Linked Ecologies: States and Universities as Environments for Professions*

Andrew Abbott
University of Chicago

In this article I generalize ecological theory by developing the notion of separate but linked ecologies. I characterize an ecology by its set of actors, its set of locations, and the relation it involves between these. I then develop two central concepts for the linkage of ecologies: hinges and avatars. The first are issues or strategies that "work" in both ecologies at once. The second are attempts to institutionalize in one ecology a copy or colony of an actor in another. The article investigates the first of these concepts using two detailed examples of hinge analysis between the professional and political ecologies. Both concern medical licensing, the first in 19th-century New York and the second in 19th-century England. For the avatar concept, the article analyzes four less detailed cases linking the professional and university ecologies: computer science, criminal justice, clinical psychology, and applied economics.

A long-standing debate pits individualist against emergentist accounts of social systems. For the individualists, social systems are the additive results of individual phenomena, aggregated through simple structures like markets. For the emergentists, social systems constitute an independent level whose fully social structures coerce individual phenomena. Between these radically opposed accounts have long existed a number of intermediate views. In these intermediate accounts, individuals make their own histories, but—to modify the Marxian dictum—in that making they produce larger structures that in turn render them unable to make those histories under conditions of their own choosing.

In this article, I extend what is perhaps the best known of those intermediate conceptions, the idea of ecology. Ecological argument is familiar in sociology. The Chicago School applied it everywhere—in the study of occupations (Hughes 1971), of interaction (Goffman 1963), and, most famously, in the study of urban phenomena from mental illness to marketing (Park, Burgess, and Mackenzie 1925). Ecological thinking remains important in urban studies, where the repeated announcements of its death—from Alihan (1938) to Castells (1968) and Dear (2002)—bear unwilling witness to its vitality, as does the recent emergence of hierarchical models of community effects (Bryk and Raudenbush 1992). Ecological arguments have also been extended from physical urban spaces to abstract social spaces. Wallerstein's (1976) celebrated "world system" is essentially an ecological conception, and Hannan and Freeman's (1977) population ecology approach to organizational analysis relies on explicit

*An earlier version of one part of this article was written for the meetings of the Association française de sociologie in October 1999 at the invitation of Pierre-Michel Menger and Jean-Louis Fabiani. It has since been published as Abbott (2003). Other versions have been presented at various universities (Oxford, Brown, Harvard, Arizona, and South Carolina) and professional associations (ISA Research Committee on Occupational Groups, Social Science History Association, and American Sociological Association).

Sociological Theory 23:3 September 2005

ecological arguments as has McPherson's similar approach to organizations and occupations (McPherson 1983; Rotolo and McPherson 2001).[1]

Ecological theory, however, has distinct limits. The usual ecological account considers a system of actors in a set of locations—countries in the world system, for example. But at the boundaries of such a system, ecological accounts usually make strong assumptions. In world systems theory, for example, religion figures as an unstudied external actor; the various states are bound into a patterned ecology of interaction, but the various religions are not. Only one part of the social world is conceived as subject to the constraints we call "ecological"; the rest is fixed. The same critique has been made for many years with respect to the Chicago School's unwillingness to study the external linkages, financial structure, and political economy of the city.[2]

In this article, I shall answer this critique with the concept of linked ecologies. Instead of envisioning a particular ecology as having a set of fixed surrounds, I reconceptualize the social world in terms of linked ecologies, each of which acts as a (flexible) surround for others. I develop my argument around a particular ecological analysis, that of the professions. But this is merely an expository convenience. The argument does not presuppose any ecology as "central" but rather makes a general claim about the structure of the social process. Nonetheless, it is easiest to see how this new approach works if we begin with a particular ecological analysis and see how the new argument extends it.

To begin with that example, then, the professions constitute an ecology, like those among nation states, ethnic groups, and so on (Abbott 1988). Professions wish to aggrandize themselves in competition, taking over this or that area of work, which they constitute into "jurisdiction" by means of professional knowledge systems. A variety of forces—both internal and external—perpetually create potentialities for gains and losses of jurisdiction. Professions proact and react by seizing openings and reinforcing or casting off their earlier jurisdictions. Alongside this symbolic constituting of tasks into construed, identified jurisdictions, the various structural apparatuses of professionalization—growing sometimes stronger, sometimes weaker—provide a structural anchoring for professions. Most important, each jurisdictional event that happens to one profession leads adjacent professions into new openings or new defeats.

Such an argument captures the intensely ecological, contingent character of professions' histories and provides a theoretical alternative to a teleological historiography in which professions grow like independent units. However, the concept of openings and defeats presupposes a criterion of success, and that criterion is, in fact, external. The several professions' claims for legitimate control are judged by various "audiences": the state, the public, co-workers in the workplace. These external judgments ratify professions' claims, thereby making them efficacious against competitors. But these external referees of jurisdiction draw their own legitimacy from outside the system of professions. Uncritically recognizing that external power, we make the mistake noted above, conceiving these environing worlds of state, public, or workplace to be mere audiences, fixed and unproblematic entities in a position to judge claims of professional authority.

[1]Ecological argument has often arisen in the context of comparative history, where it provides a middle way between case-based narrative and formal causal comparison. It embraces a broader range of facts than does individual case analysis, but retains the contingent interplay that is narrative's great attraction. The classical citations in human ecology are Park, Burgess, and Mackenzie (1925) and Hawley (1950).

[2]See Wallerstein (1976:151–56). For criticisms of the Chicago School, see, for example, Castells (1968) and Logan and Molotch (1987).

But the state, for example, is not such a simple and unified entity. Quite the contrary, it is itself an ecology, a complex interactional structure filled with competing subgroups and dominated by ecological forces quite similar to those driving the system of professions. It follows that state recognition of a profession's jurisdictional claims is more complicated than we had thought. Not only does a jurisdictional tactic like licensing have to succeed in the system of professions, it has also to succeed in the ecology of the state, usually for quite other reasons. To transpire, any such project must work in two ecologies at once.

A similar pattern obtains in the urban process. On the simple ecological model, real estate patterns in a city or region derive from the locational competition of firms acting in this market. But in fact those patterns result not simply from the ecological competition of real estate firms and developers, but also from other ecologies: those of the general commercial sector, the nonprofit sector, and, above all, the government sector. Any successful development project must bring together some *combination* of actors across all these ecologies at once. As a result, the actor who competes in the spatial ecology of regions is not really a single actor, but rather a coalition that links one group of firms, government agencies, and voluntary associations into an alliance against *other* alliances linking *other* companies, agencies, and nonprofits. Individual alliance members compete in individual ecologies, but the alliance wins because the results of those local contests can be assembled into an overall achievement. Note that in such a system, the history of this or that member of an alliance, as well as the history of this or that particular ecology, derives ultimately from the history of alliances. Thus, the most important variables in the system are those that facilitate or constrain alliances and those that determine the various strategies of alliance. For example, differences in the relative size of actors in adjacent ecologies might constrain the possibilities of alliance, as also might the diversity of local arrangements of the members of the ecologies and differences in the speed of competition between the ecologies being linked.[3]

These examples illustrate the potential of a linked ecologies argument to sustain a more general analysis of the social process without losing the initial advantages provided by ecological theory. In its simple form, ecological theory allows us to escape the false historiography produced by assuming immanent development. A linked ecologies argument moves beyond this by taking into account the simultaneous existence of numerous adjacent ecologies, all of whose actors seek alliances, resources, and support across ecological boundaries. A further layer of contingency is thus identified.

The article has two major sections—the first theoretical and the second empirical. Although the present article aims to extend ecological theory, it has first to clarify and formalize our existing conceptual machinery. The theoretical section therefore begins with the definitions necessary to ecological analysis, then moves on to a brief discussion of the varying properties of ecologies. It concludes with a theoretical analysis of the specific advance proposed here, the notion of linkage between ecologies. The empirical examples that follow take up two major questions. The first pair of examples shows the importance of interecology linkage as a contingent phenomenon. The second set of four more brief examples shows the near impossibility of creating

[3]This alliance argument is implicit in Suttles's (1990) *The Man-Made City*. A somewhat similar argument is made for abstract networks by Abell (1989) and for cities by Long (1958), who described the city as an "ecology of games": the political game, the banking game, the civic organization game, the ecclesiastical game, and so on. But for Long alliances were occasional linkages between relatively distinct, well-defined games. In the present argument, they are by contrast the defining units of the system of ecologies taken as a whole. Nonetheless, the two arguments have strong affinities.

institutionalized linkages between ecologies and provides further evidence of the kinds of forces that keep ecologies separate from one another. The article concludes with brief suggestions for further research.

THE FORMAL STRUCTURE OF ECOLOGIES AND LINKED ECOLOGIES

Definitions

When we call a set of social relations an ecology, we mean that it is best understood in terms of interactions between multiple elements that are neither fully constrained nor fully independent. We thus contrast ecology with mechanism and organism on the one hand and with atomism and reductionism on the other. The latter contrast is straightforward and general: ecology involves some kind of relation between units whereas atomism and reductionism involve only qualities of units themselves or of their aggregates. With mechanism and organism, the contrast is more specific. When we encounter complete and routine integration in the social world, we employ the metaphor of mechanics, as in the "rule-governed systems" of role theory, for example. When we encounter systems whose elements move together in flexible homeostasis, we use the metaphor of organism, as in structural functionalism. By contrast with these two, in ecological thinking the elements are not thought to move together at all; rather, they constrain or contest each other. "Ecology" thus names a social structure that is less unified than a machine or an organism, but that is considerably more unified than is a social world made up of the autonomous, atomic beings of classical liberalism or the probabilistically interacting rational actors of microeconomics.

This language suggests that the concept of ecology is analytic and metaphorical rather than ontological. But I shall, in this article, speak of ecologies as things—that is, ontologically. I will, for example, discuss "the ecology of professions" or "the university ecology" as particular social structures rather than as metaphoric understandings of structures demarcated by some other means. By doing so, I bracket the question—important but much too large to be analyzed here—of whether the word "ecology" denotes an actual species of social structure or merely a theoretical framework with which we can interpret any of a number of types of social structures. The article can thus be read either as a defense of ecology as a research framework or as an analysis of ecologies as a given type of social structure.

Analytically, the concept of ecology involves three components: actors, locations, and a relation associating the one with the other. In the ecology of the professions, these three components are the professions, a set of controlled tasks, and the links between professions and tasks. The basic structure of this ecology thus seems clear. But we should not go on to the seemingly "obvious" assumption that tasks come first, then professions, then links. This is the ordering that is implied—indeed assumed—by functionalism. But it is not correct, either as an empirical assertion or as an analytic presupposition. The locations of an ecology (e.g., tasks in the professional ecology) are not preexisting positions except in a sense too abstract to be relevant to social theory. It is the process of constructing the relations between actors and locations that in fact *constitutes* and *delimits* both actors and locations. Analytically and empirically, the relational process is prior. I shall call this relational process ligation. Avoiding the available ordinary language word (linkage), I hope to remind the reader that ligation constitutes at one and the same time an actor, a location, and a relation between them. Creating a psychiatric approach to shell shock in World War I, for example, redefined

who psychiatrists were and what shell shock was more than it defined a relation between a preexisting group and a given task.[4]

Because of the empirical and analytic priority of ligation, it is essential to remember that actors and locations are purely endogenous to social interaction. This is especially difficult with the concept of location. Our education in Cartesian coordinate systems makes us always imagine space as an empty continuum in which locations are defined by a regular coordinate system that we impose from outside, without reference to any internally produced topology. But social space is not like this. It has no empty locations. Its topology is defined relationally in the process of interaction and is therefore completely endogenous. Thus, a professional "location"—a task like obesity or alcoholism—is not a location by virtue of having a set of abstract properties that position it in some abstract social or cultural space in advance of social interaction, but by virtue of the fact that various professions have constituted certain sets of social, psychological, and biological phenomena as obesity or alcoholism in the process of fighting over the vast array of potential expert work in the society. (See Abbott 1988:ch. 2 for a full-length exposition of this argument.) The position of alcoholism "between" medicine, psychotherapy, law, and so on follows from the activity of those professions, not from variable properties discernable ahead of time within "the phenomenon of alcoholism." Indeed, this is as true for the very definition of alcoholism as it is for its position in the system of professions.

