

The Emergence of Organizational Forms: A Community Ecology Approach¹

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This article introduces a new ecological approach to the study of form emergence based on the notion of an organizational community—a bounded set of forms with related identities. Applying the approach to 48 organizational forms in the health care sector, this study suggests that the development of novel forms is affected by the positioning of their identities with respect to existing form identities in the community, by the aggregate density and size of organizations matching those existing identities, and by the amount of attention directed at identity attributes by sector participants. Findings show that the process of form emergence is subject to population-dependent effects akin to those noted previously for organizational entries within established populations. The aggregate density and size of organizations with similar identities increase the probability of form emergence to a point (cross-form legitimation), but highly saturated regions of the identity space tend to be uninviting to new forms (cross-form competition).

INTRODUCTION

The historical emergence of new forms of organizing has been of critical importance to several major organizational and administrative theories. Organizational ecologists have long stressed that their perspective seeks to answer the question, “Why are there so many (or so few) kinds of organizations?” (Hannan and Freeman 1977, 1989, p. 7). Among other

¹ This research was supported by the Center for Entrepreneurial Studies at the Stanford Graduate School of Business. I would like to thank Howard Aldrich, William Barnett, James Baron, Carol Caronna, Michael Hannan, Joel Podolny, W. Richard Scott, Valery Yakubovich, Ezra Zuckerman, and the *AJS* reviewers for their helpful comments on earlier drafts of this article. Previous versions were presented at the Strategic Management Conference, held at the Stanford Graduate School of Business, February 4–5, 2000, and the American Sociological Association meeting in Washington, D.C., August, 2000. Correspondence may be addressed to Martin Ruef, Department of Sociology, Chapel Hill, North Carolina 27599-3210. E-mail: ruef@email.unc.edu

things, responses to this query require that analysts specify “sources of increasing diversity, such as the creation of new forms” (Hannan and Freeman 1989, p. 7). Transaction cost economists approach the topic on the basis of their classical concern with the division of labor between firms, markets, and intermediate governance structures (Williamson 1985, 1991). Applications of the transaction cost perspective to the historical development of new organizational forms (e.g., factory as opposed to craft production) frame industrial evolution primarily as a matter of efficient firm boundaries (Langlois and Robertson 1995, chap. 3). Neoinstitutional theorists, by contrast, have focused attention on the non-efficiency-oriented, constitutive beliefs that are required to delineate organizational forms (see Scott [1995] for a general discussion). One of their key research questions asks how these constitutive beliefs are imported from broader institutional frameworks in order to provide new forms of organizations with legitimacy and taken-for-granted routines of behavior (Meyer and Rowan 1977).²

Despite considerable theoretical interest in form emergence, these major organizational paradigms have yet to produce a generalizable explanatory model of the development of organizational forms. Organizational ecologists have accumulated an impressive array of quantitative evidence concerning the founding patterns of individual organizations within extant populations of forms, but they have not modeled the second-order process of form emergence explicitly (Astley 1985; Carroll 1984, p. 87). For instance, ecological models of resource partitioning among individual organizations have primarily been employed to explain differential entry rates of generalist and specialist organizations within extant forms (Carroll and Hannan 2000; Péli and Nooteboom 1999). While these models can be extended to multiple organizational populations (see Ruef, Mendel, and Scott 1998), they have not been adapted to illuminate the development of new forms themselves. At present, the latter task has proceeded primarily at a formal-theoretical level in organizational ecology (Pólos et al. 1998; Hannan and Freeman 1986; but see McKendrick and Carroll [1999] for a recent exception).

Meanwhile, neoinstitutional and transaction cost scholars have developed empirical accounts of the emergence of forms that tend to focus on particular historical cases (e.g., DiMaggio 1991; Nee 1992; Haveman and Rao 1997). DiMaggio’s (1991) study of the cultural construction of art

² A fourth perspective on form development, examining the impact of technological developments on niche openings for new organizational forms, has been advanced by Tushman and Anderson (1986). The relevance of this technological perspective will be considered in greater detail once I introduce some of the empirical features of my analysis.

museums in late-19th-century America is an example in point. DiMaggio shows how the definition of these museums as a form was influenced by the specific interests of “institutional entrepreneurs,” including art professionals, museum patrons, and the Carnegie Corporation (see also DiMaggio 1988). The role of such institutional entrepreneurs in form emergence has received theoretical elaboration from Aldrich and Fiol (1994), who consider how interested actors can use collective action to foster the cognitive and sociopolitical legitimacy of new organizational forms.

In contrast to institutional concerns with the impact of interests and legitimacy demands on the emergence of forms, transaction cost scholars have emphasized the importance of efficiency considerations. Nee’s (1992) explanation of the rise of hybrid organizational forms in China during market transition hinges on the transaction cost advantage of these arrangements over alternative governance structures. Similarly, Williamson’s (1985) case study of General Motors as a pioneering example of the multidivisional form suggests that the M-form structure provided a cost-effective complement to the annual-model strategy adopted by GM during the 1920s (see also Chandler 1962). While some have argued that the rise of the M-form was tied to a broader set of considerations than simple efficiency concerns (Fligstein 1985) and other organizational researchers have doubted whether GM could even be considered a conventional example of the M-form (Freeland 1996), the underlying thrust of these scholars’ research strategies is quite similar. Whatever the specific metric applied (efficiency, legitimacy, power), institutionalists and transaction cost theorists have typically considered the emergence of forms as a product of *particular* historical constraints and motivations. In this respect, their research strategy meshes with seminal studies of form emergence prefigured by Weber’s ([1924] 1968) examination of the rise of legal-rational bureaucracy. The evolutionary-ecological perspective recently advanced by Hannan and colleagues, on the other hand, suggests a more general strategy, in which a common characterization of form emergence is sought across disparate populations of organizations (Pólos et al. 1998).

The perspective on form emergence proposed in the present article seeks a balance between the idiographic approach of institutional economists and sociologists and the nomothetic approach of ecological theorists. It proceeds from four assumptions. First, the emergence of forms is best understood in the context of a concrete system of interrelationships between organizational suppliers, consumers, regulators, and intermediaries operating in an institutional arena. This level of analysis has variously been termed an organizational field (DiMaggio and Powell 1983, p. 148), a societal sector (Scott and Meyer 1991), or an organizational community (Astley 1985; Aldrich 1999). Second, consistent with the arguments of

neoinstitutional theorists, the perspective suggests that the constitutive rules delineating identities of existing forms within an organizational community have a strong bearing on how new form identities will be developed (see also Pólos et al. 1998).³ Novel organizational forms are most likely to become legitimated when they fit into the preexisting cultural beliefs, meanings, and typifications of an organizational community. Third, consistent with the arguments of ecological theorists, the perspective contends that the distribution of population densities for existing forms within a community will have a strong bearing on the development of new forms. The coevolutionary dynamics of a community ecology can thus be seen as an extension of the density-dependence dynamics observed for individual populations (Carroll and Hannan 2000, chaps. 10 and 11). And fourth, consistent with ecological, institutional, and economic arguments, the perspective suggests that—in addition to supply parameters such as existing form identities and population densities—social demands will also affect the development of forms. Such demands tend to be found in the discourse of vocal or well-positioned community participants and may reflect efficiency-oriented motivations or non-efficiency-oriented motivations (e.g., plays of power and politics).⁴

These modeling assumptions will be fleshed out through an empirical examination of a specific organizational community: the American health care sector between 1965 and 1994. The turbulent dynamics of form emergence in this arena over the past few decades have led some observers to lament the veritable “alphabet soup” that has developed, including such newer forms as HMOs (health maintenance organizations), IPAs (independent practice associations), PROs (professional review organizations), CHCs (community health centers), and numerous others. This complex morass of organizational arrangements makes the health care sector a particularly challenging and intriguing case for the analysis of form emergence.

Before pursuing explanatory models of form emergence in this sector, several key questions must be answered in developing a community ecology approach. What defines the analytical boundaries of the community ecology? What range of coevolutionary forms should be included in the

³ The notion of “identity” employed throughout this article differs somewhat from the identity concept often applied to individual organizations (see Albert and Whetten 1985), in that it refers to the collective identity of a class of organizations. As the boundaries of this collective identity become clearly defined and linked to social evaluations, it is possible to speak of the existence of an organizational form.

⁴ It should be acknowledged from the outset that such social demands are typically not exogenous to the supply characteristics of organizational populations. Creators of new forms are usually placed in the unenviable position of generating demand for these arrangements through individual and collective action.

analysis? How does one date the emergence of an organizational form? Are there typical patterns of form emergence? These issues can be fleshed out on the basis of historical examples from the U.S. health care field, while attending to the generalizability of the approach to a variety of other organizational communities and contexts.

