/A
Switzerland	37.8%	5.1%	6.6%

flow on the Web to that of more traditional media (table 6). Clearly, national borders affect the Web much less than they do the telephone or postal service. However, we must consider that both of these media introduce a much greater impediment to international communication: cost. Depending on your perspective then, the existence of national borders on the web is especially noteworthy given the lack of technological and economic barriers supporting these borders.

We could approach this information in two ways. We might begin by considering the Web an indicator of the global social environment. For example, scientific and scholarly communities have long been international in nature, as have certain political movements. As the topical index suggests, these groups have quickly migrated to the new medium (Achleitner et al, 1998). Other groups have only recently seen an increase in the need for transnational communication. For example, the elimination of many economic impediments has driven even small businesses into the international market.

However, the Web has also provided excess capacity for transnational practices. While some Americans may be "bowling alone," many others are taking up hobbies and interests—from *anime* to macramé—for which they find support from outside of their physical communities. Many businesses approach the Web as a cheap source of advertising or another venue for sales and "stumble into" the international aspect of the medium. As users come to depend on the Web, they enter into negotiation with its conventions, adopting those they like and adapting to those they do not.

The study as presented suffers from two particularly weak points. The first of these is a marked bias toward geography. In

other words, the simple fact that we chose to measure communicative flow over territorial boundaries introduced both methodological and conceptual problems. On the methodological side, it is not clear that the physical location of the host server is the best measure of the location of a web page. But this of course leads directly into the conceptual problem: what would be the best measure of a given site's location. Would we assign it to the country in which the author resides or pays taxes? These strictly legal definitions seem no better than our technical one. As it is, we are measuring where the data is recorded, but the ambiguity of such a measure demonstrates the problem with trying to make a basically aspatial network fit into territorial categories.

A better way of measuring the borders on the world wide web would be to directly measure the clusters that form and their interaction. Doing so would be a shift in perspective that would be hard to reconcile with contemporary debates over trans-border data flow. This is precisely the problem with such debates: the structure of the Internet does not map well to physical boundaries. As I will suggest in chapter four, since the structure of the Internet is highly resistant to "territorialization," policy-makers will have to learn to create policy that does not depend on the territory of a transaction.

An analysis that did not start from a territorial perspective might find much stronger borders on the web. We might, for example, find that pornographic web sites formed a clique far removed from children's education sites, and that white supremacist groups share a fair amount of intercourse with animal husbandry groups, but are strongly segregated from civil rights-related sights. Such an analysis would establish that borders are emerging on the Net that are, perhaps, much less permeable than today's physical national borders; that, in effect, the physical world is far more homogenized than the Web.

The second weak point in this methodology is the focus on the authors of web sites. The authors of the Web are increasing an élite minority. While the early Web might have been created by its users, a number of factors seem to be leading to the "broadcastization" of the Web. The technological development of standards for web page creation have come increasing within the purview of programmers. While one can still create a relatively appealing Web site with an hour's worth of training, it will not look anything like the clearly professional sites produced by Disney or CNN. These media giants have not only technical expertise, but professional designers on their side. Furthermore, while there are a number of grass-roots efforts to promote the visibility of amateur web sites (*Link Exchange*, for example), the banners on the major portals are reserved for those with major advertising

budgets. And as the number of users of the Net grows, so too do the expenses of maintaining a computer that can handle the demands created by a popular site. Finally, developments like *Web TV* and cable modems suggest that the future of the Internet, or at least the Web, will continue to be bifurcated between users and creators.

The methodology described in this chapter maps the collective linkages created by the *authors* of the Web rather than the users. As such, it is an imperfect measure of the internationalization of the Web. As mentioned earlier, as techniques are developed to measure the actual traffic of the Net at a global level, we will have an excellent source of data to investigate. For the time being, however, measuring the hyperlinked infostructure of the Web provides a valuable picture of the state of the Web itself, and the environment users are confronted with. As such, it is a clear step in the right direction.

Overall, these two drawbacks to the methodology presented here do not diminish the findings it has produced. Debates over the effects of the Internet are too often rooted in hyperbole rather than observed evidence. The technique described here provides those who are interested in the structure of the Web with a valuable tool for measuring the degree to which borders exist on the Web.