That there are no empty locations in social space does not mean that all of social space is equally "constituted." For example, there are areas of "potentially professionalizable work" that are currently constituted under loose, commonsense understandings, as was "getting dotty" before it became "senile dementia," "organic brain syndrome," and eventually (and by the formal definitions, quite erroneously) "Alzheimer's disease." It is useful to have a formal name for general zones of experience that are not yet constituted into particular locations vis-à-vis a particular ecology. I shall call such zones "arenas," it being understood that by using such a term I do not invoke any notion that arenas are somehow predefined by social functions.[5]

The utility of careful attention to such conceptual details is made clear by looking at a second ecological system, the university system. In the United States, higher education is organized into several thousand institutions, each of which makes up an organizational turf where various disciplines, professions, and other expert groupings fight for control of on the one hand material resources for research and instruction and on the other hand areas of knowledge and intellectual endeavor. The actors in this ecology are not a fixed group, exclusively demarcated as are the professions. Their endogeneity is much more evident. But they are fairly definite social things. Some of them are professions themselves, others are well-defined academic disciplines, and still others are the many would-be professions, disciplines, and interdisciplines that are

[4]The term linkage will later be used to refer exclusively to connections between actors in different ecologies.

[5]There is, of course, an infinite regress argument possible on the term "arena," as I have given no means for defining or demarcating arenas but at the same time have refused to allow them to be defined functionally. Although resolving this infinite regress requires arguments beyond the immediate discussion, here I simply state the rough answer: we can legitimately speak of arenas because they are defined by the past states of the social process, as they are—in the examples given—by prior commonsense classifications. No social world ever exists without a preexisting topology of some sort. Hence, it is legitimate to imagine "locations" being newly defined in "arenas" that are shaped neither by currently forming location definitions nor by universal functions. I regret what may seem like an arbitrary multiplication of terminology, but only rigorous definition can tame the multivocality of commonsense terms. The following terms have specific senses in this article: arena, audience, avatar, bundle, ecology, hinge, jurisdiction, linkage, ligation, location, position, setting, and settlement.

perpetually condensing out of specializations and interdisciplinary space. Change among these actors is much more rapid than that among the professions, and individuals move between them much more fluidly than they do between professions.

The locations in this ecology—the things that these groups are attempting to control—are in most cases not as familiar as those of the professions, largely because they are not—with the exception of disciplinary knowledges—so easily reified. Like its actors, the university ecology's locations are emphatically endogenous. These locations are constituted as sites within the universe of instruction and research, and to them are expected to adhere various kinds of resources: material (financial, infrastructural), demographic (e.g., students), and even symbolic (i.e., paradigmatic dominance of certain intellectual problems). In this constituting of academic control, locations can be assembled in many different ways—in far more ways and with far more overlap, in fact, than occurs in the ecology of professions. Since they are quite different from the well-defined and relatively stable jurisdictions of professions, I shall use the term "settlements" to refer to these locations constituted within the university ecology. Academic settlements can take the form of a special faculty, a major or concentration, a set of courses, a body of more or less controlled knowledge, or any combination of these. They may involve research practices, evidentiary conventions, and perhaps systems of knowledge application, as well as all the structural apparatus of journals, degrees, conferences, and so on. Settlements lack the strongly exclusive character of professional jurisdictions. There is no sharp separation between academic disciplines, which often overlap in methods, theories, and subject matters and which often differ more in style and heritage than in substance.

The other settlements of the university ecology are even more indefinite. Liberal education, extracurricular life, and technology transfer, for example, are examples of nondisciplinary settlements, each of them being a location in the university ecology associated with particular faculty, each possibly having its own special practices and forms of knowledge, its own social structures, supports, and resources. That these "settlements" could also be seen as organizational functions is precisely the point. Viewing them ecologically enables us to see them—correctly—as more dynamic, makes the university world less machine-like and more contingent. Note that these often cross-cut disciplinary settlements.[6]

Since this article aims to replace the "audience" concept (from the analysis of professions given at the outset) with the notion of "linked ecologies," it is important to say something about the audiences for the university ecology. In the professional ecology, it is fairly clear who are the actors and who are the audiences for actors' claims: the professions on the one hand; the workplace, public, and state on the other. But in the university ecology, it is not clear exactly where the ecology ends and the audiences of the various claims within it begin. While we might think of trustees and state legislators as fully external audiences, students, administrators, and in many cases external clients constitute not merely audiences—analogous to the workplace, public, and legal audiences of the professional ecology—but also endogenous actors. For example, many types of university administrators have their own associations, degrees, and supposed knowledge. Indeed, they have their own ways of thinking about the shaping of academic settlements. They "bend" the whole ecology, in the

[6]I avoid reusing the term jurisdiction precisely because the locations of the university ecology do not have the sharp separation implicit in the word jurisdiction. I am using the term "settlement" here in the sense of Abbott (2001:136–44), on which I have drawn for this analysis. In Abbott (1988:69–79), I used "settlement" in a different fashion, denoting by it the exact quality of the link between profession and work: exclusive control, division of labor, client differentiation, or whatever.

sense that the very dimensions along which the disciplines and professions cut up the world of knowledge—intellectual dimensions first and foremost—are not important to administrators, who would rather constitute the different settlements of the university ecology around, say, types of students, types of resources used, or types of education. A cognate argument can be made for the students themselves. In the terms used here, then, the university ecology may be a place where the audiences are merging into the ecology as actors, or, to put it in the terms developed here, a place where two formerly linked ecologies are merging into a single ecology.

The university ecology thus requires that we generalize the image of ecology implicit in the "system of professions." It forces us to see that professional jurisdiction is only one type of location and that the topologies of other ecologies may be more overlapping and cross-cutting. It forces us also to see the boundaries of ecologies as newly problematic. Yet at root it still relies on the fundamental concept of an ecology as a set of actors, a set of locations, and a set of links between the two.

An even more extreme example of an ecology is the political system. Although it may seem counterintuitive to call the state an ecology, any government consists of dozens of competing units and parts. In the United States, dozens of "governments" have authority over any given place: towns, counties, states, and the federal government, to mention only the standard concentric series, to which are often added various overlapping and cross-cutting partial governments: schools boards, water commissions, sewage districts, regional authorities, planning boards, and so on. Even in statist France, one speaks of governments plural and departments plural; the Conseil d'Etat exists precisely so that the administrative state will not break out into competing factions. In short, "the state" is in practice neither a single unified thing, nor a complex machine with many parts, nor an aggregate of many individual wills. It is yet another ecology of competitors, albeit one in which some members have their hands directly on the machinery of government.

But if we seek within politics the basic units of an ecology—actors, locations, ligation—things get quite difficult. To be sure, politics has a "visible" ecology that is quite simple. Indeed, political systems are usually deliberately designed to have settings in which conflict is *supposed* to occur between formally constituted political actors. These settings—the legislatures, administrative councils, and electoral committees of democratic political systems, for example—might be viewed as a set of visible locations for the political system, within which are supposed to act representatives, administrative appointees, electors, and other duly constituted social actors, who aim to control these places the way a profession controls a jurisdiction or an academic discipline its settlement. Other political activity is considered "informal," if not illegitimate. There is thus at least the appearance of a stably organized, fully domesticated "ecology" of politics.

But just as the university ecology reaches well beyond the disciplines, so too the ecology of politics always includes far more than these formally constituted actors and their formal settings of action, which in fact become a subsystem that determines only the intermediate stakes in a political process that actually evolves far more broadly.[7] In this broader political ecology are actors of many, many different kinds: parties, civil servants, administrative departments, pressure groups, journalists, substantive experts, and so on. More important, the "locations" in this ecology are not the

[7]It was the classical theorists of the liberal state—above all, the Rousseau of *The Social Contract*—who envisioned a realm of political equality insulated from a civil society in which there could be inequality. But even Rousseau was acutely aware that politics in practice involved far more than the formal institutions of government.

previously mentioned formal legislatures, administrative councils, electoral committees, and so on; these latter are better viewed as simple settings of competition. They are not locations at all in the ecological sense of being endogenously created positions in a competitive space. The real locations in the political ecology are the analogues of jurisdictions in the professional one; they are themselves constructed out of matters of political concern, just as the jurisdictions of professions are constructed by the professions out of the continuum of potential tasks and the settlements of academia out of the continuum of things to be known, ways of knowing, and students to be taught. Another way of putting this is to say that no political group is interested in dominating a legislature simply for the sake of dominating a legislature; what it really wants to dominate is some set of political issues, decisions, and outcomes.

To denote these sets of political decisions, actions, and outcomes that are the real locations of the political ecology, I shall speak henceforth of political "bundles." These are the analogues of professional jurisdictions and academic settlements. Examples might be "social policy," or "interventionist economic policy," or "deregulation." As with jurisdictions, there is no fixed or given shape of political bundles, no preexisting topology of politics. To see politics as ex ante unified into coherent issue bundles is to make precisely the same mistake as did the functionalist theory of professions when it thought that the shape of professional work was determined by abstract functional requirements rather than by a relentless process of interaction and competition. Issues, policies, and outcomes are tied to one another by social action, not by functional necessity.[8]

Bundles differ from settlements and jurisdictions in important ways. First, the three clearly represent a range of stability. Professional jurisdictions tend to be stable for considerable periods. Academic settlements turn over somewhat more quickly, whereas rebundling of political issues takes place at a rapid rate. The issue of deregulation, for example, went from being part of populist left politics to being a staple of conservative politics in less than a decade in the United States (Prasad 2000). Similar rebundlings are commonplace in the United States, in part because the two-party system makes bundling so draconian a simplification of politics. Second, the three types of locations differ in their levels of separation. Jurisdiction takes exclusive relationship as its model, whereas settlement and bundling take overlap and coincidence much more for granted. Medicine's control of expert treatment of bodily health and law's monopoly of courtroom and judiciary remain the professional ideal, whereas interdisciplinarity is a recurrent ideal in universities and coalition-building a recurrent ideal in politics.

Underneath all three of these examples, however, is the basic concept of an ecology made up of a set of actors, a set of locations, and a set of links between them. The character of these three elements may change, but the fundamentals of the concept are the same. An ecology comprises actors, locations, and ligation. The last is the primary process, producing as it unfolds in interaction the pattern of constituted actors and locations that can sometimes look like a reified, ex ante structure. As we have seen, ligation takes different forms—jurisdiction, settlement, bundling—in different

[8]The game of any given political actor is not necessarily the mastery of this or that political issue or even this or that political bundle, but to see the success of the greater part of the political issues with which that actor is concerned. Laumann and Knoke (1987) have shown, in their study of the national political field in the United States, the diversity of strategies of actors in such an ecology. Some concern themselves entirely with a few issues, but follow them profoundly and in all settings. Others concern themselves with everything they can, exchanging quality for quantity. Note that for the specialists an optimal strategy is to impose on others their own bundling of policies, whereas the generalists aim to succeed on the backs of others' bundling of the issues.

ecologies, varying by temporal duration and degree of exclusion among many other things.