THE BOUNDARIES AND CONSTITUENT FORMS OF A COMMUNITY ECOLOGY

Community Boundaries

As interest shifts from the genesis of individual organizations to the genesis of forms, familiar issues of boundary definition are likewise recast. While researchers studying processes of organizational founding must be careful to describe the criteria whereby a new organization can be said to be a member of a given industry or particular organizational form, an analysis of form emergence requires some delineation of the community of extant forms that influence this process (Astley 1985; Aldrich 1999, chap. 11). Two general approaches to describing the boundaries of a community ecology have appeared in the organizations literature: (1) areal/geographic criteria for bounding communities and (2) functional criteria for doing so (Scott 1998, pp. 127–30). Inspired by early work in human ecology (Hawley 1950), a series of research projects were conducted between the 1960s and 1980s emphasizing the direct and indirect linkages between organizations in local geographic regions (Warren 1963; Galaskiewicz 1979; Palmer et al. 1990). The analytical inclusion of forms, in this perspective, is tied to the role that they fulfill within the community ecology of a metropolitan region. Functional approaches to delineating organizational communities, on the other hand, are more likely to emphasize linkages among regulatory, consumer, supplier, and ancillary organizations that extend well beyond the local context (e.g., Hirsch 1972; DiMaggio and Powell 1983; Barnett 1994). In this approach, the inclusion of forms is typically dictated by the broader functioning of a specific industry system or societal sector. Naturally, it is also possible to combine areal and functional considerations, as in a recent analysis of the evolution of the health care field in the San Francisco Bay area (Scott et al. 2000).

Past research gives rise to a critical question in the study of a community ecology: What are the most appropriate geographic and functional boundaries to consider for the emergence of forms? With respect to geography, no a priori delineation can typically be offered; as Aldrich (1999, p. 300) stresses, the “geographic scope of a[n organizational] community is an empirical question.” When the emergence of organizational forms is being considered in preindustrial or industrializing societies—where the scope

of communication and transportation networks may be relatively limited—local boundaries for community ecologies are often appropriate. When industrial sectors in modern societies are considered, though, form-level emergence often occurs in a meaningful fashion at higher levels of analysis; for example, that of the nation-state. This is especially true for those sectors that are subject to strong state regulatory pressures, such as the U.S. health care field.

The decision with respect to functional boundary criteria is perhaps even less clear-cut. Popular conceptions and publicly available data sources create general contours of organizational communities such as cultural production (Hirsch 1972), health care (Scott et al. 2000), and museums (DiMaggio 1991). But when the organizations in these arenas are considered in greater detail, problematic boundary forms quickly crop up. Consider the case of child guidance clinics as discussed in the health services literature (e.g., Ewalt and Ewalt 1969). Child guidance clinics are organizations that administer the delivery of a variety of counseling services to troubled children. According to one interpretation, pioneer organizations of this form—such as Healy’s Juvenile Psychopathic Institute and the Commonwealth Fund Clinics—were health service facilities devoted to the prevention and treatment of mental illness among children. At the same time, these organizations played a role in controlling juvenile delinquency and fostering the education of special-needs students. This complex organizational identity placed child guidance clinics in the functional fields of correction and education, respectively. The emergence of such hybrid forms is difficult to predict from the ecology of a single functional field, since they draw upon developments in multiple functional domains.⁵

A pragmatic solution to the issue is to bracket forms that appear on the periphery and place primary emphasis on those that are devoted to core functions of an organizational community—where the “core” may be defined either in terms of the prior substantive judgments of the analyst or inductively through an analysis of form variation along different dimensions. For the present analysis of the U.S. health care field, I adopt the former approach, emphasizing organizational forms that are devoted to four key functions of health care: (1) the provision of health care services (i.e., various forms of hospitals, clinics, and medical practices); (2) the funding and coordination of health services (insurance carriers, insurance pools, preferred provider organizations, etc.); (3) the education of health service providers (medical schools, nursing schools, etc.); and (4) the anal-

⁵ Such hybrid forms have a conceptual affinity with what Stark (1996) has referred to as recombinant organizational forms. Stark’s definition, however, concentrates in particular on forms that are grounded in transitional regulatory regimes.

ysis and storage of human biological matter (medical laboratories, blood banks, etc.).⁶

Constituent Forms

Even once the geographic and functional criteria for bounding an organizational community have been delineated, the identification of constituent forms remains a complex exercise. Many organizational communities contain “quasi forms”—organizational arrangements that may have separate identities attributed to them by community participants, although their formal structure is consistently subsumed within the governance of other forms. Such quasi forms are often sheltered from the legitimacy and competitive requirements imposed on truly novel ventures (Aldrich 1999, p. 224). In the U.S. health care sector, trauma centers fall within this category of quasi forms. Trauma centers included over 600 facilities in the United States by the early 1990s and could boast their own history of emergence and legitimation. However, while autonomous trauma centers had developed in Europe—often in the form of so-called accident hospitals—American commentators were forced to acknowledge that “political and financial constraints preclude the formation and outfitting of an independent trauma service” (Maull and Haynes 1977, pp. 497–98). Institutional and technical processes thus failed to segregate trauma centers from hospitals as a clearly identifiable organizational form.

In other cases, a community ecology contains instances of quasi forms that develop into independent forms over time. Organizational historians have identified end-stage renal disease centers (ESRDCs) as an example of service “unbundling” in hospitals that has spawned a separate form (Scott et al. 2000). Although kidney dialysis and transplantation procedures increasingly became available within hospital departments during the 1960s, it was not until the extension of Medicare coverage in 1972 that these distinctive services began to be offered by autonomous ESRDCs (Kutner 1982). The 1972 legislative act operated as a symbolic and material boundary marker that recognized ESRDCs as an organizational form in their own right.

⁶ Omitted from this definition are a variety of forms that develop medical devices and drugs for health service providers, as well as forms that only contribute to health service in the broadest sense (e.g., fitness centers). I include those alternative health providers that are typically licensed by the state to offer health services (offices of chiropractors, birthing centers), while removing a variety of holistic provider forms that may draw upon other organizational fields in sustaining their legitimacy (e.g., psychic healing clinics). Also excluded are individual state and federal agencies, which do not comprise populations of organizations as such but, rather, represent singular instances of different forms.

Aside from the segregating and blending processes surrounding organizational forms and quasi forms (see Hannan and Freeman 1986, 1989), pragmatic aspects of data collection must also be considered in delineating the constituents of a community ecology. The extension of an ecological approach to the community level requires that one gather information on the relative densities of various organizational populations, and the definition of corresponding forms is likely to be influenced in the process. For the analysis in this article, I began by identifying organizational forms appearing with some minimal frequency in the professional literature of the U.S. health care field.⁷ A total of nearly 90 forms were enumerated as candidates for analysis. This initial list was then pruned based on four considerations: (1) eliminating those “quasi forms” that are generally not structurally autonomous from other health care organizations (e.g., trauma centers, cardiac care facilities, mobile health units); (2) eliminating those forms that exist on the periphery of the organizational community (as described in n. 5); (3) eliminating those forms that represent proper subtypes of organizational forms already included in the list (e.g., military and veteran’s hospitals, which are types of federal hospitals); and (4) eliminating forms that are classified along cross-cutting, secondary dimensions compared to the primary dimensions found in public data sources (e.g., insurance carriers classified by specific coverage rather than the broad categories used by the Bureau of the Census). After pruning, the remaining 48 forms were mapped onto available data sources, as shown in table 1.

TIMING THE EMERGENCE OF ORGANIZATIONAL FORMS

How can one date the historical emergence of forms? Just as researchers have come to recognize that the founding of organizations is typically more a process than a discrete event, one should also be attentive to the processual character of the emergence of forms (while acknowledging the need for discrete timing data in many analytic models). Early statements by organizational ecologists indicated a number of vital events that may be linked to the founding of a new organization, including the intention to organize, resource mobilization, legal establishment, social organization (e.g., hiring of employees), and operational start-up (Hannan and Freeman 1989, p. 148; Carter, Gartner, and Reynolds 1996). Similar phases can be examined at the level of organizational forms. Thus, there are periods when ideas and intentions are being circulated with respect to the creation

⁷ Specifically, an organizational arrangement had to be identified in at least 10 separate texts in a systematic search of the MEDLINE corpus. See “data and measures” section, below, for additional details.