The final chapter will make use of two of the important findings of this study to draw out some implications to national sovereignty and the design of effective policy. The first of these is the recognition that the Web is not oblivious to national boundaries. While it is certainly affected less by traditional national boundaries than other networked media are, the effect of nationality remains pronounced. The second attribute is the dominance of U.S. web sites. The main reason for such domination appears to be the total number of sites based in the United States as compared to the rest of the world. If we are to take an aspatial view of the Internet, we must still concede that American culture and the English language remain at its core.

Endnotes

¹ The relatively large Canadian counts are probably due to .com and .net sites that were registered to Canadian addresses. See below.

² Geocities alone claims a total of 1.4 million individual sites on hosts in the US and Japan.

³ NetNames domain registrations: May 1998. <http://www.domainstats.com>.

⁴ Net Wizards server survey: Jan 1998. <http://nw.com>. Only those countries which appear in the sample are listed. US includes the common 3-letter TLDs.

⁵ Reasons a site could not be processed include hosts that could not be contacted, missing/deleted pages, hosts that turned away browsers not of a particular type, pages which forbid access or required passwords, pages that relied heavily on extensions to HTML (dynamic HTML, heavy use of script), and robot exclusions.

⁶ According to Raymond Corsin of Network Solutions, 25% of new registrations for the .com domain are from foreign companies (Hickman, 1997).

⁷ These categories were: art, business, computer/Internet, education, entertainment, government, health, news, personal home page, politics/activism, pornography, recreation, reference, regional/local, religion, science/research, society and culture, sports, and travel.

⁸ An updated version of this report, published in 1997, was not available during the preparation of this thesis.

⁹ A German site in the sample serves as a case in point. A law firm that dealt primarily with matters having little to do with the international sphere, included an English translation of their site "after having recognized [sic] that the AltaVista translation client translates the german legal expression 'Erbrecht' into 'vomit'..." (<http://www.afs-rechtsanwaelte.de/>)

CHAPTER IV

The Future of the Nation-State

What does the perspective gained from the study in chapter three tell us, if anything, about the future of national sovereignty? Despite the warnings of some the Internet is not a *force majeure* in the death of the modern state. It is, however, an indicator of the increasing transactions between those in different parts of the world, and a warning that the borders of the state may not accurately reflect social borders. Policy-makers tend to see the Internet as a regulatory problem. They see the social issues of the Net—from fraud to pornography—as problems to be solved individually rather than indicators of larger social change. This chapter discusses a metaphor for understanding those changes and the challenges for the future of the administrative state.

Nineteenth Century Chicago and the "Digital City"

The first step in managing the "problem" of policy in an age of networked global society is coming to terms with the structure of that society. This cannot be done through even the most thorough understanding of the transactions taking place: through, for example, statistics indicating vast increases in international trade and communication. It cannot be accomplished by educating policy-makers about the new dynamics of complexity (as Durlauf, 1998 suggests). Nor can it be accomplished by even the most earnest, though unavoidably farouche, technical experts explaining the peculiarities of the new medium in reverent tones. What is needed is a clear indication of observable trends and a way to give policy-makers a more connected understanding of the problem. Chapter three provides a small step toward fulfilling the former aim. Further development of methodologies for measuring the Internet will provide the factual evidence to serve as the foundation for sensible policy. As for the latter question—placing these data in an approachable context—we must turn to a useful metaphor. The best way to come to a full understanding of a new system,

especially when that system involves complex interactions, is to make use of metaphor (Raad, 1989). Below, I introduce a metaphor I think works well for understanding the policy problems (as well as other organizational aspects) of the Net¹.

There are many metaphors for the Internet. The most common of these is *cyberspace*, a word coined by William Gibson (1984) in the science fiction novel *Neuromancer*. As noted in chapter one, the Internet can certainly be described in spatial terms. However, *cyberspace* does nothing to give us any understanding of the relationships, linkages, and interdependencies that exist in a networked world (Benedikt, 1994; Gozzi, 1994). Another term, popularized by Al Gore, is the *information superhighway*. While this compares the new networks to a widely experienced system, it reflects only a very limited vision of what the Internet is capable of and how it is actually used. The complex, distributed connections that are common on the Internet have little in common with a broad highway between well-traveled points.