The Properties of Ecologies

I argued earlier that when ecologies come in contact with one another we see the emergence of alliances between subgroups in one ecology and subgroups in another. These alliances and the points of contact that enable them are the determining factors in a system of linked ecologies. But the possibilities for contact and alliance are shaped by the internal character of the ecologies being linked, so we must first discuss the many ways in which those internal characters can differ.

We begin with the forms of the actors and of their associated locations: the dimensions, numbers, and covering pattern of actors and locations. Some ecologies have actors all of one common size. In others, size varies. In terms of distribution, some ecologies have one or two major actors surrounded by lesser groups and perhaps some isolates. Others have a more uniform packing. Finally, some ecologies have purely exclusive actors; professions are generally disjunct, for example. By contrast, political actors are often overlapping in complex and irreducible ways, because single individuals and subgroups can be members of several different "larger" political actors.

When adjacent ecologies are of the same material form in terms of actor size, distribution, and exclusiveness, the linkages between them will unfold in a way quite different from the way those linkages unfold when the adjacent ecologies are of differing forms. Thus, when linked ecologies each contain a small number of exclusive actors, we can expect the creation of simple correspondences between the two sets of actors. When they are both of a complex and diaphanous form, as with the political ecology discussed above, we will more likely see ephemeral alliances, and homomorphism will matter less. In the third case (the case of considerable difference in the material and structure of the two ecologies that may become linked), the situation seems quite unpredictable, as we shall see below in the case of medical licensing.

We must also consider the pattern of created locations—the jurisdictions of the professions, the settlements of the disciplines, the bundles of politics, and so on. Some locational systems are highly exclusive—like professional jurisdictions. Others mix overlap in some dimensions with sharp separation in others, like the disciplinary settlements in academics. Sometimes, as in the political ecology, it is hard to find real exclusion anywhere. Indeed, as we shall see, the exact pattern of overlap for various political bundles is one of the important stakes of the political ecology. Beside this variation in degree of overlap, there are many other important dimensions on which linked locational systems can vary. Locations can be large or small, packed in or loosely covering, and so on. Given all these various dimensions of difference, it follows that the degree of homomorphism between the locational structure of two ecologies will influence very strongly the kinds of alliances that can be made between them, just as does the degree of homomorphism between their actor structures.

Finally, we must consider the kinds of links between actors and locations, the varieties of ligation. These too can vary considerably between ecologies. Even within the realm of professions, we see various kinds of jurisdictions: not only exclusive control, but also division of labor, client differentiation, and so on. In universities, the typically extensive substantive overlap between disciplines is often accompanied by sharp differentiation in methodologies, yet in some cases there is little substantive overlap and settlements are, indeed, fully exclusive. Looser settlements—liberal

education or technology transfer, for example—can also range from exclusive to interpenetrating. In the ecology of politics, bundles of issues and policies can be tied together in myriad ways of unimaginable complexity, and, as I noted earlier, these bundlings tend to change steadily. In general, then, there is a long list of variables in ligation: exclusivity, intensity, types of division, legal standing, external recognition, and so on. As with actors and locations, ligation must be compared in detail across ecologies, above all to understand the possibilities that it affords for alliances between them.

Analysis of the interior forms of neighboring ecologies and the homology between them must be supplemented by analysis of their differing temporal structures, for these too affect the possibilities of linkage between ecologies. Just as there is a question of the numbers, patterns, and ligations of actors and locations in the synchronic competitive space of an ecology, there is also a question of the grain of an ecology in time. There can be rhythms and cycles of actors, or of locations, or of the links between the two. One of the most important tendencies of the ecology of professions, as well as that of occupations more broadly, for example, is the historical acceleration of the rhythms of the actors. In the 19th century, professionals made their studies in youth and needed no further education for a lifetime. But by the turn of the 20th century, engineers for example had come to see their knowledge obsolesce before their careers were finished. Other professions quickly followed suit. Today, nearly all the professions face such a rapid rhythm. Yet when knowledge doesn't last to the end of a career, the very idea of career is questioned, which in turn begins to challenge the underlying demographic constitution of the professions themselves, which are built up as groups of individuals with a common career pattern. We see this clearly in the failure of the "information profession" to emerge as a stable and effective actor in the ecology of professions, despite the massive importance of information work in the current economy. The blunt fact is that knowledge turns over too fast for a real information profession to emerge, unless the very design of professions were to reorganize itself around a life-stage concept.[9]

Since a given ecology has its own characteristic rhythms, connection between two ecologies can depend on the parallels and disparities between those rhythms. As we shall see below, medical licensing was a continuously important concern for 19th-century doctors. But for the political systems they faced, it was only of occasional importance, with the consequence that the doctors' allies changed often over the years as they sought friends in a political ecology largely disinterested in them. Thus, not only the synchronic structures of adjacent ecologies make a difference in linkage between them, but also their temporal ones.

Having set forth the various types of differences that can affect the possibilities for linkage between ecologies, we can finally return to the original question and theorize the interecology links themselves. To recapitulate, the concept of linked ecologies recognizes that events within any particular ecology—changes in jurisdictional claims, settlement patterns, and political efficacy—are hostage in some sense to events in adjacent ecologies. In the "Ecology/Audience" model that the present argument aims to transcend, this hostage relationship was conceived as a kind of external judgment. The state or public made a judgment of professional jurisdictional claims and accepted or rejected them on external grounds. In the linked ecologies argument, however, this hostage relationship is more mutual. Both sides are ecologies and both

[9]There are such life-stage occupations (short-order cook, for example), but they often have difficulty organizing for collective activity. See Abbott (2005).

sides look for something out of the transaction. To succeed in one ecology, a particular competitive strategy must therefore provide results to allies in an adjacent one. To restate an earlier example, medical licensing passes (or is struck down) only because doing so provides a payoff not only for either the doctors or their "irregular" competitors, but also for some political group against *its* political competitors. For example, licensing might help out civil servants against legislators by giving the former reason to demand a bigger budget.

Issues that provide these kinds of dual rewards, differing in the two ecologies, I shall call hinges. Synchronic and diachronic patterns within and between ecologies create possibilities for alliances between actors and locations across the borders of ecologies. Exploring these possibilities are various interecology contacts, the whisperings and the negotiations from which come the alliances of the future. Out of those explorations come in turn the hinges, the strategies that work as well in one ecology as in the other. Note that a hinge can not only provide different rewards, but can actually be of a fundamentally different type in the two ecologies that it links. To take again the example of medical licensure, we shall see that in the medical world it was a characteristic of ligation, whereas in the political world it was a contested location.

Indeed, this difference of what we might call the axis of hinges may well be what keeps ecologies separate. If two adjacent ecologies were squabbling over the same resources, and issues occupied similar axes in both of them, there would be little keeping the ecologies from merging. It is precisely because politics is organized differently from the professions, around different issues, with different kinds and qualities of actors, with different concepts of location and ligation, and with different rhythms, that the world of the professions does not simply merge into the more general political world.

A good example of this separation is the emergence of sociology itself, which first began as part of a much larger entity—the progressive reform movement—whose basic arena of activity was not the university but politics. As the university system gradually condensed in its new form in the late 19th century, the reformers located in universities formed, among other things, a local version of reform—sociology—which did not shed its last direct connections with the political world until the 1930s and 1940s. The huge expansion of the university system after 1900, by creating a whole new arena of competition, created the opportunity for academic sociology. But it also came to define the terms in which sociology competed with the other disciplines that emerged around it—anthropology, political science, and (slightly older) economics and history. Ultimately, these terms of competition—the concept of the undergraduate major and the idea of disciplinary specialization, for example—meant that academic sociology had to separate from reform or merge into the academic teaching of social work. But the terms of this academic competition were not given ex ante. They were produced by the internecine conflict of the disciplines themselves in the academic setting.[10]

It is this ability of new arenas of competition sometimes to constitute themselves as separate ecologies that makes ecological analysis worthwhile as a general strategy. Otherwise, the social process would simply consist of an undifferentiated flow (as it is in purely contingent theories of history) or a systematically proliferating and differentiating system (as it is in the evolutionary functionalism of Parsons, for example). But by viewing ecologies as current arenas of competition that can be linked together

[10]On the early history of sociology, see Turner and Turner (1990) and Abbott (1999). Note that the concept of hinge is to some extent cognate with Padgett and Ansell's (1993) "robust action." Both involve the importance in action of brokerage points between different structures.

and even in some cases be amalgamated or divided, we can reduce the contingent complexity of the social process without assuming any fixed or functional structure to it.

To evaluate this argument, we need to consider some examples of linked ecologies. I shall therefore take the system of professions as my core ecology and examine some cases of linkage between it and the ecologies around it.

LINKED ECOLOGIES

Professional and Political Ecologies

To illustrate a linked ecological analysis, I begin with two examples of medical licensing, an issue that brings together the professional and political ecologies. In the first of these examples—19th-century medical licensing in New York—action succeeds because striking down licensing becomes a successful hinge action, with both political and medical payoffs. In the second—medical licensing in the same period in England—action fails because licensing fails to mobilize a supportive coalition in the professional ecology, despite its political success.

Taking the New York case first, I begin with the actors, locations, and ligation history of the medical ecology.[11] The actors in the New York medical ecology in the 19th century included three different medical sects: the allopaths, who were the inheritors of earlier British and continental medicine; the homeopaths, a new sect arriving from Germany in the 1840s; and the eclectics, who tried to embrace all methods. There were also Thomsonian botanical doctors and a large miscellany of midwives, pharmacists, chemists, and others. Unlike these latter, who were unorganized or disorganized, the three medical sects pursued the structural road to professionalization—journals, societies, university-based schools, and so on. A crucial part of that program was licensure, generally conceived as state-authorized penalties against those who practiced medicine without the imprimatur of the sect. But the sects could not bring themselves to recognize each other, a dissension that made coordinated action impossible.

The work at issue among these various actors was that of curing human physical problems, which was itself constituted, by means of these jurisdictional battles, into what we now would think of as the jurisdiction of health. What was and was not part of this health jurisdiction was very unclear in the 19th century. Delivering babies, for example, was only "medicalized" in the course of the century, and even then not very completely; it was principally a family event, not a health one.

In terms of ligation, all of the various actor-groups spent most of the 19th century jockeying for control of various areas of medical work, the higher-status professions aiming at exclusive jurisdiction, the lower-status ones at retaining a free field with openings for all. Roughly speaking, exclusive jurisdiction was won and lost several times by the allopaths during the early years of the century, but around mid-century a Jacksonian free-for-all opened medical work to all comers. In the last third of the century, there were roughly parallel establishments for the three major sects, coupled with a variety of restrictions on the others, although the teeth of enforcement were often weak.

[11]The most important sources on the medical history of New York are Walsh (1907), Duffy (1968, 1974), and Van Ingen (1949). For medical licensure generally throughout the United States, Rothstein (1972) remains the most important source. A detailed study is Rosenfeld (1984). For the legal history, I have followed the account of Walsh (1907), filled out by my reading of the journals of the legislature.