TABLE 1
HEALTH CARE FORMS INCLUDED IN THE COMMUNITY ECOLOGY ANALYSIS

Organizational Form	Data Source
Abortion clinics	Alan Guttmacher Institute
Academic medical centers	Association of American Medical Colleges
Area health education centers	Department of Health, Education, and Welfare (DHEW)
Birthing centers	National Association of Childbearing Centers
Blood banks	National Center for Health Statistics (NCHS)
Chiropractor offices	Bureau of the Census
Community health centers	Office of Economic Opportunity, NCHS, General Accounting Office (GAO)
Community mental health centers	National Institutes of Mental Health, GAO, NCHS
Dental offices	Bureau of the Census
End-stage renal disease facilities	Health Care Financing Administration (HCFA), Social Security Administration
Family planning clinics	NCHS, Planned Parenthood
Group practices	American Medical Association (AMA)
Health care coalitions	Chamber of Commerce, American Hospital Association (AHA)
Health maintenance organizations	Interstudy, Group Health Association of America
Health systems agencies	DHEW
Home health agencies	NCHS, Bureau of the Census
Homes for the aged	NCHS
Hospices	GAO, NCHS, National Hospice Organization
Hospitals, federal	AHA
Hospitals, general (nonfederal)	AHA
Hospitals, psychiatric (nonfederal)	AHA
Hospitals, special (nonfederal)	AHA
Independent practice associations	Interstudy, Group Health Association of America
Insurance carriers, hospitalization	Bureau of the Census
Insurance carriers, accident	Bureau of the Census
Insurance pools	Intergovernmental Health Policy Project, GAO
Intermediate care facilities	Bureau of the Census
Laboratories, medical and dental	Bureau of the Census
Libraries, medical	American Library Directory
Multi-institutional systems	AHA
Nursing homes	NCHS
Optometrist offices	Bureau of the Census
Partnership practices	AMA
Pharmacies	National Association of Boards of Pharmacy

TABLE 1 (Continued)

Organizational Form	Data Source
Physician solo practices	AMA
Poison control centers	NCHS
Preferred provider organizations	American Managed Care and Review Association
Professional corporations	AMA
Professional review organizations	DHEW, HCFA, American Medical Peer Review Organization
Rehabilitation centers	Association of Rehabilitation Centers, Commission on Accreditation of Rehabilitation Facilities
Schools, dental	American Dental Association
Schools, nursing	National League for Nursing
Schools, public health	American Public Health Association
Skilled nursing facilities	NCHS
Sperm banks and fertility clinics	IVF-ET / ART Registries
Substance abuse treatment centers	Bureau of the Census, NCHS
Surgicenters	SMG Marketing Group
Voluntary health agencies	NCHS

of new organizational forms (DiMaggio 1991, pp. 269–72); there are social movements that secure resources for the development of forms (Swaminathan and Wade, in press; DiMaggio 1991, pp. 274–79); there are regulations that identify new forms as legitimated organizational roles (Tucker, Singh, and Meinhard 1990); there are periods when forms are recognized as offering distinctive employment niches or employment training by labor market participants (Brint and Karabel 1991); and there are points when organizational forms become viable providers of goods and services within a society.

More so than individual organizations, the process of form emergence may proceed over very long periods of time—often decades, or even centuries. Two cases in the U.S. health care field, health maintenance organizations (HMOs) and birth centers, serve as illustrative examples.

Example 1: HMOs

An HMO may be defined as “an organized system of health care delivery available to persons in an enrolled group who reside in a specific geographic area. . . . The HMO provides a specific set of health benefits to its members including the services of physicians and other health care professionals,” typically under capitated payment arrangements (Zipperer and Pace 1993, p. 97). In the United States, some historical accounts trace the core idea of HMOs—prepaid group practice—as far back as the es-

establishment of the Marine Hospital Service in 1798 or the Committee on the Costs of Medical Care (CCMC), active between 1927 and 1932 (see Freeborn and Pope 1994). When slightly more restrictive definitions are applied, sustained efforts toward the development of an HMO form can be credited to a number of prepaid group practices (PGPs)—including the Ross-Loos Clinic of Los Angeles, the Group Health Association of Washington, D.C., Kaiser Permanente, and the Health Insurance Plan of New York City—founded between the late 1920s and the 1940s. Following many decades of pillorying by the medical establishment (and activism that included an antitrust case by Group Health against the AMA), these pioneers finally found acceptance in the increasingly cost-conscious environment of the 1970s (Shouldice and Shouldice 1978; Brown 1983).

It was not until 1970 that the term “health maintenance organization” was coined (Ellwood 1970). During the same year, the HMO form received its first significant regulatory attention when the Nixon administration introduced a proposal (Alternative C) that would add a new HMO enrollment method to the Medicare and Medicaid programs. Definitive regulatory endorsement did not occur until 1973, when Public Law 93-222 committed the federal government to the support of HMO development. Once health care professionals became widely aware of HMOs as a distinctive organizational arrangement, the form had been in the process of emergence for at least half a century. And cognitive recognizability of the HMO form among the general public did not become firmly entrenched until a number of years later.⁸

Example 2: Birth Centers

Since the innovative contribution of the HMO form is primarily directed at funding and coordinative aspects of health care, it is useful to compare its emergence with that of the birth center, a form that is primarily oriented toward health services delivery. For most of human history, birth events have taken place in noninstitutionalized settings—homes rather than hospitals. Due to the gradual breakup of the extended family, improvements in asepsis and hospital hygiene, and increasing faith in allopathic medicine, this changed dramatically in the United States during the early 20th century (Lindheim 1981). At the turn of the century, only 5% of babies in the United States were delivered in hospital settings; in 1935, the

⁸ Blanket statements concerning the cognitive legitimacy of HMOs are difficult to make, given the considerable geographic heterogeneity of market penetration for such forms. In the late 1970s, for instance, HMO market penetration at a national level was merely 3%, but some regions (e.g., the San Francisco Bay Area) had more than 25% of their resident population enrolled in HMOs (Scott et al. 2000).

proportion had risen to 75%; and by the late 1960s, the medicalization of birth events was almost complete (Devitt 1977).

Birth centers emerged as a reaction against this medicalization process. As described by the National Association of Childbearing Centers (NACC), a birth center is “a homelike facility, existing within a health care system with a program of care designed in the wellness model of pregnancy and birth.”⁹ In short, these centers are an organizational form that provides a compromise between home and hospital birth. The earliest birthing centers in the United States developed in rural areas, where women lived too far away to come to a hospital or be attended by nurse-midwives at home. Pioneering centers, such as La Casita in New Mexico (founded in 1945) and the Barnesville-Lamar Maternity Shelter in Georgia (1951), were quite different from modern birthing organizations in that they did not seek to compete with hospitals (existing in catchment areas unserved by other maternity services) and in that they were sustained as projects by larger organizations (the Catholic Maternity Institute and Georgia Department of Public Health, respectively [Rooks 1997, p. 74]).

Freestanding urban centers began to appear in the early 1970s, often as outgrowths of the counterculture and the woman’s movement. Because they *did* challenge conventional medical practice, this new incarnation of birthing center was subject to the censure of regulatory bodies and professional associations, such as the American College of Obstetricians and Gynecologists. With the advocacy and increasingly formalized training of nurse-midwives, the legitimacy of birthing centers increased dramatically during the late 1970s. Some birthing centers (such as Manhattan’s Maternity Center Association, often considered to be the first urban birthing center) collected extensive statistics to document the safety of center births as opposed to hospital births, leading to accreditation by the American Public Health Association. Regulatory legitimacy improved in 1977, when a committee of the California legislature reported high levels of dissatisfaction with hospital birth environments and the need for viable organizational alternatives (Lindheim 1981, p. 8). By that time, national rates of out-of-hospital births had more than doubled what they had been just a few years before and were even higher in certain western states, such as California.

Patterns of Form Emergence

The brief examination of the histories of health maintenance organizations and birth centers illustrates the processual character of the emergence of

⁹ This information can be found on the NACC Web page entitled, “What Is a Birth Center?” at <http://www.birthcenters.org/faqbirthcenters/whatis.shtml>.

organizational forms. In dealing with these processes analytically, organizational theorists confront two issues: (1) Are there typical patterns that structure the emergence of forms? (2) Are there discrete points that are particularly critical to the successful institutionalization of a form?

The question of patterning is roughly analogous to the extensive research tradition in the sociology of the professions that examines sequential stages in the professionalization of a task domain (see Abbott 1991). In contrast to the literature on professions, empirical findings on organizational form emergence are still embryonic. Preliminary insights can be drawn from historical case studies, such as those presented above for HMOs and birth centers. In both of these cases, one finds that the idea for the new form was hatched within existing organizational arrangements. For HMOs, the notion of prepaid health care was initially tied to the development of a subset of group practice forms (such as the Ross-Loss clinic) or, in the case of Kaiser Permanente, an employee insurance plan. The earliest birth centers were established by public and nonprofit organizations interested in providing maternity services to women in rural areas. Metaphorically, then, these new forms can be seen as having their origins as subtle “mutations” of established organizational forms.

Of course, such mutations do not necessarily become elaborated into distinctive organizational arrangements. For both HMOs and birthing centers, social movements were pivotal in transforming and differentiating the seminal forms. A PGP movement against professional dominance and fee-for-service payment arrangements yielded the prototypical HMO form that began to interest policy makers in the late 1960s. And the counter-culture and women’s movements of the early 1970s were critical in molding birthing centers, which had previously been seen as functional auxiliaries to hospital delivery environments, into a unique organizational form. In both instances, these social movements culminated in legislative processes that served to legitimate the forms at the national or state levels. While struggles for normative approval among health professionals and for cognitive recognition among the general public would continue, regulatory attention helped to crystallize the identity of these novel arrangements.

What implications do these patterns hold for attempts to time the emergence of forms? Organizational ecologists have typically held that the founding of the first organization in a new population can be timed unproblematically and that the form effectively emerges with the creation of that initial organization (Hannan and Carroll 1992). Historical case studies suggest, though, that archival data sets have a tendency to reify the appearance of a form in this manner (see Rooks 1997, chap. 4)—for example, do birthing centers appear with the founding of La Casita in 1945, various birth collectives in the early 1970s, or the Maternity Center

Association's freestanding center in 1975? Which founding event is emphasized depends on the phase of form emergence that the analyst has in mind. More fundamentally, it could be argued that no particular *organizational* event can define the emergence of a form, since the process of emergence implicates social structures far beyond the organizational level.