William Mitchell, who in his book *City of Bits* (1995) outlines the parallels between the structure of cyberspace and that of the city, is one of a growing number of architects and urban planners that are moving into cyberspace. They are interested in this new "global metropolis" because of the homologies between the social structures supported by global networking and those structures supported by the metropolises of the physical world. Just as the "real" city has begun to atrophy in the last two decades (at least in the U.S. and Europe), a new city is forming in the interstices of the Internet. Of course, I am writing here not of the "cities" metaphor often encountered on the Web: like those found in *GeoCities* or *AlphaWorld*. Rather, using the city as a metaphor for, or perhaps as a predecessor to, the structures of a connected world, we draw together research that tracks a centuries-long movement in the role of institutions and relationships in social systems. In Stewart Brand's words, "urbanity no longer has anything to do with proximity to tall buildings" (1987:246).

Although cities have been around for a long time, they altered in form, function, and size with the Industrial Revolution. Between 1880 and 1890, Chicago's population doubled to over one

million and other cities exhibited similar rates of growth. One fifth of Chicago's residents were foreign born, and many retained the languages and cultures of their homelands (Weber, 1899: 187). Urban concentration fueled vast increases in telephone and telegraph wiring and the post office routinized its procedures to handle the increased flow of traffic. Postage stamp sales increased almost three-fold during the 1880's. This pattern of communication networks, from the newspaper to the telephone, being driven by urban development would continue for the next century (Schudson, 1978; Pool, 1977; Goddard 1989:156).

In 1925, Robert Park's ecological theory of the city appeared. According to Park, the city was a natural environment for man, and there "is a limit to the arbitrary modification which it is possible to make: 1. in its physical appearance, and 2. in its moral order" (1925:4). The city relied on the market system and rationalization. This resulted in a "substitution of 'secondary' relations for direct, face-to-face 'primary' relations" and resulting changes to the structure of family, school, and church (Martindale, 1958:21). In sum, the ecological view suggested that "the city represents an externally organized unit in space produced by laws of its own" (p. 22).

Riots in the late sixties and population shifts during the following decade brought urban planners and sociologists back to the central question of the city. For the first time in a century, people were leaving the city (Oosterboan, 1980:1). As the 1960's ended, Melvin Webber predicted the demise of the metropolis and coined the term "post-city age." The reason for this exodus, argued Webber, was the substitution of communication for transportation: "The high volumes of communication among various cities and metropolitan areas suggests that these now comprise a single urban system across the 3000-mile-wide continent... it is as though the new societal scale has brought the geographic parts of the US together into a single city" (1971:296). Webber also claimed that the "increasing ease of transportation and communication [was] dissolving the spatial barriers to social intercourse" (1968:1092). The result is the gradual separation of society from spatial boundaries, the creation of an "antispacial" place.

(Mitchell, 1995:8; de Kerckhove, 1991:272)

The parallels between the industrial city and the post-industrial cyberspace allow us to bring some of the sociological research of the past century to bear on problems of a global social network. The problems of governing the Internet resonate well with the problems of governing the early cities. As with the Internet², lawmakers and the public worried about everything from the moral decay brought on by the city, to problems in policing and controlling the new social constructs. Despite the poetic musings of John Perry Barlow, the networks supported by the global Internet today resemble far less the land grab of the open west, and more *fin de siècle* Chicago—including the proportion of residents born outside of the United States.

Latin has two words—*civitas* and *urbs*—that are both usually translated into the English word *city* (Coulanges, 1901:177). *Civitas* referred to the "religious and political associations of families and tribes," while *urbs* referred to the place of assembly or residence. The rise of distributed communication networking is contributing to the ongoing unraveling of the social part of the city (the *civitas*) and the physical part (*urbs*). As nations become less attached to geography, states will have to adapt to thinking about these two elements of administration differently.

The problems of managing the city are in many ways akin to the problems of managing the new global communication networks. Some of this is due to the fact that the city is often seen as the prototypical source of political theory. But a number of scholars who try to understand the interaction of social control and "cyberspace" turn to the city as a model (e.g., Lévy, 1997). Like the modern city, the Internet supports a great diversity of thought and culture all interacting to a degree that would be impossible without technology (either skyscrapers or computers) that allow proximity. Mapping social topography remains a key element in any kind of policy-creation for the urban environment (Bollens & Schmandt, 1982:31-59).