Finally, in 1907 a general reorganization of all this turf emerged. In teleological histories of professionalization, this was the goal toward which all the 19th-century comings and goings had tended. By contrast, in the linked ecological perspective, the 1907 licensing system meant the creation of an institutional system that provided an acceptable basis on which to terminate one form of jurisdictional competition and to start new ones, both in medicine and in politics.[12]

Throughout the 19th century, there were nowhere near enough doctors in the three sects, much less in allopathy alone, to meet statewide health demand, and so in practice the jurisdictional pattern tended to be one of client differentiation, the sects serving the higher-status clients, the others the lower. As we shall see when we consider links between the ecologies, however, there were a number of specific medical "locations" that were, in fact, constituted at the behest of the political system. There, too, the aim of high-status healers was to create exclusive jurisdiction by a small group, and that of low-status healers to destroy it.

By contrast with this relatively straightforward medical ecology, the political ecology was extremely complex. In the first place, the very arena of political activity was hard to define. The vagaries of American state formation had created three major settings for politics—city, state, and federal—without really deciding what issues were to be resolved where and why. National issues—slavery until the Civil War and reconstruction afterward—gave form to some political parties, but not to others, which were purely local. As for city and state politics, their relation was transformed several times during the century (there were four new constitutions) as different sides prevailed in the debate over home rule for the City of New York. Moreover, the boundary between government and private activity was quite hazy. Nineteenth-century city governments typically acted as coordinating and pass-through agents aiding landholders in local infrastructural improvements rather than as general redistributors of income and creators of public infrastructure.[13]

All this implied that the identity of "the government of New York" and, indeed, even what it meant to speak of "governing New York" was quite hazy. For example, in 1866, the state legislature directed the taxes, debts, building codes, and public health of the city. The state governor named the commissioners of police, of health, of fire, and of immigration, while the city's mayor named the commissioners of streets and of the aqueduct, and the electorate chose the mayor, the council, the aldermen, the commissioners of education, and the controller, who, in turn, named the commissioners of the city's hospitals and of the city's prisons.

As this recitation makes clear, the actors in the New York political ecology were numerous and diverse. These actors included political parties, which were in turn constituted of clubs, fire-fighting companies, commercial interests, and "patronage swamps"—specific areas of government work under party control. There was also an extensive administrative corps (actually, several competing administrative corps, some

[12]See Rothstein (1972) and above all Rosenfeld (1984). On the homeopaths, see Kaufman (1971). Laws seeking to regulate the practice of medicine were proposed almost annually throughout the 19th century, but most disappeared in the public health committees of the Assembly. From 1792 to 1907, there were eight successful projects that aimed at increasing the regulation of medicine. For these, there were perhaps 20 or 30 failures. There were also four or five successful proposals to reverse or overturn regulation and a considerably larger number of failed attempts to do this.

[13]The sources on state and city politics in New York in the 19th century are numerous and diverse. There is no definitive and complete account. Hammond (1848) and Jenkins (1846) remain important sources. Simple summaries are Brown (1922) and Johnson (1922). Recent studies of importance are Spann (1981), Hammack (1982), and McCormick (1981). On the role of cities in particular, see Sam Bass Warner's (1968) classic *The Private City*. See also Teaford (1984), McDonald (1986), Einhorn (1991), and Monkkonen (1995).

of them in Albany, some in New York). There were also the legislative bodies in Albany, sometimes dominated by the city's Tammany Hall, sometimes by the upstate republican machine.[14] There was the Board of Regents, a council of notables named for life (by whatever political party controlled the state at the moment of vacancy) and charged with supervising all the public and private educational establishments in New York. Throughout the century, there were also recognized groups representing private interests: for example, the elite reformers who governed the state behind the scenes in the 1870s and 1880s.

The locations at stake among the many and widely divergent actors in this ecology of politics were very diverse. They included decisions about public policy, about public expenditure, and above all about what was to be considered public in the first place. They involved agriculture, manufacture, health, transportation, retailing, education, crime, slavery, and dozens of other things. As a result, the competing activities by means of which the professions aiming to establish and control the jurisdiction that we would eventually call "medicine" took place in the context of political actors who themselves were competing in an ecology of agents—governmental as well as private—of which the central question was the manner in which a vast and indefinite array of goods and services would be distributed and paid for. The state was, indeed, yet another ecology of little groups fighting their own little wars for their own little reasons. Indeed, the locational and actor complexity of this ecology was so great that it is difficult to descry any real structure of policy "bundles." There were major issues, to be sure, but they were combined and recombined in dizzying varieties of ways.

Between these two ecologies ran an extensive variety of ties and claims. Medicine was mixed up in many problems and social establishments of which the identity—political or technocratic, statist or medical—was very much in play. Public general hospitals, quarantine hospitals, mental hospitals, and asylums for the retarded not only employed many doctors, but also provided targets for medical lobbying about "public health," public morality, and employment. Medical people served in many of the offices and councils concerned with what we would now call public health: a city health department, a council on contagious illnesses, a bureau of "summer physicians," and, of course, the vast system of quarantine and immigrant inspection on Ellis and Staten Islands. Here too doctors played several roles: employee, reformer, and political agent. Doctors of all types were also involved in public debates on medicolegal questions: abortion, the legal status of the insane, professional malpractice, the functions of the coroner, insurance and pension issues. And of course, they spoke publicly on various topics in areas that they claimed concerned "public health" (which was not yet a common locution): clean water, sewers, and street cleaning. Doctors took these political activities seriously, perceiving them as technocratic matters of public health, but other political actors often viewed their interventions as partisan or self-interested. As a result, doctors' pretensions to be recognized as experts were to a large extent hostage to their political activities.[15]

[14]Histories of Boss Tweed, Tammany Hall, and the Tammany Society are numerous but for the most part aim more at shock value than serious analysis. Werner (1928) remains important. Mandelbaum (1965) was the earliest to see Tweed as the politician who first resolved—despite himself—the coordination problem that had theretofore stymied politics in the large American cities.

[15]On the subject of public health in New York, see Duffy (1968, 1974). For a surprising and amusing story of medical influence, see the history of the Croton Aqueduct and the sewers in Goldman (1997). Doctors favoring wet sewers found themselves opposing the many parties interested in the for-profit nightsoil industry that was fertilizing New Jersey fields with New York excrement. The political role of the New York Academy of Medicine has been well studied. See Van Ingen (1949) and also Duffy (1968, 1974).

On the linked ecologies argument, the political system interested itself in the internal affairs of the healers—the fight between homeopaths and allopaths, for example—only when the allopaths and homeopaths could be allied with different political positions in the political ecology. For only then would the fight between homeopaths and allopaths as professions provide anyone in the political ecology with helpful political resources. This might explain the general stalling on the medical licensing issue in the late 19th century, which has usually been attributed to obscure conflicts between medical sects. Rather, since the allopaths and homeopaths were not adversaries in the many politicomedical arenas where doctors were active, no political actors had any incentive to offer one or the other of them licensure in exchange for partisan support. For example, there was a great debate over the origins of the cholera epidemics—whether they came from human contact or from "miasmas." These two theories implied different policies with different political costs, supporters, and detractors—in the one case quarantine (with costly specialty hospitals, not-in-my-backyard problems, and delay of expensive business shipments), in the other a program for general public health (with expensive pure water, wet sewers that attacked the nightsoil industry, housing inspection that hit landlords, and so on). But since allopathy and homeopathy both included supporters of both theories, competitive issues within the realm of healing offered no turf for political profit taking.[16]

The early 19th century provides at least one clear example of this fact that changes in medical licensing happened only when those changes could succeed in the interprofessional arena and at the same time could serve the interests of some actor in the ecology of politics. In 1843, a crescendo of complaints bombarded the legislature demanding the abrogation of all penalties for unauthorized healing. On May 2, 1844, the Assembly did, indeed, strike down the existing penalties by a vote of 61–40 (NYAJ 1844:1042).[17]

This success was not the result of party politics, even though the Whigs were at each other's throats and the Democrats themselves had divided into radicals and "hunkers" over the issue of passive versus active government. Indeed, the numbers absent indicate that this was not really an essential question for either party. But the geography of the votes shows that votes for the continuation of regulation came from three regions whose counties had large populations and large numbers of already-authorized doctors: New York and its immediate environs, the populous counties from Albany westward, and the counties of the souther tier along the border with Pennsylvania. Votes to strike down regulation came from the rural and mountainous areas of New York: the counties along Lake Ontario, the Adirondack counties in the extreme North, and the Catskill and Taconic counties between Albany and New York. The vote was thus overwhelmingly a vote of urban regions against rural ones, and the key to the situation was the importance of herbal medicine in the rural regions.

[16]For an extended discussion of allopathic views of cholera, on both sides of the miasma/germ divide, see Rosenberg (1962). Among homeopaths, the miasma theory can be found in various sources, (e.g., Warner 1858:106ff; Small 1876:236). By contrast, the germ theory with its contagion/quarantine implications can be found in Comstock (1868:43–44). Most homeopaths, like most allopaths, sat on the fence (see the excellent review of the homeopathic approach in Paine (1867), which starts by announcing the germ theory and then moves without hesitation into a miasma model). Thus, the two schools did become less differentiable across the broad front of political issues that involved doctors, and other actors in the political ecology probably no longer cared about resolving their conflict in the professional ecology. As a result, the homeopathic medical association was recognized by the state from 1865 and there was a homeopathic state mental hospital from 1874.

[17]The two houses of the state legislature, Assembly and Senate, both published *Journals* and *Documents*. I have denoted these NYAJ, NYAD, NYSJ, and NYSD, respectively. For the *Journals*, it suffices to say the year and the page. For the *Documents*, one must add the number of the documents. Thus, NYSD 1844, 31:3 means the third page of Senate Document 31 for the year 1844.

But this is not at all what was discussed in the legislative debates. Rather, the debates were about the partisan issue dividing Whigs, radicals, and hunkers—that of activist government—and invoked all the highest stakes of that debate—democracy, liberty, equality, and science. For example:

> Your committee has yet to learn that science, and a long established profession have anything to lose from open and fair competition or to fear from error and quackery, when free to combat them with the power of light and truth. (NYAD 1843, 62:6)

> A people accustomed to govern themselves and boasting of their intelligence are impatient of restraint; they want no protection but freedom of inquiry and freedom of action. (NYSD 1844, 31:3, 5)

This grandiloquent language shows us that medical licensure fell in 1844 because the demands of the empirical healers (above all the botanicals) in their competition with allopathic doctors provided the democratic radicals with a chance to shout about their faith in liberty, competition, and the reason of the average man. The project of abrogation didn't succeed because the Thomsonians persuaded members of the legislature of their various arguments about medicine, but rather because some members of that legislature saw that the question of abrogation would give them a chance to shoot off rhetorical arrows against their enemies, the hunkers and the Whigs. There was medical action because medicine could be an occasion for political action.

Thus, an event like deregulation of doctors in New York became a hinge event. It was not situated solely in the system of professions, but also in the political system. It should be obvious that the rule that a hinge event must "succeed" in two ecologies at once obtains equally if the impetus comes from the other side, the political ecology. The case of 19th-century British medical licensure—a case of failure—makes that clear.