A community ecology perspective focuses on the timing of events that are crucial to the emergence of an organizational form but are typically not reducible to the activities of individual organizations. What types of events are emphasized at the community level depend to a considerable extent on the pressures posed by technical and institutional environments on organizations within the community (see Scott and Meyer 1991). For fields that are subject to strong institutional pressures—such as health care, utilities, schools, banks, and the like—regulatory events are especially important as timing markers. Given the legal-rational authority of the state in modern society, its recognition of an organizational form as a legitimate (or illegitimate) class of collective actors is often one of the most significant events in highly institutionalized arenas. When technical rather than institutional pressures are dominant—as in many areas of large-scale manufacturing or in the high-tech industry—groundbreaking technical papers, innovations, or patents may serve as the most useful timing markers (Tushman and Anderson 1986). Thus, McKendrick and Carroll (1999) trace the origins of the disk array industry to a Berkeley technical paper appearing in the late 1980s (naturally, such technical breakthroughs need not lead automatically to the emergence of a distinctive organizational form, as McKendrick and Carroll find in their own research). For fields that are subject to neither strong technical nor strong institutional pressures—such as restaurants—or those that confront institutional environments that are not necessarily regulatory in character—such as churches—the initial identification and naming of new organizational forms in media sources may be the most propitious markers of form emergence. This approach is also often the most conducive to historical scholarship, such as that conducted by Braudel ([1979] 1992, pp. 97–100) when he traces mentions of the emergence of European commodity and stock exchanges in a variety of regions and under a variety of names.

Given the highly institutionalized environment of the contemporary U.S. health care field, I will consider regulatory events in timing the appearance of forms. This operationalization offers one key theoretical advantage, insofar as regulations often codify the identity and valuations associated with organizational forms. In the process, they tend to convert the “weak” organizational identities generated by linguistic conventions into “strong” identities that impose constraints on organizational actors

(see Pólos et al. 1998). Thus, the 1972 amendment to the Social Security Act (Public Law 92-603) specified identity attributes, such as health and safety standards, that would be applicable to all end-stage renal disease facilities receiving Medicare reimbursement under the bill.

At the same time, two possible complications arise in using a regulatory conception of form emergence. First, in relatively decentralized polities such as the United States, there may be some decoupling between regulatory legitimation at the federal level and legitimation at the state/provincial level. For example, the legalization of abortion services in New York, Alaska, Hawaii, and Washington in 1970 permitted the regional development of abortion clinics as a legitimate organizational form; but regulatory legitimation at a federal level would not occur until the Supreme Court judgment on *Roe vs. Wade* in 1973 (Segers and Byrnes 1995).¹⁰ Gaps in legitimating events at multiple levels of analysis are accommodated here by coding form emergence on the basis of regulatory events at the state level, as long as other states do not treat the organizational form as illegitimate. In the latter case, regulatory events at the federal level are considered. The regulatory legitimation of abortion clinics within the U.S. health care field is therefore timed to 1973—the occurrence of the federal legitimating event. For state insurance/risk pools, to use another example, enabling legislation in 1976 in Minnesota and Connecticut is accepted as a marker of form emergence, since no explicit legislation against insurance pools existed in other states (see Bovbjerg and Koller 1986).

The second complication in using regulatory events as markers of form emergence involves the processual character of regulation. Like the dynamics of form emergence themselves, the legislative or judicial events that legitimate an organizational form may proceed over an extended period of time. In 1970, the Nixon administration's Alternative C proposal served to delineate the notion of HMOs as an organizational arrangement in the public eye. Successful passage of a federal HMO act (Public Law 93-222), however, did not occur until three years later. The measurement approach employed in the present analysis is to emphasize the earliest regulatory event in the string of legislation/judicial review that ultimately led to the legitimation of a form (i.e., 1970 in the case of HMOs). Realizing that this coding decision reflects some arbitrariness, I also conduct an analysis to consider the sensitivity of community ecology dynamics to small perturbations in the timing of form emergence.

¹⁰ Abortion practice had enjoyed widespread legality in the United States during the early 19th century. At the time, of course, the medicalization of abortion had not proceeded to the point where an organizational form analogous to contemporary abortion clinics could emerge.

Of the 48 health care forms listed in table 1, 19 experienced regulatory legitimating events between 1965 and 1994. Table 2 identifies these organizational forms, the corresponding regulatory events, and some relevant literature discussing form emergence. One can note that roughly half of the events in the table involve federal legislative actions, while the rest include judicial and administrative actions at the federal level as well as various state-level initiatives. The remaining 29 forms in table 1 received substantial regulatory legitimation prior to the beginning of the study period and will be included in analyses as preexisting features of the community ecology.

EXPLANATIONS FOR THE EMERGENCE OF ORGANIZATIONAL FORMS

What conditions stimulate the emergence of new organizational forms within a community ecology? Previous explanations operating from a community perspective have often placed strong emphasis on the role of *technological* factors in the development of novel arrangements (Schumpeter 1934; Astley 1985; Tushman and Anderson 1986). In recent versions of these explanations, the impact of innovative technologies is usually not seen as deterministic nor one-sided; instead, organizational forms and technology coevolve in a complex process of mutual influence: “organizations introduce technological innovations [and] are at the same time constrained by the current technological state of the art” (Rosenkopf and Tushman 1994, p. 410). Niche opening events, such as the first production of Portland cement in 1872 or the development of the first affordable minicomputer in 1956 (Tushman and Anderson 1986), can thus be situated within an existing landscape of organizational forms and their core technical processes.

Technological perspectives provide some insight on the emergence of organizational forms but seem inadequate as general explanations. When the timing of technical innovation and the emergence of an autonomous organizational form is considered in detail, one often finds loose coupling between the two events. The slow transition of ESRDCs from “quasi forms” to autonomous organizational forms is a case in point. Although the first kidney transplant was performed in 1956 and hemodialysis procedures became routine in the early 1960s, the initial diffusion of ESRDC departments within hospitals was threatened by inadequate facilities, labor shortages, and the high costs of treatment (Schmidt, Blumenkrantz, and Wiegmann 1983). The notion of an autonomous organizational form only became conceivable in 1972 when a national program was created to help cover the costs of end-stage renal disease patients—some 16 years

TABLE 2
HEALTH CARE FORMS EXPERIENCING LEGITIMATING REGULATORY EVENTS BETWEEN 1965 AND 1994

Organizational Form	Regulatory Event(s)	Year	Selected Literature
Abortion clinics	<i>Roe vs. Wade</i>	1973	Segers and Byrnes (1995)
Area health education centers (AHECs)	Public Law 92-157	1971	Miike and Ross (1975), Watts and Jones (1990)
Birthing centers	California Committee to Study Alternative Birthing	1977	Lindheim (1981), Rooks (1997)
Community/neighborhood health centers (CHCs)	Economic Opportunity Act	1966	Marcus (1981), Hessler and Beavert (1982)
Community mental health centers (CMHCs)	Public Law 89-105	1965	Dorris and McGuire (1981)
End-stage renal disease centers (ESRDCs)	Public Law 92-603; section 299-I	1972	Kutner (1982), NCHS (1975-77)
Health care coalitions	Chamber of Commerce's clearing house	1980	Bergthold (1990)
Health maintenance organizations (HMOs)	Medicare Alternative C bill	1970	Shouldice and Shouldice (1978), Ellwood (1970), Brown (1983)
Health systems agencies (HSAs)	Public Law 93-641	1975*	Altman (1981)
Hospices	Public Law 98-247 (hospice Medicare reimbursement)	1983	Lindheim (1981); Comptroller General (1979)
Independent practice associations (IPAs)	Medicare Alternative C bill	1970	Shouldice and Shouldice (1978); Ellwood (1970); Brown (1983)

Insurance/risk pools	Legislative approval of risk pools in Minnesota and Connecticut	1976	Bovbjerg and Koller (1986)
Intermediate care facilities (ICFs)	42 CFR; parts 405–49	1974	Deibel (1974)
Preferred provider organizations (PPOs)	Selective contracting in California/Massachusetts	1982	Kodner (1982)
Professional corporations (medical group practices)	Treasury Department TIR-1019	1969	Burke and Zaloom (1970)
Professional review organizations [†]	Public Law 92-603	1972	Berman and Gertman (1981)
Substance abuse treatment centers	Narcotic Addict Rehabilitation Act, Center for Prevention and Control of Alcoholism	1966	NCHS (1975)
Sperm banks	Uniform Parentage Act	1973	Fader (1993)
Surgicenters	GAO reviews of surgicenters	1972	Henderson (1984); Hill (1973)

* Public Law 93-641 was passed in 1974, but not signed into law by President Ford until early 1975.

[†] Form was later renamed “professional standards review organization” and “peer review organization.”

after the technological breakthrough in transplantation had first been made.