Problems of territoriality and jurisdiction have also been a mainstay of city government, now accelerated by the forces of aspatial communication. A great deal of a city's resources go to

coordinating the policies of other levels of government. This process is made even more difficult as administrators attempt to match their boundaries with those of the "imagined" city. That is, the policy-maker strives to ensure that the city is "truly-bounded," that the territorial boundaries of administration match the boundaries that citizens collectively create (Bennet, 1989:34-39).

While envisioning the wired city may help politicians come to terms with the problems of cyberspace, solutions are not so easily arrived at. Indeed, the problems that face the Networks today remain the problems of the modern metropolis. However, identifying the modern wired city with the urban expansion early in the Industrial Revolution may help us avoid some of the same administrative mistakes. Worries over crime, control, and morality led to a top-heavy administrative system early on in American cities. This plutarchy often led to political corruption and rarely improved the lot of city dwellers (Griffith, 1938). Many of these problems were eventually alleviated by allowing for greater autonomy within the neighborhoods of the metropolis, coordinated at a city-wide level.

This multi-level approach to managing the Web can already be observed. The self-policing of Usenet groups quickly reminds one of neighborhood watches, and the overall government of the Web has thus far been "regulated" through a collaborative process of standards-setting. But in point of fact, national and local governments are becoming involved with the process of governing the Net because there is a perceived lack of appropriate government. Like governing a city, governing the Net requires that the cultures and practices of its "citizens" are respected, that participation in governance is encouraged, and at the same time that a set of commonly agreed upon norms and procedures are adhered to.

The urban perspective, however, is not meant to lead immediately to answers. Rather, it is a way of helping policy-makers understand that the Network is a complex problem that demands carefully crafted solutions. The Communications Decency Act demonstrated the dangers of policy-makers who have an abbreviated sense of the complexities and structure of this new communication me-

dium. I am not among those who suggest that the government should simply step out of the way. On the other hand, I think it is clear that many of the current bureaucratic structures of government and business are ill-suited to the network society³. Drawing parallels between the Internet and another complex social system that policy-makers are more familiar with may allow for better analysis of the problems of the new medium.

The Future Nation

Despite the hopes and fears of many, a global Net does not at all mean a homogenous world. Rather, it means the emergence of communities with limited membership that stretch around the world. These sodalities may consist of ethnic groups (Elkins, 1997), religions (O'Leary & Brasher, 1996), and scholarly groups (Achleitner et al, 1998), as well as any other communities of interest we might imagine (and quite a few that are unimaginable). There are also likely to be national groups, tied by tradition, culture, and language. No doubt for many of these national groups there will also be some form of vestigial (or, in a few cases, very influential) traditional territorial claim. In such cases, the shared understanding of territorial boundaries remains a defining characteristic of the national community.

These nations-without-space will not necessarily arise from each of the nation-states in today's world. Those with strong "social capital" (Fukuyama, 1995)—shared identities that have clear boundaries—are likely to transfer well into the newly networked world. France and Japan, though both have voiced concerns over the loss of "traditional" culture, are likely to transfer their cultural boundaries into the aspatial Net. Indeed, the survey described in chapter three demonstrates the degree to which these two countries have already established linkage boundaries that are aligned with their territorial borders⁴.

The existence of nations on the Web does not preclude the emergence of a global culture. Many worry that such a culture will be a *de facto* American culture. There are good reasons for such a worry. America has been a powerful exporter of cultural products

during this century (see Volkmer, 1997). This includes not only media and McDonalds, but technology, business practices, and political structure. Americans seem ambivalent about the effect they have on indigenous or traditional culture, and some have even suggested that an Americanized world presents an ideal state of affairs (Dyson et al, 1996; Rothkopf, 1997). All of these things lead many to worry that their own cultures will be somehow tainted.