Again, we review the actors, locations, and ligations of the ecologies involved. In the early 19th century, England had more or less four official types of healers, plus the usual range of empirics, botanicals, midwives, and so on. First, there were perhaps 1,500 physicians: university-educated, high-status, and long organized into the Royal College of Physicians. Second, there were several thousand surgeons, descended from the old barber-surgeon guild and organized into the Royal College of Surgeons in 1800. Although qualifications and an examination existed for surgeons, neither was stringent, and one could enter the profession easily from military surgery. Third, there were the apothecaries, tradesmen selling drugs and dispensing advice with them. Apothecaries made the first moves in the 19th-century licensing game, acquiring an act in 1815 that licensed them, allowed professional examinations, and trademarked the term apothecary. Lower in status than surgeons, apothecaries were considerably more numerous, numbering perhaps 10,000 in the kingdom in the 1820s. Competition from apothecaries in the early 19th century led the surgeons to tighten their examinations, and many men entering general practice passed both sets of examinations.[18]

In addition to these three groups were the chemists and druggists, a less organized group who simply sold drugs (without any advice), and whom the apothecaries saw as their opponents and inferiors. The chemists also were governed by parliamentary acts,

[18]General sources on the British medical professions in this period include Reader (1966) and Loudon (1986), the former placing the medical men in a broader context, the latter a first-rate, extraordinarily detailed study of actual medical practice. On chemists, see Russell, Coley, and Roberts (1977), which well describes the complex alliance of pharmacists and analytical chemists, two groups that are wholly separate in the United States. See also the discussion in Erickson (1952:243ff).

although these mainly focused not on practice but on purity of medicines. Beyond the chemists were still more healers. The general lack of medical care throughout society meant that many people set up in various forms of general practice under still other names, without any form of qualification or label. All of these practiced various pieces of what we would now consider general medicine, including such tasks as attending at childbirth. The name "doctor" of course was not protected. And as in the United States, the actual extent of "medicalization" was by no means clear.

The continuous jockeying in this professional ecology is evident in the many attempts at legal control of it: the Apothecaries Act in 1815; attempts to amend that act in 1825 and 1833; bills to regulate medical practice in 1816, 1818, 1841, 1844, 1845, 1846, 1847, 1850, 1854, 1856, 1857, 1858; select committees on medical education in 1834 and on the medical profession in 1847; and a long and complex history of attempts to regulate doctors in civil service and military positions. As in the United States, there were many tries for few successes. But since homeopaths were not in England the force that they were in the United States, the actual dynamics of competition in the professional ecology were different. In the United States, the competition was more or less between equal schools, at least after the retreat of the botanicals. In England, the competition was, characteristically, a status competition between groups jostling in a vertical hierarchy. (It came to an end only when the three top groups allied against the rest in 1858.[19])

The political ecology facing this vertically fluctuating professional ecology was itself vertically organized. Much more than in the United States, the political realm was constituted around a single formally democratic structure—Parliament—in and through which most political actors had to channel their efforts. Although there was an extra-parliamentary politics of considerable importance, and although much of 19th-century British politics concerned political actors' access to Parliament, what matters for medical licensing is that the core of the parliamentary political ecology was tiny indeed. There were about 600 seats in the Commons, and the total parliamentarily active group cannot have numbered much more than perhaps two or three thousand people. Shaping the politics of the country in the great London political clubs—Brooks, the Carlton, the Reform—political coalitions controlled not only Parliament, but also the patronage-filled bureaucracies.[20]

The actual actors in this tiny arena were shifting alliances shaped by personal friendships, inherited political allegiances, and rapidly changing personal fortunes. The location they aimed to control was "office," that is, the holding of the monarch's authority to make a government, with which went the ability to initiate major legislation and to exercise a patronage power of some considerable use in maintaining family and alliance fortunes. As in many democratic systems, holding office was far more important than was maintaining a consistent politics, and throughout the century we have examples of prime ministers proposing and passing bills to which they were in private completely opposed merely to stay in office; Disraeli's passage of the 1867 Reform Bill is only the most celebrated example. This organization of the

[19]The list of parliamentary activities comes from my own survey of the indexes of the *Journals* of the House of Commons, Hansard's *Parliamentary Debates*, and *Sessional Papers*, as well as the massive *Subject Catalogue* (Cockton 1988) for the relevant years. On the various negotiations and complexities among the medical groups themselves, see Berlant (1975), Loudon (1986), and above all Newman (1957). The last one describes the legal situation in excellent detail, but only from the point of view of the medical personnel.

[20]British politics in the middle third of the 19th century is usually regarded as having been in transition from the unreformed aristocratic politics of the 18th century to the populist, party-dominated politics of the late Victorian era. The foremost exponent of this view was Norman Gash (1953, 1965, 1972), but it continues to be standard (see, e.g., Jenkins 1996). For a general study of the emergence of liberalism, see Parry (1993) and for an alternative view of reform, see Newbould (1990).

political ecology around personal matters rather than political bundles grew out of the unified interest of the political class in shedding its political power as slowly as was compatible with social stability. In such a world, party conflict involved family political traditions more than it did contested political bundles and, in fact, the parties were by no means strongly attached to particular political locations. The Tories tended to be interested in conserving the past and anchored the old landed interest, to be sure, but they also included technocrats like Sir Robert Peel, who would prove willing to strike down the Corn Laws that bankrolled the principal (landed) constituency of the party. But the Whigs (later Liberals) were great landholders quite as much as the Tories, if not more so.[21]

As in New York, the area of activities we now call public health created an important link between the medical and political ecologies. But the driving force in public health in England was not medical or popular. It was largely administrative and came mostly from the remarkable Edwin Chadwick. From his position as secretary to the national Poor Law Commissioners and later to the General Health Council, Chadwick's enormous energy took him and his investigators—sometimes doctors, sometimes engineers, sometimes middle-class reformers—into dozens of areas: clean water, burial grounds, housing sanitation, and so on. One of those many areas was medical licensing, for Chadwick's tidy administrative mind was outraged by the fact that a sizeable minority of Poor Law medical officers (one in every parish in the kingdom) were not in any way qualified to practice medicine. Strangely, the Poor Law medical officers ended up competing with the regular medical profession by providing cheaper services, and the regular profession often attacked the Poor Law system for this reason (see Lewis 1952:76). At the same time, Chadwick's vision of public health involved engineers and chemists as well as physicians, surgeons, and apothecaries. It was not merely medical, but broadly scientific. (Chadwick was a doctrinaire Benthamite.) This was one of several reasons why the British medical professions were nowhere near as deeply involved in the politics of "public health" as were those in New York. They were much less dependent on state largesse—the workhouses and poorhouses did not sustain employment among those groups of doctors most active for licensure. Even worse, they did sustain employment for lower-status practitioners despised by those very licensers. Thus, the state was effectively a competitor in the professional ecology itself.[22]

The story of medical licensing in the 1840s—the period of the greatest licensing activity—was that no version of licensing that was successful in both ecologies could be found. In 1840, the Whigs introduced a licensing bill at the behest of a partisan group of surgeons whose real aim was to attack the governing bodies of the physicians, surgeons, and apothecaries. But this strategy from the professional ecology failed to

[21]On the patronage system of office, see Lewis (1952:32), who remarks that "a large proportion of government offices was directed to the outdoor relief of the upper classes." Note that despite the overwhelmingly common class interests across parties, the tiny disagreements between the protectionist Tories, the technocratic Peelites, and the "reforming" Whig/Liberals embodied enough "difference" to provide the leverage whereby larger public differences pressured Parliament into a vast overhauling of British life. Indeed, one might say that to fight purely internal squabbles over minor matters of status and precedence, the great English aristocrats used the larger differences of the public as their weapons, with the indirect consequence of abolishing the foundations of their power. This is an example of the deliberately self-similar character of democratic political institutions, whereby slight self-interest differences in the political class are harnessed to larger differences of the whole society in such a way that internecine warfare in the political class produces policies dictated by broader constellations of interests. See Abbott (2001:173ff). This self-similarity is the hidden foundation of classical pluralism as described by Dahl (1961).

[22]On the emergence of a genuine state bureaucracy in this period, see Parris (1969). The classic study of Chadwick is Finer (1952) and that of Chadwick's impact on public health is Lewis (1952). A more recent and detailed study of the public health area as eventually constituted is Hamlin (1998), which in particular portrays the competition provided by Poor Law medical personnel (Hamlin 1998:93ff). On the daily life and practice of the Poor Law Medical Officers, see Loudon (1986:ch. 11).

prove of much political use to anyone. The Home Office (in charge of the realm's internal affairs) more or less took the point of view of the existing corporations (Hansard 3rd series, 56:362–63 [1841]) and, indeed, there were no real political enthusiasts for the bill, but rather skepticism from all quarters. The fact was that there was no political profit to be made from supporting or opposing the bill (Newman 1957:154ff).

After the general election of 1841 brought in the Tory ministry of Sir Robert Peel, however, Sir James Graham, the new Home Secretary, brought in a major medical reform bill in 1844. Graham's action was partly a response to the steady prodding of opposition (Whig) politicians. Most of these had little prior connection with the subject. Rather, medical reform seems to have become a useful issue with which they could twit the government, so Graham sought to disarm it preemptively. Indeed, even Graham's logical allies—such as Chadwick at the Poor Law Commission—seem to have been dangerous friends.[23] Graham's bill had a long and tortuous history, but ended in failure after his many attempts to arbitrate between the conflicting interests of the various healing groups failed. Finally, they all unified around hatred of the bill's creation of a strong, central, governmentally appointed board that would have supervised professional licensing. This time, licensing worked in the political ecology but not in the medical one.

More generally, medical licensing was seen too many different ways by too many actors; no single version of it could be found to work in both ecologies. In the Peel government's somewhat authoritarian and technocratic approach, licensing was part of a broader program (bundle) of institution creation in government, a program of bureaucratization and social control that had taken shape in the new Poor Law, the Factory Acts, and the creation of the metropolitan police. Other parties treated it as a handy tool for various ephemeral political uses. The medical professions, on the other hand, treated it as a burning issue of monopoly, a fact shown clearly by the opposition to the Graham bill as first proposed, which strongly protected the two royal colleges, to the great resentment of apothecaries and other general practitioners. Once Graham conciliated the GPs, he had lost the elites, who attacked him for loss of their vested interests.[24]

Yet the very failure of licensure to succeed as a hinge had enduring importance within the medical ecology itself. In the United Kingdom, the National Association of General Medical Practitioners emerged in specific opposition to the activities of the three professional corporations vis-à-vis the 1841 and 1844–1845 medical bills. The licensing debate thus not only led to complex alliances, it resulted in new structures within the professional ecology itself.

These first examples underscore the importance of the varying properties of ecologies discussed earlier. First, these examples show the importance of studying the

[23]The standard work on Sir James Graham is Erickson (1952) and the standard biography of Sir Robert Peel is Gash (1972). A study of the Peel administration specifically is Crosby (1976). Chadwick was playing his own political games with doctors (Hamlin 1998: 182–83). He was also playing games with Graham, whose brother had been appointed Registrar General over Chadwick's evident disapproval (Lewis 1952:32). Chadwick's *Sanitary Report* was one of the most revolutionary documents of the age, and Graham of political necessity "maintained a wary reserve" (Lewis 1952:62). Graham may have been looking to the medical world for weapons with which to fight his state-internal battles with Chadwick, whose position as secretary of a free-standing board (the Poor Law Commissioners) allowed him to intervene at will in matters of great import to the political classes, whose outlook he did not fully share.

[24]Hamlin (1998:157) remarks that "Chadwick offered Peel and Sir James Graham an innocuous yet viable way for moderate governments to respond to the polarized condition-of-England question." That is, public health more broadly was the proposed hinge issue. But because the medical professions presented a relatively united front against government-sponsored reform, rather than presenting a variety of views differentiated by subprofession, no joint action was possible. Things might have turned out quite differently had the apothecaries broken ranks. For a medical-side view of the constitution of this politics, see Berman (2002).

relative comparability of size and other qualities across actors in the linked ecologies. In New York, allopathic physicians were of about the same size as the homeopaths, but more than the eclectics. The nonmedical healers probably outnumbered all three medical groups taken together, yet all of these groups were tiny by comparison with the major political groups and organizations of the state. The doctors of New York numbered perhaps three thousand in 1840, perhaps six thousand or seven thousand in 1900, whereas Tammany Hall—but one of many political clubs in but one city—numbered fifteen thousand in 1892 (Blake 1901:150). To be sure, the political actors closely involved in medical licensure—the legislature, the Regents, the health commissions of the State and City of New York—were much fewer, but still the political world was overall a vastly more numerous world than was the medical world in New York in the 19th century. The doctors were but one of the numberless pressure groups drifting around in the political ecology. By contrast, in England, it was the political ecology that was small and tightly focused.