A more drastic case of decoupling between technological innovation and form emergence is evidenced in the historical development of fertility clinics/sperm banks. The first successful case of human donor insemination has been dated as far back as 1884, while the first successful human pregnancy with frozen spermatozoa was reported in 1953 (Fader 1993). But the technical innovations provoked heated controversy in both instances. A 1954 ruling by the Circuit Court of Cook County (Illinois) went so far as to call donor insemination “contrary to public policy and good morals, and considered adultery on the mother’s part . . . a child so conceived [is] born out of wedlock and therefore illegitimate.” Sperm banks only began to appear as a distinctive organizational form after 1973, once the National Conference of Commissioners on Uniform State Laws approved the Uniform Parentage Act that established that the “natural father” of a child conceived from donor insemination was the husband of the woman being inseminated (and not the donor; Fader 1993). The development of both sperm banks and ESRDCs points to the manner in which purely technological aspects of form emergence are filtered through institutional constraints on the appropriateness, efficacy, and recognizability of those innovations. In other words, technology only has an impact on the development of novel arrangements when it manages to attract attention, when it is viewed as legitimate from a moral and instrumental standpoint, and when powerful community participants rally in its favor (Scott 1998, p. 168).

There are other organizational arrangements, of course, that are tied even less strongly to technological developments. In those cases, *functional* criteria (e.g., the reduction of transaction or monitoring costs) are often applied as the metrics guiding the emergence of new forms (see Williamson 1985). Within the health care field, the development of PROs during the early 1970s can be characterized in such terms. PROs are charged with the task of ensuring that the utilization of medical services is appropriate, especially when federal funding is involved (Scott 1982). Rational choice theorists can suggest that a demand for this new organizational form was generated when the actions of some consumers of health care services yielded negative externalities for others. Specifically, the argument goes, negative externalities had been generated by entitlement programs such as Medicare/Medicaid, insofar as some taxpayers contributed to public health goods while remaining uncertain about how they would benefit from these goods themselves. This uncertainty, in turn, led to a need for organizations (PROs) that would monitor the actions of medical providers serving entitlement beneficiaries.

Many policy analysts will agree with this theoretical explanation of

PRO form emergence—Medicare costs were almost twice initial expectations in 1970 and existing utilization review procedures, conducted *within* provider organizations rather than by a *separate* organizational form, were widely viewed as ineffective (Berman and Gertman 1981). As in the case of technological explanations, however, the functional explanation, in and of itself, appears inadequate. While the cost overruns of federal programs in the early 1970s may have generated demands for a new organizational form, the specific character of that arrangement—emphasizing monitoring by local organizations of physicians operating under a federal mandate—was not necessarily dictated by functionalist concerns. Indeed, *neoinstitutional* scholars would suggest that the specific character of PROs was strongly influenced by the taken-for-granted logics of organizing that were prevalent in the health care field at the time. Two of these logics, one based on a core principle of physician autonomy and the other based on a principle of federal involvement, are conjoined in the structure of PROs (see Scott et al. [2000] for a discussion of the logics). According to the neoinstitutional explanation of form emergence, the nature of new organizational arrangements such as PROs is as much a function of what is perceived as appropriate and recognizable as it is a function of what is perceived as instrumentally efficacious. Support for this contention can be found by comparing the PROs as a legislated solution to cost containment with a policy act that was passed 11 years later—the Prospective Payment System (PPS) of 1983. PPS moved Medicare from retrospective reimbursement of costs to prospective payments linked to diagnosis. Although PPS itself did not create any new organizational forms, it shifted the locus of organizational decision making back to individual provider facilities (ProPAC 1989). This new approach to cost containment reflected the decentralized model favored in an institutional environment of market orientation—a model that appealed to quite different standards of appropriateness than those influencing the identity of PROs just a decade earlier.

FORM IDENTITIES AND CARRYING CAPACITY

The preceding historical case studies suggest that technological, functional, and neoinstitutional explanations of form emergence provide partial justifications at best. Actual processes of form emergence can involve intricate interactions among these factors, and the extent to which one factor is more salient than another may vary significantly depending on

the identity of the form in question as well as broader historical trends.¹¹ Such complexity calls for a general approach to characterizing social demands for new organizational forms.

A community ecology perspective adopts the concept of *carrying capacities* as a way of describing these social demands. In population ecology, a carrying capacity defines the maximum number of organizations in a population (i.e., organizations of a particular form) that can be supported by the social environment at a given point in time. When the size of an organizational population equals the carrying capacity, the growth rate for that population will be zero (Hannan and Freeman 1989, p. 100). When carrying capacity exceeds population size, one can anticipate increased rates of organizational founding and, in the absence of an existing population, the development of new organizational forms.

This idea of a carrying capacity can inform the emergence of forms in a community ecology provided that two elaborations are permitted. First, one must allow for the existence (and operationalization) of a *latent* carrying capacity—one that predates the emergence of an organizational form itself. This latent carrying capacity can obviously not be articulated strictly in terms of demand for an organizational form, but must be represented instead as demands for attributes related to the identity of a *potential* form. To return to the case of professional review organizations, one might expect to find the health services discourse of the early 1970s to be dotted with references to “cost containment,” “federal intervention,” “utilization review,” and even “experimental medical care review organizations” (a precursor quasi form for the PROs). The attention heaped on these various symbols in the discourse only later became articulated in the realized identity of an emerging PRO form.

Second, the straightforward one-to-one correspondence between a population/form and a carrying capacity must be abandoned in a community ecology study. In the analysis of individual organizational populations, it may be reasonable to consider demand for a particular form while bracketing other forms that share similar identities with it. This approach is not feasible in a community ecology specification, where the emergence of new form identities can occur alongside existing identities as well as in regions of the identity space that are completely unexploited. Within the community ecology approach, then, a carrying capacity is defined as *the maximum number of organizations having some identity (potential or realized) that can be supported by the environment at a particular point in time*. This definition gives rise to two analytical components of a com-

¹¹ As DiMaggio and Powell (1983) intimate, organizational fields that embrace instrumental criteria of form emergence early in their history may later transition to patterns of institutional isomorphism that resist novel arrangements.

munity ecology, one being the distribution of potential and realized forms in an abstract identity space and the other being the topology of organizational carrying capacities spread over that space.

The first analytical component requires some formal notion of the extent to which organizational forms may be differentiated from one another, or, in Hannan and Freeman's (1989) terms, how "segregating and blending processes" have yielded a set of commonly recognized distinctions among form identities. In the case of individual organizations within a population, such distinctions are often readily extracted from archival data sources reporting product/service portfolios (Baum and Singh 1994), human resource characteristics (McPherson and Rotolo 1996), or common technological dependencies (Podolny, Stuart, and Hannan 1996)—all of which can be employed to obtain estimates of niche overlap between organizations. When distinctions between the identities of forms (and, in particular, *potential* forms) are considered, the collection and comparability of such data over long historical periods may be problematic. Even in situations where these measurement strategies can be implemented for an entire organizational community, the salience attributed by analysts to different dimensions that partition form identities is likely to be driven largely by data availability. The perceptions held by community participants with respect to distinctions among organizational forms tend to be ignored in the process.

An alternative approach to identifying differences among organizational forms examines the discourse of community participants themselves (Ruef 1999; Mohr and Guerra-Pearson 1996). In this relational approach, the realized identity of organizational forms is constituted by their pattern of textual association with other publicly recognized symbols. Potential form identities are represented as regions of the discourse where discussions of procedures (e.g., "kidney transplantation or dialysis"), actors (the "Health Care Financing Administration"), values ("universal coverage"), and other symbols may ultimately become formalized as novel organizational arrangements (ESRDCs). The rationale behind this conception of form identities is that community participants often have the greatest impact on the constitutive rules that define potential and realized organizational arrangements.

A cultural view of carrying capacities can be developed from the same notion. Given the distribution of potential and realized form identities throughout a discourse space, the carrying capacity at any point in that space can be characterized in terms of the aggregate amount of discourse referring to attributes of a form identity. As Aldrich and Fiol (1994, pp. 651–52) have noted, a key factor in the success of new organizational arrangements is the ability of advocates to connect the identity of those arrangements to encompassing and widely recognized linguistic symbols.

Hybels (1994) has shown the importance of expert discourse in influencing founding rates within extant populations. More generally, discourse can be seen as a cultural carrying capacity for emergent organizational forms. For example, if there is increased discussion among health policy makers concerning utilization reviews, and utilization reviews are seen as attributes of the identity of PROs, then one can suggest that the environmental carrying capacity for PROs has been increased. In the absence of any existing organizations corresponding to that form identity, the emergence of a new organizational arrangement is likely to occur.¹² A key methodological advantage of this formulation is that discourse measures are generalizable across organizational populations in ways that many measures of material resources are not.

By conceptualizing carrying capacity in these terms, of course, researchers may gloss over important differences in the valences—or positive and negative attributions—that connect an organizational form to a social problem of popular discussion. Thus, even when there is considerable discourse on utilization reviews, as well as discourse connecting the PRO form to these reviews, there may be a number of negative statements made about utilization reviews (i.e., “Utilization reviews represent an assault on physician autonomy”) or about the way that PROs implement them (“PROs are especially inefficient in conducting these reviews”). In social phenomenology, this measurement issue corresponds generally to the difference between *topical relevance* and *interpretive relevance* (Schutz 1970). Aggregate discourse serves as a cultural proxy for topical relevance—whether an organizational form or attributes that could be connected to a form are worth debating about. Valenced discourse, by contrast, taps into interpretive relevance—whether a form or its attributes are considered beneficial within a cultural system. Arguably, carrying capacity is a function of both the topical and interpretive relevance of a potential organizational identity.¹³ Given the considerable cost of coding valenced attributions, however, many researchers will want to explore the validity of using aggregate discourse alone as an indicator of carrying

¹² Naturally, the emergence of an organizational form is also likely to feed increased discourse on symbols that are related to the form. A complete model would consider the impact of discourse at time $t - 1$ on form emergence at time t , as well as the latter’s reciprocal influence on discourse at time $t + 1$ (and so forth). In this article, attention is limited to the former causal relationship.