Earlier attempts at creating a world culture—the Roman Empire, Christian missionaries, colonialism—demonstrate that an dominant culture is rarely as steam-roller-esque as it may seem (Kauffman, 1995:298-302; Nelson, 1998; Wang, 1997). "American" culture, if such a thing exists, consists of appropriations of cultures both within and outside the territorial United States. Many identify American culture with consumerism and capitalism. I would argue that this is not a case of American culture influencing the world system. Instead, I would suggest that the "entanglement of all peoples in the net of the world-market" (Marx, 1936:836) has simply occurred first in a country that boasts little cohesive national culture. However, there can be no doubt that a number of American innovations, from fashion to diet to legal procedure, are increasingly being adopted around the world (Sassen, 1996:16-21). The question, one that has no easy answer, is whether the ubiquity of American practices can be equated with dominance of American culture.

On the other hand, if we recall Deutsch's method of judging the degree to which a group could be called a community or nation, clearly the dominance of the Web by the United States should give us pause. Autonomy quickly slips into domination when control messages originate from outside the group. Web sites in many countries are nearly as likely to link to an American site as they are to link to a site in their own nation. The converse, however, is not true. One reason for this inequity is clearly that the vast majority of sites are still hosted by servers in the United States⁵. While the Web is experiencing a great deal of growth around the world, there is no guarantee that even the developed nations of the globe will reach parity with the United States any

time soon, while the difficulties of developing countries striving for better access are well known. The present state of affairs lends credence to those like Herbert Schiller who claim that the Internet is no different in principle from earlier broadcasting media that exported American culture in the interests of American capital (Gillespie & Robins, 1989; Droege, 1997; Schiller, 1992).

A second concern is that the dominance of American culture on the Web will lead to an attempt at making the Web part of our "own backyard" ("Spawned," 1998). Questions as to who has jurisdiction over the web are real. Does the numeric dominance of the Web by Americans mean that the American government should have a greater say in how the Web is managed? The question of how the state figures in these new information spaces is one that must be decided soon and that has important consequences. The Web seems to exemplify a continuing tension between the "unification and fragmentation" Giddens (1991) names as one of the main dialectics of late modernism. We might hope that more development in areas outside the "American Web" will lead to a more diverse linkage pattern in coming years; otherwise we risk the destructive homogenizing forces many rightly fear.

The Future State

George Yeo, an Arts Minister in Singapore, compares the nation to a cell in an organism (1995). The cell builds a semiporous wall around itself, allowing some things in, but not others. It acts both as part of the wider system and on its own behalf. Such an organic view (even when the context is an argument for censorship) demonstrates clearly the idea that borders between countries, like borders between people, are not hard and fast. Moreover, national borders both bisect and unite disparate states. As Nordenstreng and Varis note, "the crucial boundaries in the world do not occur between nations, but within them." (1973:393) What are the implications of this mis-alignment of nation and state?

Singapore, which has been an independent state for three decades, is still in the process of "nation building." They know well that the arbitrary borders of the state (in this case rein-

forced by the South China Sea) do not necessarily define a nation. Singapore is home to diasporic ethnic groups from all over Asia, and has resorted to at least a partial suspension of its constitution during much of its history as an independent state in order to force these groups to abide by a system that represents none of them very well. Nonetheless, this city-state can serve as an example of the choices open to states of the future. That choice is to retain territorial and authoritative control at the risk of not benefiting as much from the economic and social changes underway, or to trade control for prosperity and diversity by encouraging the building of networks both within the nation and to other parts of the world.

Unfortunately, that choice may be made for most states. States were in most cases designed to resist change and promote standardization. Such objectives were well suited to the Industrial Revolution; however, as Pool suggests, the information revolution requires more dynamic organizational forms (Etheredge, 1997; Pool, 1990). A number of authors suggest that modern state governments suffer a kind of institutional incumbency, a resistance to change that leaves them unable to face today's administrative challenges (Bennet, 1989; Drake, 1993; Lefebvre, 1991:26; Reidenberg, 1997; Sassen, 1996). Moreover, many policy-makers see the Internet simply as an extension of the mass media that have come before it, failing to recognize the potential ramifications of its distributed nature (see Information Highway Advisory Council, 1995:26).