Equally important are general differences in ligation. Medical actors aimed at or were largely exclusive. To be an allopath was to not be a homeopath or an eclectic or a botanical healer and so on. Similarly for the others. But in the political world, there was no such exclusiveness anywhere. Members of Tammany might also be members of the Assembly, bureaucrats or other administrators in the governments of state or city, members of governmental commissions, democratic party officeholders, and so on without losing their identities as members of Tammany Hall and—something that matters considerably vis-à-vis the ecology of professions—without losing their identities as members of this or that occupation. Political actors were not exclusive actors. Indeed, the exact overlaps of various actors were very much one of the stakes of the entire political ecology.

This leads to a second point. It is essential to realize that what is location in one ecology can be ligation quality in another. For the New York doctors, medical licensing concerned a crucial property of the linkages of actors and locations, the quality of exclusive jurisdiction. For the English doctors, licensing was not only such a quality of ligation, but also the defining boundary of a social actor; ultimately, all three regulated medical professions made common cause against all the others. For the political ecology, by contrast, licensing was not a characteristic of the links between actors and locations. It was rather a policy—that is, a location. In the political ecology, therefore, medical licensure was a tiny question bundled among many other things as a way of consolidating and dominating political terrains that were much larger. In New York, licensing was bundled with other issues of liberty and freedom, in this case the liberty to pursue health in one's own way. In England, by contrast, it was bundled with public health and social control, as a precondition of good government.

A third crucial issue, mentioned earlier, is temporal grain. For New York doctors, licensure was a perpetual question, but a question that, when one had voted some laws and created some administrative structures to embody them in practice, could in their view be regulated once for all. By contrast, political affairs, of the city as of the state, were far more hasty things. They were not envisaged in any long run, but only in the short. Only rarely did the political ecology concern itself with matters of regulation looking even 10 years into the future. Much less did the political ecology envision definitive regulation and indeed we have seen medical licensing in the late 20th century be effectively disemboweled by the expansion of nursing, the appearance of physicians' assistants, and the supervision of managed care. This mismatch of the rhythms of interests in licensing between the two ecologies surely implied that the allies of the doctors—of the allopaths as well as of the homeopaths—necessarily varied during the

decades of battles over the question of licensure. As the political kaleidoscope turned up new openings within the political system, the doctors found now one group, now another to be their principal ally in the pursuit of licensure. This rhythmic discord perhaps also implied that the doctors ultimately succeeded in getting "permanent" licensing only when other medical issues—chiefly, the cost of medical care and the problem of specialization (Stevens 1971)—began to provide straw from which political bricks could be made on the more rapid time scale of the political ecology. Permanent licensing came, oddly enough, because licensing was no longer a politically useful controversy.

Professional and University Ecologies

Rather than seeking an alliance with some particular unit of an adjacent ecology, a profession could attempt to create an avatar of itself within that ecology. This would be the creation, in some sense, of an institutionalized hinge. We have just seen an example of this—although in the reverse direction—in the case of the Poor Law medical officers, who were a governmental creation in the professional ecology. Such a strategy commonly results in conflict between original and avatar, as the two face fundamentally different competitive situations. This reshaping of avatars shows well the powerful internal dynamics of ecologies, the ways in which those internal conditions of competition tend to keep ecologies separate. To illustrate these dynamics, I shall consider four short examples here of attempted avatars between the professional and university ecologies: two originating in the professional ecology and two originating in the academic one.

The avatar process is to some extent already visible in the cross-sectional fact that there are three basic kinds of actors or disciplines in the American academic ecology, loosely defined by whether they give graduate degrees, undergraduate degrees, or both. There are the 30 or so "heartland" disciplines that give both kinds of degrees—mathematics, economics, English, and so on. Heartland departments hire faculty almost exclusively from their disciplines' Ph.D.s and are always associated with undergraduate liberal arts majors. Beside these heartland disciplines are the purely research-based disciplines, such as cognitive neuroscience, development studies, and Renaissance studies, which sometimes generate their own Ph.D.s but typically do not have undergraduate majors. These are often linked to research worlds outside the university, in government and industry. Finally, there are what I shall call the undergraduate disciplines, such as criminal justice, occupational therapy, film studies, and Puerto Rican studies, which are undergraduate fields typically based on an occupation, an identity, or some other undergraduate demand factor, and that for the most part do not generate and hire their own Ph.D.s.[25] Undergraduate disciplines are often avatars created by large practice professions seeking a place in the academic ecology and catering to the practical side of the student mind. Although American community colleges originally aimed to bring liberal arts education to the masses, by the 1970s the entire movement had turned occupational (Brint and Karabel 1989). Many practice occupations entered the tertiary education system in this period, the most conspicuous example being nursing, which was almost completely hospital based in 1950 and almost completely college based by 1990.[26]

[25]For an extensive discussion, see Abbott (2001:ch. 5).

[26]In fact, 87 percent of nursing students were in the 1,070 hospital schools in 1949 (West and Hawkins 1950:10, 19). Small hospitals drew much of their care staff from students, who provided 80 percent of home front nursing services during World War II (Haase 1990:2). By 1983, however, there were only 281 hospital schools left, and they were graduating only 14.9 percent of the nurses. (*Facts about Nursing* 1984–1985:138, 126). The immense mass of hospital-school-trained nurses, however, meant that the profession as a whole was still 50 percent hospital trained at that time (*Facts* 1984–1985:27).

But the shaping power of the academic ecology transforms the academic avatars of practice professions. A first example is computer science. The original roots of computer science lay in applied mathematics and electrical engineering. The major associations predated the full development of the first generation of electronic computers: the Association for Computing Machinery appeared in 1947 and the Society for Industrial and Applied Mathematics in 1952. By the time third-generation computers arrived in the 1960s, both computer programming and systems analysis had emerged as widespread forms of work (Pettigrew 1973). But they lacked formal academic foundation. The needs for rapid and mass training, for systematic evolution of computer knowledge, and for legitimation of what appeared to be ad hoc, recipe-based knowledge, acquirable by anyone smart enough to master it: all these things gradually called an academic discipline into existence.

In terms of training, that discipline was wildly successful. After expanding moderately in the 1970s, the number of schools with computer science (CS) programs exploded in the 1980s and 1990s. CS BAs grew from 7,200 in 1978 to 35,000 in 1989. Although this figure has since flattened out as programming jobs leave the United States for India, it remains about 3 percent of all bachelor degrees in the United States. CS has also begun approaching heartland levels of Ph.D. production and is now nearly self-sufficient in Ph.D.-level faculty.[27]

But the practice profession and the academic discipline have largely decoupled. While the demand for current basic-level programming skills is large, those skills turn over very quickly. Yet the theoretical issues of computing are largely independent of changes in programming and even of programming level. As a result, CS departments have difficulty finding faculty willing to teach highly demanded skills because those skills are themselves of little interest or importance to the academic faculty. Essentially, a separate training faculty is hired. In summary, the academic competition of CS with applied mathematics and related disciplines has necessitated a level of abstraction for the academic field that rapidly distances it from the applied field. And unlike the situation in medicine, the applied field does not in practice live directly off academically generated innovations. At the same time, the practice discipline remains dominant. There still does not exist a separate society for purely academic computer science.[28]

Criminology is another case where the impetus for the academic discipline came from the practice profession. To be sure, the heartland disciplines did study crime, but practice associations grew up in parallel. The American Correctional Association dates from 1870 and the National Probation Association from 1907. Police training emerged in the university context in the 1930s, and "police science" became a separate section in the major heartland crime journal in 1934. By 1941, college faculty engaged in training police—most of them former policemen themselves—had created the National Association of College Police Training Officials, which renamed itself in 1947 the Society for the Advancement of Criminology, and in 1957, once that "advancement" seemed to have reached its goal, the American Society for Criminology (ASC).

[27]Throughout this section (all four examples), data on programs in colleges come from Volume 4 of the *College Blue Book* for the relevant years. Similarly, all figures on degrees come from the relevant volumes of the *Digest of Education Statistics*, produced by the National Center for Educational Statistics and available from the GPO. Data on the founding dates of organizations come from the *Encyclopedia of Associations*. For sources on the development of computer science education in early years, see the comprehensive Austing, Barnes, and Engel (1977).

[28]On the divergence between academic CS education and industry needs by the year 2000, see the special issue of *Computer Science Education* in March 2002 on "Software Engineering Education and Training," and, in particular, editor Saiedian's (2002) introduction. In fact, the ACM, SIAM, and the IEEE-based Computer Society remain the most important academic professional societies for CS.

Thus, the principal academic society in the criminology area emerged as an "academicizing" of faculty whose original aim was to train policemen. But the academic ecology's immense pressure for abstraction did not stop. Although the heartland academics working on crime published in the same places as did the newly academicized "police scientists," they had no interdisciplinary society pulling them together, and inevitably they oozed into the police trainers' SAC/ASC. More of the heartlanders began to work in emerging criminology departments and schools. By 1953, a heartland social scientist was president of the ASC, and since 1963 nearly all presidents have been. At present, 30 percent of members are academics in sociology or other heartland departments, 35 percent are in criminology departments, 15 percent in other "undergraduate discipline" departments, for a total of 80 percent pure academics. This takeover of the ASC by the academics—half of them from heartland departments and more than half with Ph.D.s from those departments—has, in turn, created an opening for, indeed almost required the creation of, another practice-based academicizing group, the International Association of Police Professors, founded in 1963 and renamed in 1971 the Academy of Criminal Justice Scientists.[29]

This pattern of academicizing followed by capture from the academic side and a new academicizing from the practice side was driven, in part, by an immense success: the very rapid expansion of criminal justice study in American colleges from a handful of colleges in the 1960s to many hundreds today, reflected in an expansion from 17,000 criminology and law enforcement BAs by 1978 to 27,000 in 2000, about 2 percent of all bachelors degrees granted in the United States. But it was also driven by the utility of the ASC for heartland academics themselves. As competition intensifies in the core of the old heartland disciplines, substantive specialization provides in some ways a shelter from that competition, both in career terms for individuals and in resource terms for the subspecialty. The history of the ASC is thus driven by its performing different functions in the two ecologies: legitimation in the professional one, respite from competition in the academic one.[30]

The situation of new avatars is somewhat different when the expansion that creates them is an expansion into the professional ecology from the academic one. I consider two examples, psychology and economics. Both have the degree pattern that characterizes established heartland disciplines, producing a doctorate for about every 20 bachelors. Both have developed large presences outside academia over the course of the 20th century. Yet they have decisively different patterns of development.