¹³ The previous PRO examples have illustrated how a potential identity may be topically relevant but suffer from negative attributions from an interpretive stance. One can also imagine scenarios where there is interpretive relevance (positive attribution) but limited topical relevance—as in cases where solutions to a social problem are greeted favorably but fail to capture widespread attention.

capacity. In the methodology section, I consider a formal test of construct validity for an aggregated discourse measure.

COMPETITION AND SYMBIOSIS

Given these conceptualizations of form identity and carrying capacity, I will consider more elaborate models of form emergence that incorporate competition and symbiosis among organizations. One can begin by analogizing between the first-order process of growth in individual organizational populations and the second-order process of form emergence, using the standard Lotka-Volterra model of organizational ecology (Hannan and Freeman 1977, 1989). For J populations in a community ecology, the model of population growth can be written as:

$$\frac{dN_i}{dt} = r_i(N_i - \frac{N_i^2}{K_i(t)} + \sum_{j \neq i}^J c_{ij}N_j), \quad (1)$$

where N_i is the number of organizations corresponding to form identity i (usually referred to as the *density* of organizations having that identity), K_i is the environmental carrying capacity for identity i , r_i is the intrinsic growth rate of organizational populations corresponding to identity i , and c_{ij} represents the effect of organizational populations of identity j on populations of identity i . Following Brittain (1994), the carrying capacity in the model is treated explicitly as a time-varying quantity—in our approach, one linked to the recognition received by attributes of a form identity in public discourse. As this carrying capacity increases, the competitive interactions among organizations having a particular identity (represented by the quadratic density term N_i^2) tend to be dampened.

From a community ecology perspective, the most straightforward extension of the population growth model holds that the probability of form emergence [$\text{prob}(F)$] is proportional to the growth rate for a given form identity, that is:

$$\text{prob}(F_i) \propto \frac{dN_i}{dt}.$$

Nevertheless, this simple elaboration reveals an intrinsic difficulty. When coevolutionary effects (c_{ij}) are constrained to zero, the underlying equation has two steady states: one when the carrying capacity for a form identity equals the number of organizations having that identity ($K_i = N_i$) and the other when the number of organizations having the identity is zero (Tuma and Hannan 1984, p. 469). The former steady state is a desirable mathematical result, but the latter is an undesirable by-product of a model originally devised for biological applications. In effect, it fails to permit

form emergence in regions of the identity space that have no existing organizations.

One possible resolution to the problem is to treat the process of form emergence as being completely *density-independent* and therefore influenced only by carrying capacity. The exclusion of existing numbers of organizations (N_i) from the equation of form emergence, however, does not seem realistic. Competition among organizations in a crowded region of the identity space is likely to deter the development of novel arrangements having a similar identity. As Astley (1985, p. 235) suggests, the organizational populations in such regions of a community ecology are likely to stabilize both in terms of size and characteristic form. In the U.S. health care field, few observers would expect the emergence of new types of acute care arrangements that bear structural similarities to general hospitals; the existing niche for that form identity is already too saturated. From a modeling standpoint, it appears that the specification of form emergence should, at the least, include terms that capture the competitive impact of existing organizations having some given identity.

If one accepts that the process of form emergence is, in certain respects, *density dependent*, a logical follow-up question is whether this density dependence is described by a monotonic or nonmonotonic relationship. In the case of growth and decline in individual organizational populations, ecological theory (e.g., Carroll and Hannan 2000) holds that density dependence is nonmonotonic: as the density of a form rises, competition increases at an *increasing* rate, while the legitimation of that form increases at a *decreasing* rate. Whether a similar nonmonotonic relationship holds in the process of form emergence depends primarily on the existence of a community-level analogue to legitimation; that is, does the emergence of a new organizational form draw some symbiotic benefit from the existence of a relatively small number of organizations having a form with a similar identity? Again following Astley (1985) and more recent scholarship (Baum and Oliver 1996; Swaminathan and Wade, in press), I suggest that such symbiotic effects do in fact apply. The emergence of freestanding abortion clinics in the early 1970s, for instance, depended strongly on the legitimation offered by an existing population of family planning organizations. Not only did the family planning clinics bear much of the "social movement" cost in terms of securing regulatory approval for the emerging abortion clinics, but they also provided organizational templates that could be readily copied by facilities within the other form.

More generally, the legitimating benefits of such relationships can be characterized along two underlying dimensions: (1) the residual socio-political legitimation enjoyed by an emerging form due to prior collective action on the part of a predecessor form (see Minkoff 1997) and (2) the

residual cognitive legitimation enjoyed by an emerging form, resulting from its ability to draw on the more highly crystallized identity of a predecessor form. Yet a third dimension of the symbiotic relationship taps into benefits that are not tied to legitimacy per se, but rather to resource spillover: prior organizational forms provide a set of structures, strategies, and routines that can be adopted by forms with related identities. Even in the face of potential competition, proximate density between forms can lead to regulatory and mimetic side effects that expand the collective resource base of those forms (Ingram and Inman 1996). Thus, family planning centers did not just offer legitimacy to an emerging class of abortion clinics during the 1970s, but also more tangible tools—such as counseling routines and methods for obtaining informed consent in the case of adolescents. Naturally, one can also imagine an alternative scenario in which family planning clinics were so widespread and highly legitimated that the emergence of a separate organizational form specializing in abortion services would have been deemed unnecessary—the abortion services would have simply been incorporated into the service portfolio of the family planning facilities.¹⁴ In that case, the benefits of symbiosis could be seen as being outweighed by competition in a nonmonotonic density-dependence model.

These considerations seem to recommend a model of form emergence that features both density-dependent and density-independent components. A nonmonotonic version of the model holds that organizational density has symbiotic as well as competitive effects. The effects can be captured by incorporating both density terms from the population growth model:

$$\text{prob}(F_i) \propto K_i(t) + N_i - 2 \frac{N_i^2}{K_i(t)}.$$

The model expresses our basic intuition that the probability of form emergence increases with carrying capacity and the legitimating/spillover effects of having existing organizations with a similar identity but decreases when competition among existing organizations consumes much of the resources available to the potential form. Note that a scalar multiplier has been added to the squared density term to ensure that a steady state is reached when $K_i = N_i$.

To complete the model specification, one must also consider the co-

¹⁴ A 1991–92 survey reveals that almost 70% of abortions were performed in specialized abortion clinics, while only 20% were performed in other clinics (including family planning facilities). The remaining 10% were performed in hospitals or physicians' offices (Henshaw and Van Vort 1994).

evolutionary impact of organizational forms in the community ecology that have an identity (j) that is not very similar to that of the focal identity being considered ($j \neq i$). In the general Lotka-Volterra model, the competitive or symbiotic impact of organizational populations having these dissimilar identities is left unspecified, being estimated instead as a generic density-dependent parameter c_{ij} affecting form emergence:

$$\text{prob}(F_i) \propto K_i(t) + N_i - 2 \frac{N_i^2}{K_i(t)} + \sum_{j \neq i}^J c_{ij} N_j. \quad (2)$$

Predictions for the pattern of coevolutionary effects in an organizational community can be developed by considering variations in the extent of dissimilarity among form identities. For form identities that are extremely dissimilar (e.g., medical libraries and intermediate care facilities), neither competitive nor symbiotic influences on the probability of form emergence are likely ($c_{ij} = 0$). The case of form identities that differ on only one or two crucial dimensions (e.g., hospices and nursing homes) is more complex. In contrast to situations where forms share a matching identity, cross-form legitimation or resource spillover is unlikely to occur under these circumstances—the small but crucial differences in form identity are typically sufficient to prevent symbiotic coevolution. For instance, while nursing homes generally serve a clientele that is similar to that of hospices, the philosophy of these organizational forms is fundamentally different—hospices are seen as offering palliative care to the terminally ill in home settings, while nursing homes represent more institutionalized contexts in which the condition of residents is not seen as terminal. Ideological divisions over the social delineation of terminal illness are sufficient to prevent cross-form legitimation but are unlikely to prevent competition between these organizations. Accordingly, one can anticipate that the coevolutionary dynamics among form identities with a small number of crucial differences will tend to be competitive rather than symbiotic ($c_{ij} < 0$).

SOCIAL MOVEMENTS

Considering the qualitative evidence on form emergence, a model specification expressed only in terms of current carrying capacity and density dependence may appear incomplete. As emphasized in the previous examples of birthing centers and health maintenance organizations, social movements play a significant role in attracting attention to a form identity and securing resources that will support that identity. Aside from issues of resource mobilization, social movements may also be critical in clari-

fyng the boundaries of a form identity vis-à-vis competing forms and countermovements (Swaminathan and Wade, in press). Industry pioneers who are able to engage in successful collective action thus enhance the cognitive and sociopolitical legitimacy of a new form (Aldrich and Fiol 1994; Hunt and Aldrich 1998).