Facing such challenges requires, first, an understanding that territorial boundaries can no longer be relied upon to provide a reference point in all administrative policy (Lenk, 1997). Non-territorial systems of administration have always existed (Sassen, 1996:3-4), but in the present state system territorially-based policy is the most common. Increasingly, the transactions these policies regulate take place across jurisdictional boundaries. There are a number of ways to treat this problem. The first is to force these basically aspatial transactions into territorial law⁶. That is, consider all activities of citizens of your own country to be within your jurisdiction. Interesting moves in this

direction have begun to appear even in areas that have nothing to do with communication technology. For example, American and Australian citizens (as well as those from a number of other countries) who engage in "sex tours" can be arrested for this crime upon their return (Doheny, 1996; Ooi, 1994). This means applying laws to the citizen and not the territory, although enforcement remains territorially based. This represents an important step for states who wish to maintain control of a society that is not overly concerned with territory. The next step is to design methods of punishment (banishment, fines, etc.) that do not require physical presence to be executed.

Secondly, states must ask whether sovereignty is a necessary prerequisite of statehood at all (Vincent, 1987:37). It seems inevitable that some form of supranational regulations will come into effect to help govern the global Internet. The globalization of capital has required such a regime, and it seems very likely that a need to control the global communication networks will lead to similar bodies. The question is how powerful these bodies will be and whether they will replicate other bodies of international control, as they have so far, or adopt a paradigm more appropriate to hypermedia⁷. Although some argue that information flows are uncontrollable (Spenser, 1997), on both technical and social matters the Net seems well equipped to make its own rules and police itself (Gillet & Kapor, 1997; "Like," 1995; Reidenberg, 1997). It seems that building on the processes that make the Internet work now would be a sensible path. We must devise protocols that work for more than the technical operation of the Net, protocols for managing the larger social issues that will continue to plague the growth of a global network society.

The future state must learn that "the effective use of information technologies to resolve disharmonies requires reflectivity and reflexiveness." (Couch, 1994:250) The new state structure cannot rely upon bureaucratic processes to manage the problems of policy in a network society. Instead, states must be restructured to meet these new policy challenges. In a number of areas, this restructuring is already taking place, often using new business structures as a model⁸. The main thrust of such struc-

turing is often to tear down traditional practices of centralized control, efficiency, and adherence to a set of rules and procedures. Instead governments must learn to work within a network, manage rather than regulate problems, and, above all else, recognize that solutions to problems often come by creating effective communication networks (Ackoff, 1994; Agre, 1997; Barzelay & Armajani, 1992; Sproul & Kiesler, 1991).

In a networked society, the advantage goes to the nation that can become networked the quickest (Castells, 1996; Ohmae, 1990:194). This has already been recognized in the area of research and development (e.g., Wulf, 1996), but it is true of other organizations in the informatizing world as well. Success also comes with diversity, and states can ensure diversity by making sure that there is equitable and increased access to information and communication technologies. Finally, in chapter two I mentioned briefly Dennett's conception that we must design for "virtuosity." This sentiment is shared by Mattelart & Stourdze (1985:169) who see the importance of promoting "open technology," technology that can be easily adapted and used as a creative tool. The state that is interested in the welfare of its citizens can act as a guide in these matters, promoting research and organizations that create social technologies.

This means an end to the state—as we know it. Of course, no one would admit to accepting the delusion that states have remained a static entity in the last century. The end of the Second World War, the end of the Cold War, and the present global economy have all produced enormous changes in how the state does its job and what the people ask of the government. Rather than worrying that trans-border data flow is somehow diminishing the rights of the administrative state, it would be better to see these transactions as indicators of public opinion. People want a new kind of state. In *Snow Crash*, science fiction novelist Neal Stephenson (1993) describes a world in which the state has been reduced to the equivalent of a hotel chain or artists guild, judged solely on the services it can provide⁹. In this "new world, borders will not be relevant because of the distances they represent, but because of the differing regulatory regimes they contain" (Stern & Kelly,

1997). Is that so different from the states today? Yes, in part it is. The degree to which we are still creatures of the land means that states have enjoyed a kind of default power. Those of a certain nationality could not choose a new state without, to some extent, giving up their nationality as well. In a world in which social topography is becoming (asymptotically) independent of physical geography, the state must legitimize itself by means other than territorial.