Psychology began as an academic discipline, and the APA (in 1870) as an organization of academic researchers. Applied—or as it later became known "clinical"—psychology began on two fronts. The first of these was work with delinquency in child guidance clinics, schools, and criminal courts, where psychologists usually became members of psychiatrist-headed treatment teams. The second was the fully autonomous jurisdiction of intelligence and personality testing, introduced to a wide public by the extraordinary impact of the Army Alpha test in World War I. In the 1920s, testing gradually spread throughout American society, from business to school, from hospital to court.[31]

[29]A general history of the ASC is Morris (1975). These membership percentages come from my own random sample from the ASC's current directory (www.asc41/director/title.htm, accessed December 2003). The shape of the heartland criminologists can be traced through the history of their interdisciplinary society's journal, the *Journal of the American Institute of Criminal Law and Criminology*, which had a "Police Science" section by 1934 and eventually (1951) added "and Police Science" to its title.

[30]On early criminology education, see Piven and Alcabes (1968).

[31]Basic sources on the history of psychology as a discipline include Riesman (1991), Napoli (1981), Routh (1994), and Capshew (1999).

The applied psychologists were often women, and applied psychology had difficulty getting recognition in the APA. (Before 1945, full membership required postgraduate publication.) An abortive applied psychology association flickered into and out of existence in the late teens, succeeded by a clinical section within the APA (1919–1937). In 1937, the clinicians again separated from APA, creating the American Association of Applied Psychology. This was reabsorbed into the APA in 1945; by then, the war—in which about a quarter of American psychologists served (Napoli 1981:103)—had confirmed clinical psychologists firmly as the legitimate testers of the intelligence, vocational aims, and personality quirks of soldiers, students, workers, and employees. After the war, the brand new NIMH devoted substantial funds to the training of clinical psychologists, and the field ballooned. The first moves of clinical psychology into psychotherapy date from the postwar period as well.

In the 1970s, certification and licensure for clinical psychologists marched rapidly across the United States, covering virtually all states by 1980. By this point, clinicians were dominant in the APA, and reimbursement for not only testing but also psychotherapy had been won from various third-party payors, a signal victory in the professional ecology over the arch-rival psychiatrists. So dominant were the clinicians that the academics seceded from the APA, creating the Psychonomic Society as early as 1959 and the more successful American Psychological Society in 1988 (Riesman 1991:330, 380). The latter is now the basic professional association of academic nonclinical psychologists.

Psychology thus provides an example where the academic discipline spawned a practice wing that over about 60 years became so powerful as to drive the academics themselves to secession. Reincarnation of an academic discipline in the professional ecology failed because the pressures of professional practice drove the APA in directions unacceptable to academics dedicated to general theory and experiment in psychology. In the process, clinical psychology eventually built its own separate academic system—the schools of "professional psychology"—complete with separate journals and bodies of knowledge (Riesman 1991:352). Faculties at such schools include very few researchers in foundational psychology; the schools' researchers work mainly on applied problems, like therapy efficacy, test construction, and so on.

The practice wing of psychology originated from techniques invented by the field itself and readily accepted—aside from some conflicts with psychiatrists—outside it. By contrast, economists who ventured into the policy and advice arena—a venture that dates from the earliest years of the discipline—found themselves surrounded by businessmen, bureaucrats, volunteer leaders, and others who claimed equal expertise about the same things. In the discipline's early years—the AEA was founded in 1885—there was a fairly seamless gradation from applied economists working in business and government through to the professors in universities. A sign of this was the success of the discipline's independent foundation for peddling economic expertise—the National Bureau of Economic Research, founded in 1920.

But the 1930s and 1940s saw a major change. The war years brought operations research (OR), whose cost/benefit analysis rapidly became a basic tool for applied economists. OR was rather like psychological testing—straightforward, doable only by experts, but not requiring much truly academic expertise. It, too, was desired by clients, but controllable and ownable by the profession. At the same time, the war period also brought Keynsian economics, a comprehensive and quite academic system that dominated national economic policy for 30 years after the war. More important, the period brought a level of statistical and mathematical sophistication to academic economics that began to deeply divide the academic and applied fields. By the 1950s,

Arrow and Debreu were doing their Nobel-prize-winning work on general equilibrium, a transformatively brilliant theory, but one with such otherworldly assumptions as that there is no such thing as money. Such work was utterly irrelevant to applied economics.

Thus, abstracting developments—driven by the mathematicization that seized academic economics after the war—began to push the academic and practice wings of the discipline apart. All the same, the applied economists have never left the American Economic Association. The AEA continues to be dominated by academic economists, even though those academic economists have had their own society for statistical and mathematical economics (the Econometric Society) since 1930. This alliance continues because the applied economists generally believe that the mathematical dreaming of the academics provides the legitimation for their own considerably more homespun work. Most applied economics involves little more than the first two semesters of microeconomics and the first semester of macroeconomics. Economists both applied and academic report that this is what they really agree on and, indeed, that this is all they really know (Reay 2004). But the vast mathematical daydreams of the academic economists—which have been the subject of internal jeremiads for many years—provide the incomprehensible proof that applied economics rests ultimately on "science."

This holds true even when academic and applied economists enter the same policy arena and fight over it. A good example is the conflict between academic and applied economists in the analysis of federal manpower programs. The debate pitted applied economists who wanted to measure the programs by doing randomized experiments against academic economists who wanted to use "scientific" statistics, the latter group being led by James Heckman, who in fact won the Nobel Prize for just those "scientific statistics." But although long, hard, and still unresolved, the fight has not produced anything like the schism in psychology. It seems clear that applied economics remains tied to academic economics in part because the professional competitions in which it is engaged are so severe, as I noted at the outset. So academic legitimation proves a crucial resource for applied economics and keeps it closely tied to the academic ecology.[32]

These four cases show, then, that attempts to make avatars across ecology lines inevitably run into the problem that the internal forces of competition in the avatar's ecology tend to drive the avatar in directions unforeseen ahead of time. There is, in that sense, no way to build a perfect hinge. No structure can be built that can completely escape the differing pressures of interaction within two different ecologies.

Overdetermination and the Emergence of Ecologies

Despite the generality of the linked ecologies approach, there are clearly cases in which analysis in terms of linked ecologies is impossible. The most important such case occurs when ecologies lose their separation because of the overwhelming number of linkages binding them.

A good example of this is the arena of military activity. The theme of interservice rivalry is an old one, and the military arena would seem well described by an ecological analysis. The basic actors in this ecology would be the services and their subunits—Army, Navy, Air Force, and Marines, together with their various specialized subsections of Special Forces, Submarine Force, and so on. In the traditional interservice rivalry model, these actors compete for resources of men and money, but in an ecological model we would conceive of the "locations" to be monopolized as

[32]This example comes from the work of Breslau (1997a, 1997b).

bundles of work: specific tactical tasks and, beyond those, bundles of tactical tasks that add up to strategic bundles. Command of resources should flow from control of such strategic bundles, as, for example, command of resources slipped from Air Force to Navy when the U.S. nuclear deterrent moved underwater in the 1960s.

Certainly, for long stretches of U.S. military history, a linked ecologies model works well. The military was a small area of competing groups controlling widely divergent tactical tasks and facing a fairly straightforward political ecology in Washington. State governments were occasionally involved because of the extensive use of the military in the suppression of civil disorder, although most such work fell to the hermaphroditic (state/federal) National Guard units.

But the strategic world of the post-Cold-War period makes such a model quite inappropriate. In the current imperial situation, the U.S. military must maintain a complex set of strategic outputs ranging from nuclear deterrence to preparedness for major conventional war to the long list of quasi-warfare activities characteristic of imperial militaries: counterterrorism and reprisals against terrorism, police actions involving conflicts over race, property, and the like in places where policymakers decide that the United States has interests, protection of American nationals working worldwide, guaranteeing of the free trade that keeps the United States hegemonic, and so on. Such tasks call for officers with as many political skills as military ones and involve extensive collaboration with other agencies both American and non-American, governmental and private. The network of production involved in these outputs is much too dense to conceptualize in terms of subsegments of the military competing for control of this or that strategic service.[33]

In effect, the military is enmeshed in too many ecologies for it to move in much of any direction. Imagining it as a set of professions involved in jurisdictional adventures over who controls traditional combat, unconventional warfare, and operations other than war can capture only a tiny portion of the systems of environing relations that govern it. It is for this reason that the great books about the bureaucratic politics of the military—Halperin's (1974) *Bureaucratic Politics and Foreign Policy*, for example—spend most of their time first elaborating an enormous cast of characters and their interests—the branches of the service, the civilian and military bureaucracies, the NSC, the CIA, the congressmen with their worries about base closure and military business, the manufacturers with their desire for military profits—and then tracing the various settings and rituals through which these characters and interests shape a decision before, during, and after it is made. Such books portray a system far too clogged with influence, alliance, and opposition to be seen as a relatively open system of ecological relations or competitions that governs actors in the security arena. In such a congested world of influence and overdetermination, ecological models are less useful.

[33]The literature on the military "ecology" is mostly normative. Both sides agree on a loosely ecological perspective on interservice relations. They differ about whether that rivalry is a good thing. Those who believe that interservice rivalry produces better security through competition think that the historical record demonstrates the dangers of the massive intervention by outside (civilian) policy bureaucracies (themselves enmeshed in other competitions, although this is not emphasized in the defense literature). An example is Hoffman (1999). Those who believe that interservice rivalry produces dangerous coordination failures think that the historical record underscores the dangers of ecological competition between the services. Davis (1985) exemplifies this "dangerous rivalry" conception, even making a linked ecologies argument in which civilian political combatants (Congress and the executive branch) make use of rivalries in the Pentagon to achieve civilian political aims (1985:155ff). Halperin and Halperin (1985) also provide some noteworthy examples. In brief, a linked ecologies approach may be applicable to the military case, but only if used with extreme care.

This argument about overdetermination implies that whether a zone of the social process takes on an ecological nature is an empirical question. A further important question is, therefore, that of the conditions under which such ecologies emerge. If we could answer that question in future work, we might also understand why in some cases we see overdetermined, congested zones of social structure that are not ecological in character.[34]

CONCLUSIONS

The idea of linked ecologies overcomes the limitations of the original ecological model, which always takes as given certain external parameters. By recognizing that these parameters are themselves the results of other ecologies, the idea of linking removes this arbitrary assumption. It also immediately redirects our research attention to a list of questions about the way linking works. First, there are the questions about the hinge issues between ecologies: How are those hinges made? What are the conditions that make certain things work as hinges and others not? Second, there are the questions about how the various similarities and differences between potentially linked ecologies—similarities in actors and in numbers, distributions, and relations of actors, in locational tessellation, and so on—influence the building and destruction of hinges.

But beyond these questions, which are a matter of working out the details, lies a larger question mentioned at the outset: the question of whether on the one hand ecological thinking is an analytic strategy applicable to certain parts of the social process, or on the other the social process does empirically tend to shape itself into ecologies, which are actual regularities of the process itself. In part, this is an unanswerable question encapsulated in the unresolved debate of realism and nominalism.

But it remains important nonetheless. And if the answer is that ecologies are an empirical phenomenon rather than an analytic convenience, we are then faced with a whole range of questions about why it should be that the social process shapes itself so. Do we simply enact the social world this way? Is ecology an outcome of modernism and the modern structuring of the relation of individuals and groups? Does it result from some quirk of our symbolic systems as they are deployed in living? Or is it in some sense inherent in the nature of, say, small-world-type networks as they evolve in time? Whatever the answer, if we think that the social process actually happens in ecologies, we have to find a reason for that. For the present, I hope to have established here the utility of a linked ecologies account, and in particular the concepts of hinges and avatars, as a productive general framework for analyzing complex and contingent social processes.