Successful social movements can be thought of simply as actions that increase the carrying capacity of a form. This conceptualization does not mean that analysts can be sanguine about the specification of form emergence presented in equation (2). The processual aspect of the definition is essential: a latent form identity that enjoys a relatively modest and constant carrying capacity between two sequential time periods is subject to very different social pressures than a latent form that enjoys a modest, but increasing, carrying capacity. In the latter case, contagion and “bandwagon” effects may be evidenced that are tied primarily to the change in—rather than level of—the carrying capacity. The social movement influence (ΔK) can be incorporated formally as:

$$\text{prob}(F_i) \propto [K_i(t) + \Delta K_i(t, t-1)] + N_i - 2 \frac{N_i^2}{K_i(t)} + \sum_{j \neq i}^J c_{ij} N_j. \quad (3)$$

Naturally, this characterization presents a short-term view of the effect of social movements; over the long term, social movement effects become endogenized in carrying capacity (K) itself.

Considering a simple additive version of equation (3), the predictions anticipated for a community ecology can now be summarized briefly. Form emergence is encouraged by greater cultural carrying capacity (effect of $K > 0$), as well as short-term increases in carrying capacity (effect of $\Delta K > 0$). Both sociopolitical and cognitive legitimacy is conferred by the development of populations having an identity similar to a focal organizational form (effect of $N_i > 0$), but too much development leads to a saturated niche and probable subsumption of new functions under the auspices of existing forms (effect of $N_i^2 < 0$). Populations with dissimilar identities exercise simple competition with respect to a focal identity ($c_{ij} < 0$) and no legitimating effect.

Punctuated Equilibrium

A community ecology perspective characterizes the probability of form emergence in incremental terms, parameterized largely by endogenous features of an organizational community such as the locus of form identities, the distribution of carrying capacities, change in carrying capacities, and the contours of competition and symbiosis. This imagery contradicts another popular conception of form emergence that emphasizes episodic

rather than incremental change, and random or exogenous influences on the development of new forms rather than influences that are endogenous to a community (see Astley 1985, pp. 230–33). Stinchcombe's (1965) work, in particular, stimulated research interest in the tendency of differentiated historical eras to have imprinting effects on organizational forms that emerge during those periods. Employing the terminology of bioecology, the abrupt periods of change in the structure of an organizational community are referred to as "punctuated equilibria" (Astley 1985).

The punctuated equilibrium model suggests that the specific features of a community ecology may be relatively unimportant to form emergence once temporal discontinuities in community evolution are controlled for. In the health care field, it could be argued that one such discontinuity was introduced with the passage of the Medicare/Medicaid act in 1965. The passage of the act reflected the broader institutional environment of Lyndon B. Johnson's Great Society agenda, which promoted medical access for the elderly and indigent (Scott et al. 2000, chap. 6). As the federal government started to intervene increasingly in the health care field, first as a purchaser of health services and then (beginning in the early 1970s) as a regulator, an unprecedented number of new organizational arrangements were introduced to the field—for example, community health centers, PROs, and substance abuse centers, just to name a few (see table 2). In the following empirical models, I will investigate whether these years of punctuated equilibrium account for much of the variance presumably captured by more specific community-level effects.

METHODOLOGY

Data and Measures

Population density and mass.—I collected characteristics of organizational populations in the U.S. health care field from a wide variety of data sources (see table 1). For each population, two types of measures were coded—(1) aggregate number of organizations in the population and (2) aggregate number of workers employed by organizations in the population. The former measure represents the conventional indicator of population density, as utilized in organizational ecology studies (Carroll and Hannan 2000). Unfortunately, when this measure is analyzed across different organizational forms, problems of comparability may surface. For instance, one finds that there were over 100,000 dental offices in existence in 1987 and less than 20,000 nursing homes (U.S. Bureau of the Census 1987).¹⁵ But when these population densities are weighted by organiza-

¹⁵ Note that these figures only include organizations with payrolls.

tional size (e.g., numbers of paid staff members), a different picture appears: the dental offices employed a little under half a million staff members in 1987, while over a million were employed by the nursing home population. In order to explore the possible impact of this discrepancy on the empirical models, I consider two types of population dependence in the community ecology: *density dependence*, which is tied to the numbers of organizations at various points in the identity space, and *mass dependence*, which, in this case, is tied to the number of workers employed by organizations at various points in the identity space (see Barnett [1997] for a discussion of density and mass dependence).

Whenever possible, both organization counts and human resources were coded on an annual basis for each organizational population from 1965 to 1994. Around 40% of the values were not available for each population-year and were estimated using linear interpolation based on surrounding data points. Three special issues related to the health care field were considered in coding the human resource measure. First, the human resources of educational institutions in the field (e.g., academic medical centers, schools of nursing, schools of dentistry, etc.) are more properly conceived of in terms of numbers of medical/nursing students than employees per se. Second, since medical personnel tend to move readily across the boundaries of different organizational forms (e.g., physicians in private practice who have admitting privileges at general hospitals), human resources were coded in terms of full-time equivalents (FTEs), when available. Finally, one organizational form included in the analysis—the multi-institutional system—primarily entails the horizontal and vertical integration of various organizational arrangements (Shortell, Gillies, and Anderson 1994); employees were not counted separately for this form, since their counts tend to be subsumed by other organizational forms at the facility level.

Form identity.—The identities of existing and potential organizational forms were coded on the basis of systematic discourse data from the health services domain. The textual data (*corpus*) for this analysis was extracted from MEDLINE, the largest database of machine-readable text in the medical area. Over a thousand professional journals and proceedings published between 1965 and 1994 were scanned with a search engine for content related to the domain of health services research and policy.¹⁶ The journals subsumed publications targeted at physicians and allied health professionals (e.g., *New England Journal of Medicine*, *Journal of the American Medical Association*, etc.), those targeted at facility managers and business consultants (*Modern Healthcare*, *Health Care Management*

¹⁶ The search engine used includes both the Aries MEDLINE Knowledge Finder and customized programs developed by the author.

Review), and those oriented toward policy professionals and social scientists (*Milbank Memorial Fund Quarterly*, *Journal of Health Politics, Policy, and Law*). A subset was extracted based on the following criteria—(1) texts must include discussion of at least one of the organizational forms listed in table 1, and (2) texts must appear in English-language journals. For the sake of computational efficiency, texts discussing a particular organizational form were no longer added to the database once 1,000 randomly selected texts referring to that form had been included. The resulting database features 13,941 texts—including articles, conference proceedings, editorials, and so on.

Aside from the texts themselves, a set of symbols was also extracted from the MEDLINE corpus. In this context, “symbols” refer to terms that were consistently applied by human coders over the period covered by the corpus in order to characterize the content of each text. They represent not only organizational forms themselves, but also health service values (e.g., efficiency, accessibility), technologies (e.g., genetic screening, intensive care units), processes (e.g., ambulatory care, life support care), personnel (e.g., physicians, consultants), and other concepts that could possibly be linked to the identities of forms. Again for the sake of computational efficiency, symbols were only included if they appeared in at least 10 texts within the entire corpus. This criterion yielded a total of 988 symbols to be considered in the analysis.

Symbol identities were assessed using a latent semantic analysis (see appendix, below). This exploratory technique produced a distribution of symbol identities in a continuous, multidimensional space. Similarities and dissimilarities among the identities of organizational forms were examined for face validity. The distribution of forms generally corresponds to common intuitions—for example, abortion clinics have an identity that is very similar to that of family planning centers, while medical libraries and intermediate care facilities have identities that are quite dissimilar.

Carrying capacity.—The MEDLINE corpus was also employed to code environmental carrying capacities. The carrying capacity at discrete points in the multidimensional identity space was operationalized for every year (1965–94) in terms of the aggregate number of texts discussing a symbol having an identity located near those points (including symbols representing organizational forms). To achieve comparability across time, this aggregate was standardized as a percentage of the total number of texts appearing annually in the corpus.

Due to the novelty of this particular carrying capacity measure, additional steps were taken to investigate its construct validity. As Aldrich (1999, p. 225) notes, “in practice . . . we only know the level of carrying capacity after it has been reached and a new population’s numbers have stabilized or shrunk.” An alternative gauge of carrying capacity can thus

be gleaned from the steady state predictions of equation (1). In particular, we know that $K_i(t) = N_i$ when $dN_i/dt = 0$ and N_i is maximized (assuming that the effects of all other population densities N_j are normalized to equal 0). If local maxima are accepted as inflection points, one finds that form identities experience 28 density peaks during the study period, followed by subsequent declines or population stabilization. When the peak densities are regressed on the discourse measure of carrying capacity for the 28 cases, almost 50% of the variance in peak density is accounted for, and the partial correlation between peak density and carrying capacity is significant at the $P < .001$ level. As a result, confidence in the construct validity of the discourse measure of carrying capacity is enhanced considerably.