Conclusions and Future Work

In the introduction, I suggested that there is a great deal of popular concern over the effects of the Internet on national sovereignty. The intent of this thesis was to show that rather than threatening national sovereignty, the Internet serves as a warning that the society of the future may not need or want such borders. Globalization is in the process of building new cultural boundaries as it dismisses the chiefly spatial borders provided by the state. As society abandons spatial borders, national borders will become a distinct liability for those governments that continue to rely upon them.

There are three things I hope the Reader will take away from this thesis. The first is that the World Wide Web is both far more international than earlier media and at the same time that national borders continue to strongly influence the organization of the global information environment. Of course, the study presented in chapter three is only a snapshot of the Web, and an unfocussed one at that. With a medium that is growing at such an extraordinary rate, it would be premature to draw conclusions from this single view. This is especially true when it seems that the greatest growth on the Web is occurring outside the United States. It is entirely likely that the web will be very different in a year's time. At the same time, the study shows not only that there is a preponderance of American web sites, but that America is a net exporter of communication via the World Wide Web. Such an environment may imply a colonial cyberspace, an anathema to the networked society that thrives on diversity.

The second theme of the thesis is that the structural form of the Web is worth studying because it is an indicator of social structure. There are other reasons for studying Web structure. Most such study is in the hope of creating commercially viable ways of navigating in infospace. But the use of the Internet to chart social topology is a relatively new and promising field. As researchers we must create tools to catch up with the hypertrophic Network. As more people bring more of their lives onto the Net, the effectiveness of the Internet as a tool for social measurement will only increase.

Finally, I hope it is clear that the question of national sovereignty is ill-conceived. The challenges facing governments are more far-reaching than sealing off leaky borders. Governing the network society requires a network government, one that values decentralization, localization of information, and dynamic solutions. The "winners" in the global economy are likely to also be the winners in global culture. These winners will share governments that have responded quickly to the network environment.

The communication researcher is left an important task: to develop the necessary techniques for measuring where new cultural boundaries are emerging and the processes by which they shift. We are the cartographers of this brave new world. Unfortunately, social science lacks many of the tools needed to take advantage of the opportunities offered by hypermedia. This thesis described one such tool, and demonstrated its usefulness. It is time for a concerted effort to develop further tools so that we may be part of supporting policy and theory that accurately reflects the reality of the modern social system.

¹ I take as a cue Kuhn's (1965) description of how new vocabulary relating to paradigms comes about: "...two objects or situations are juxtaposed and said to be the same or similar... the juxtaposed items are exhibited to a previously uninitiated audience by someone who can already recognize their similarity, and who urges that audience to learn to do the same..." (p. 20-21) See also Lorenz (1974).

² "Far from embracing the brave new world of the Internet, most Britons view it with fear and suspicion, a report published Monday reveals. Fears that it aids fraud, creates unsociable computer nerds and culti-

vates porn addicts abound among the largely technophobic public." The same survey found that 14% of the population were regular Internet users (Hall, 1998).

Endnotes

³ A position that IBM CEO Louis Gerstner agrees with ("Old Habits," 1998), as does Deibert (1997:128).

⁴ Taken to a greater extreme, some networks that did not appear in chapter three's study are, no doubt even more autonomous. Cuba, for example, has a surprisingly developed degree of computer networking within the country that barely links to the outside world at all (Press, 1998).

⁵ The physical infrastructure of the Internet also remains centered on the U.S. (Evagora, 1997), and although this does not directly affect the organization of the web, there remain ties between the virtual world and the physical infrastructure.

⁶ Perritt (1997) discusses issues of jurisdiction in cyberspace, and suggests a model for dispute resolution in "cyberspace."

⁷ The problem with recreating earlier control regimes is one of both organization type (procedure-bound, bureaucratic) and understanding of the problem. These organizations retain an institutional memory of earlier regimes and are likely to see the problem in as international (rather than from a global perspective) and primarily economic. See Bender (1988) and Jussawalla & Cheah (1987).

⁸ Learning to "cultivate and coordinate" rather than "command and control," in the words of Thomas Malone (Schwartz, 1998).

⁹ A more optimistic view of the same "franchising" of nationality is described by Dertouzos (1997:281-2).

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