[34]In the interests of space, I have removed from the article here a lengthy comparison between Bourdieu's concept of field and my concept of ecology. One might also ask why I have not related the ecological theory urged here to the population ecology paradigm descending from Hannan and Freeman's (1977) famous article. Most of that literature, however, concerns competition among individual organizations rather than whole types of organizations (i.e., it is more analogous to a literature on professionals than that on professions). It is also overwhelmingly focused on organizational birth and death rather than organizational change and transformation. See Singh and Lumsden (1990).

REFERENCES

Abbott, A. 1988. *The System of Professions*. Chicago: University of Chicago Press.

———. 1999. *Department and Discipline*. Chicago: University of Chicago Press.

———. 2001. *Chaos of Disciplines*. Chicago: University of Chicago Press.

———. 2003. "Ecologies liées." Pp. 29–50 in *Les professions et leurs sociologies*, edited by P.-M. Menger. Paris: Maison des Sciences de L'homme.

———. 2005."The Sociology of Work and Occupations." Pp. 307–30 in *The Handbook of Economic Sociology*, 2nd ed., edited by R. Swedberg and N. J. Smelser. New York and Princeton: Russell Sage Foundation and Princeton University Press.

Abell, P. 1989. "Games in Networks." *Rationality and Society* 1:259–82.

Alihan, M. 1938. *Social Ecology*. New York: Columbia University Press.

American Nurses Association. 1984/1985. *Facts about Nursing*. Kansas City, Mo: American Nurses Association.

Austing, R. H., B. H. Barnes, and G. L. Engel. 1977. "A Survey of the Literature in Computer Science Education Since Curriculum '68." *Communications of the ACM* 20:13–21.

Berlant, J. 1975. *Profession and Monopoly*. Berkeley: University of California Press.

Berman, E. P. 2002. "Creating a National Medical Field." Department of Sociology, University of California, Berkeley.

Blake, E. V. 1901. *History of the Tammany Society*. New York: Souvenir Press.

Breslau, D. 1997a. "Contract Shop Epistemology." *Social Studies of Science* 27:363–94.

———. 1997b. "The Political Power of Research Methods." *Theory and Society* 26:869–902.

Brint, S. and J. Karabel. 1989. *The Diverted Dream*. New York: Oxford University Press.

Brown, R. C. E. 1922. *History of the State of New York: Political and Governmental*. Vol. III. Syracuse, NY: Syracuse Press.

Bryk, A. S. and S. W. Raudenbush. 1992. *Hierarchical Linear Models*. Newbury Park, CA: Sage.

Capshew, J. H. 1999. *Psychologists on the March*. Cambridge: Cambridge University Press.

Castells, M. 1968. "Y a-t-il une sociologie urbaine?" *Sociologie du travail* 10:72–90.

Cockton, P. 1988. *Subject Catalogue of the House of Commons Parliamentary Papers. 1801–1900*. Cambridge: Chadwyck Healey.

Comstock, T. G. 1868. "Experience in the Late Epidemic of Cholera in St. Louis." *Transactions of the Twentieth Session of the American Institute of Homeopathy*. Section III: 34–47.

Crosby, T. L. 1976. *Sir Robert Peel's Administration*. Newton Abbot: David and Charles.

Dahl, R. A. 1961. *Who Governs?* New Haven: Yale University Press.

Davis, V. 1985. "The Evolution of Central U.S. Defense Management." Pp. 149–67 in *Reorganizing America's Defense*, edited by R. J. Art, V. Davis, and S. Huntington. Washington: Pergamon.

Dear, M. 2002. "Los Angeles and the Chicago School." *City and Community* 1:5–32.

Duffy, J. 1968. *A History of Public Health in New York City. 1625–1866*. New York: Russell Sage.

———. 1974. *A History of Public Health in New York City. 1866–1966*. New York: Russell Sage.

Einhorn, R. 1991. *Property Rules*. Chicago: University of Chicago Press.

Erickson, A. B. 1952. *The Public Career of Sir James Graham*. Oxford: Basil Blackwell.

Fabiani, J.-L. 1999. "Les règles du champ." Pp. 75–91 in *Le Travail Sociologique de Pierre Bourdieu*, edited by B. Lahire. Paris: la Decouverte.

Finer, S. E. 1952. *The Life and Times of Sir Edwin Chadwick*. London: Methuen.

Gash, N. 1953. *Politics in the Age of Peel*. London: Longmans.

———. 1965. *Reaction and Reconstruction in English Politics. 1832–1852*. Oxford: Clarendon Press.

———. 1972. *Sir Robert Peel*. Totowa NJ: Rowman and Littlefield.

Goffman, E. 1963. *Behavior in Public Places*. New York: Free Press.

Goldman, J. A. 1997. *Building New York's Sewers*. West Lafayette, IN: Purdue University Press.

Haase, P. T. 1990. *The Origins and Rise of Associate Degree Nursing Education*. Durham, NC: Duke University Press.

Halperin, M. H. 1974. *Bureaucratic Politics and Foreign Policy*. Washington, DC: Brookings.

Halperin, M. H. and D. Halperin. 1985. "Rewriting the Key West Accord." Pp. 344–58 in *Reorganizing America's Defense*, edited by R. J. Art, V. Davis, and S. Huntington. Washington, DC: Pergamon.

Hamlin, C. 1998. *Public Health and Social Justice in the Age of Chadwick*. Cambridge: Cambridge University Press.

Hammack, D. C. 1982. *Power and Society*. New York: Russell Sage.

Hammond, J. D. 1848. *The History of Political Parties in the State of New York*. Syracuse, NY: L. W. Hall.

Hannan, M. T. and J. Freeman. 1977. "The Population Ecology of Organizations." *American Journal of Sociology* 82:929–64.

Hawley, A. H. 1950. *Human Ecology*. New York: Ronald Press.
Hoffman, F. 1999. "Goldwater-Nichols After a Decade." Pp. 156–82 in *The Emerging Strategic Environment*, edited by W. Murray. Westport, CT: Praeger.
Hughes, E. C. 1971. *The Sociological Eye. Part III: Work and Self*. Chicago: Aldine.
Jenkins, J. S. 1846. *History of Political Parties in the State of New York*. Auburn, NY: Alden and Markham.
Jenkins, T. A. 1996. *Parliament, Party and Politics in Victorian Britain*. Manchester: Manchester University Press.
Johnson, W. F. 1922. *History of the State of New York: Political and Governmental, Vol. II, 1822–1864*. Syracuse, NY: Syracuse Press.
Kaufman, M. 1971. *Homeopathy*. Baltimore: Johns Hopkins University Press.
Laumann, E. O. and D. Knoke. 1987. *The Organizational State*. Madison, WI: University of Wisconsin Press.
Lewis, R. A. 1952. *Edwin Chadwick and the Public Health Movement*. London: Methuen.
Logan, J. R. and H. L. Molotch. 1987. *Urban Fortunes*. Berkeley, CA: University of California Press.
Long, N. 1958. "The Local Community as an Ecology of Games." *American Journal of Sociology* 64:261–81.
Loudon, I. 1986. *Medical Care and the General Practitioner*. Oxford: Clarendon Press.
Mandelbaum, S. J. 1965. *Boss Tweed's New York*. New York: Wiley.
McCormick, R. L. 1981. *From Realignment to Reform*. Ithaca: Cornell University Press.
McDonald, T. J. *The Parameters of Urban Fiscal Policy*. Berkeley: University of California Press.
McPherson, J. M. 1983. "An Ecology of Affiliation." *American Sociological Review* 48:519–32.
Monkkonen, E. H. 1995. *The Local State*. Stanford: Stanford University Press.
Morris, A. 1975. "The American Society of Criminology: A History 1941–1974." *Criminology* 13:123–67.
Napoli, D. S. 1981. *Architects of Adjustment*. Port Washington, NY: Kennikat.
Newbould, I. 1990. *Whiggery and Reform. 1830–1841*. Stanford: Stanford University Press.
Newman, C. 1957. *The Evolution of Medical Education in the Nineteenth Century*. London: Oxford University Press.
New York Secretary of State. Various years. *Legislative Manual*.
Padgett, J. F. and C. K. Ansell. 1993. "Robust Action and the Rise of the Medici."*American Journal of Sociology* 98:1259–1319.
Paine, H. M. 1867. "Epidemic Cholera." *Proceedings of the Nineteenth Session of the American Institute of Homeopathy*: 126–41.
Park, R. E., E. W. Burgess, and R. D. Mackenzie. 1925. *The City*. Chicago: University of Chicago Press.
Parris, H. 1969. *Constitutional Bureaucracy*. London: Allen Unwin.
Parry, J. 1993. *The Rise and Fall of Liberal Government in England*. New Haven: Yale University Press.
Pettigrew, A. 1973. "Occupational Specialization as an Emergent Process." *Sociological Review* 21:255–78.
Piven, H. and A. Alcabes. 1968. *Education and Training for Criminal Justice*. USDHEW, Office of Juvenile Delinquency and Youth Development. JD Pub. #78. Washington: GPO.
Prasad, M. 2000. The Politics of Free Markets. Unpublished Ph.D. Dissertation, University of Chicago.
Reader, W. J. 1966. *Professional Men*. New York: Basic.
Reay, M. 2004. Economic Experts and Economic Knowledge. Unpublished Ph.D. dissertation, University of Chicago.
Riesman, J. M. 1991. *A History of Clinical Psychology*. New York: Hemisphere.
Rosenberg, C. E. 1962. *The Cholera Years*. Chicago: University of Chicago Press.
Rosenfeld, P. 1984. Protecting the Public or Promoting the Professsion? Unpublished Ph.D. dissertation, SUNY–Stony Brook.
Rothstein, W. G. 1972. *American Physicians in the Nineteenth Century*. Baltimore: Johns Hopkins University Press.
Rotolo, T. and J. M. McPherson. 2001. "The System of Occupations." *Social Forces* 79:1095–1130.
Routh, D. K. 1994. *Clinical Psychology Since 1917*. New York: Plenum.
Russell, C. A., N. G. Coley, and G. K. Roberts. 1977. *Chemists by Profession*. Milton Keynes: Open University Press.
Saiedian, H. 2002. "Bridging Academic Software Engineering Education and Industrial Needs." *Computer Science Education* 12:5–9.
Singh, J. V. and C. J. Lumsden. 1990. "Theory and Research in Organizational Ecology." *Annual Review of Sociology* 16:161–95.
Small, A. E. 1876. *Manual of Homeopathic Practice*. New York: Boericke and Tafel.
Spann, E. K. 1981. *The New Metropolis*. New York: Columbia University Press.
Stevens, R. 1971. *American Medicine and the Public Interest*. New Haven: Yale University Press.
Suttles, G. D. 1990. *The Man-Made City*. Chicago: University of Chicago Press.
Teaford, J. C. 1984. *The Unheralded Triumph*. Baltimore: Johns Hopkins University Press.

Turner, J. and S. Turner. 1990. *The Impossible Science*. Newbury Park, CA: Sage.
Van Ingen, P. 1949. *The New York Academy of Medicine*. New York: Columbia University Press.
Wallerstein, I. 1976. *The Modern World-System*. New York: Academic.
Walsh, J. J. 1907. *History of the Medical Society of the State of New York*. New York State Medical Society.
Warner, N. H. 1858. "On Epidemic Cholera." *Proceedings of the Fifteenth Annual Meeting of the American Institute of Homeopathy*: 102–19.
Warner, S. B. 1968. *The Private City*. Philadelphia: University of Pennsylvania Press.
Werner, M. R. 1928. *Tammany Hall*. Garden City, NY: Doubleday.
West, M. and C. Hawkins. 1950. *Nursing Schools at Midcentury*. New York: National Committee for the Improvement of Nursing Services.