Structure of the Community Ecology

For purposes of explanatory analysis, the continuous multidimensional space classifying symbols had to be divided into a finite number of cases, that is, discourse domains potentially giving rise to new organizational forms. Each dimension in the space was partitioned along the dimension mean into a set of symbols having loadings below the mean and symbols having loadings above the mean. For the 10-dimensional identity space chosen for analysis, this yielded a total of 1,024 cases per annum (2^{10}) or 30,720 cases in all.

The structure of the identity space can be understood more concretely if we consider its first two dimensions and some representative forms arrayed within those dimensions (see fig. 1). All 988 symbols in the discourse—including organizational forms—are assigned loadings in the space by a latent semantic analysis (see the appendix, below). Interpretations of the space can likewise be made on the basis of these loadings. Thus, we can see that the first dimension tends to segregate those symbols associated with treatment and maintenance functions in the health care field from those associated with informational and storage functions, while the second dimension tends to segregate symbols associated with functions performed in public contexts from those performed in private contexts. Cross-classification leads to further semantic nuances in the identities represented within the space—treatment and maintenance functions performed in private homes lead to a class of residential providers (cell 4); confidential diagnostic and storage functions performed on human biological matter lead to a class of medical laboratories and storage facilities (cell 2); and so forth.¹⁷ Given a mean loading of -3.13 on dimension 1

¹⁷ While some analyses of health care organization and policy treat such dimensional interpretations as a primary focus (see Ruef 1999), it is unclear that this is equally

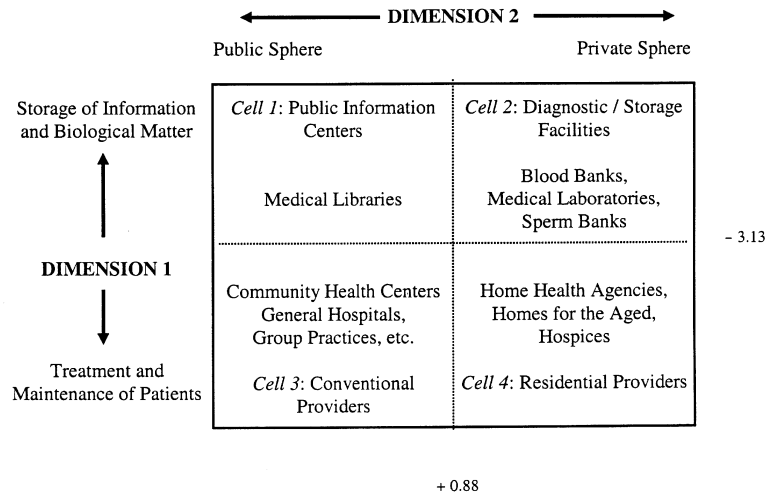


FIG. 1.—Two dimensions of identity space (with representative forms)

and 0.88 on dimension 2 for all 988 symbols, partitions are inserted at these points. Limited to these two dimensions, the resulting space would have 4 (2^2) cells to serve as the units of analysis. One should note that a cell need not contain an organizational form to qualify as a unit of analysis—at the beginning of the 20th century, the upper-right-hand quadrant of the two-dimensional identity space was effectively empty, although an analysis extending back to this period would need to account for the possibility of form emergence in that region of the health discourse.

The dependent variable, form emergence, is operationalized as a count of the number of forms first entering a cell of the identity space during any given year. For the 19 form entries in table 2, this variable is Poisson-distributed across the partitioned identity space (having a mean approximately equal to its variance). The independent variables—population density, mass, and carrying capacity—are operationalized as aggregated organization, human resource, and discourse counts (respectively) for each cell of the identity space. Thus, if there are 100 abortion clinics in the United States and 200 family planning centers and both organizational forms are mapped on to the same cell of the identity space, then that cell is coded as having a density of 300 organizations for that given year (assuming that no other organizational forms have a similar identity). Density and mass measures were entered into the empirical models in

useful when a large number of dimensions are involved. An alternative strategy generates hierarchical interpretations of identities based on symbol similarities and dissimilarities across dimensions (see discussion section, below).

terms of thousands of establishments and thousands of FTEs, respectively. Due to a pronounced positive skew in the variable distributions, the linear terms for these measures were subjected to a log transformation.

In order to conserve degrees of freedom, the community matrix parameters for the impact of population density/mass outside a focal cell of the identity space (c_{ij} in eqq. [2] and [3]) were not estimated separately for each alternative identity. Instead, a single weighted measure was calculated for regions of the identity space, as follows:

$$C_i = \sum_{j \neq i}^J \frac{P_{ij}}{P} N_j, \quad (4)$$

where C_i represents the coevolutionary impact of all other forms in the community ecology on forms having identity i , N_j is the aggregated density or mass of form identity j , P_{ij} is the number of partitioned dimensions for which identity j is classified as being similar (i.e., located in the same partition) as identity i , and P is the total number of dimensions in the identity space.

Estimation Methods

The emergence of forms within the community ecology is modeled as a stochastic process that generates annual event counts. Estimation proceeds via maximum likelihood techniques that are applied to the following Poisson regression model (Greene 1997):

$$\text{prob}(Y_t = y_t) = e^{-\lambda(t)} \lambda(t)^{y_t} / y_t!,$$

where Y_t is the estimated entry count in year t , y_t is the corresponding observed entry count, and $\lambda(t)$ is a linear function of the included covariates and their coefficients. Given the specification in equation (3), the operational lambda term in the estimated model is expressed as $\lambda(t) = f[K(t), \Delta K(t), N, N^2, C]$, with C being operationalized as shown in equation (4). To accommodate the possibility of an autoregressive influence, a lagged term for the dependent variable was also included in the equation. The model is applied using the 1,024 cells of the partitioned identity space as its units of analysis—that is, counts include any new organizational form emerging within each cell, and covariates are likewise measured at

this level of analysis. Greene's (1992) LIMDEP software was used to estimate the Poisson regression model.¹⁸

Two methodological concerns arose in applying the model. One involved the possibility of "structural zeros" in the form identity space—that is, cells in which a new organizational identity could not be constituted by definition of the model. While no straightforward cases of structural zeros could be noted, empirical absences of discourse for a sizable number of cells in the identity space ($K = 0$ for 852 out of 1,024 cells) imply that no form identity can be constituted in those cells (given that discourse is required to delineate identities). Since the models may be sensitive to these zero cells, additional analyses were conducted to determine whether the results were robust when the partitioned identity space was limited to the 172 cells that evidenced discourse at some point during the 30 years being studied.

The second methodological issue involved spatial autocorrelation between observations. Insofar as there are coevolutionary effects among form identities, there is also a clear possibility of autocorrelated disturbances in the identity space.¹⁹ Given the difficulty of characterizing this autocorrelation parametrically, I opted for a variant of the nonparametric quadratic assignment procedure (QAP) to explore the sensitivity of the results (see Krackhardt 1987). The Poisson regression QAP applied involved (a) estimating the parametric specification, (b) randomly permuting the cells of the dependent identity-time matrix over 200 replications, (c) estimating the Poisson model for each bootstrapped replication, and (d) conducting pseudo *t*-tests comparing the bootstrapped with the parametric estimates.

RESULTS

Analyses of Form Emergence

The Poisson regression models of form emergence were analyzed in three stages. First, the development of new forms was estimated exclusively

¹⁸ The Poisson model assumes that the mean and variance of the dependent variable are approximately equal. When the variance significantly exceeds the mean, overdispersion results and other models—such as negative binomial regression—are more appropriate (Greene 1997, pp. 937–40). While the dimensionality of the discourse space was chosen to accommodate the parametric assumptions of the Poisson regression (see the appendix, below), I also conducted a separate Lagrange multiplier test of overdispersion. The test indicates that overdispersion did not pose a significant problem for the analyses.

¹⁹ Due to concerns about serial correlation, I also examined the regression residuals with a standard Durbin-Watson test. Significant serial correlation ($P < .05$ level) was not found in any of the models.

TABLE 3
POISSON REGRESSION MODELS OF FORM EMERGENCE IN THE
HEALTH CARE FIELD, 1965–94

VARIABLE	MODEL	
	1	2
Intercept	-7.697 (.264)**	-7.790 (.276)**
Lag emergence [$F(t-1)$]	2.176 (1.020)**	1.081 (1.176)
Discourse (K) .....	.380 (.042)**	.264 (.079)**
Change in discourse (ΔK) .....	.330 (.117)**	.254 (.170) ⁺
Extant organizational forms ...	...	.430 (.130)**
-2 log likelihood (df)	281.70 (4)	271.11 (5)

NOTE.—All covariates are lagged by one year. N of cells = 30,720.

⁺ $P \leq .10$, one-tailed tests.

* $P \leq .05$.

** $P \leq .01$.

on the basis of population-independent parameters (e.g., carrying capacity and change in carrying capacity). Then, a number of population-dependent parameters (density, mass, coevolutionary effects) were added to the community ecology specification. Finally, a sensitivity analysis was conducted to consider whether the empirical results were likely to be affected by zero cells, by small shifts in the timing of form emergence, or by autocorrelation among cells in the identity space.

Table 3 presents the population-independent models of form emergence. Model 1 shows that increases in both the discourse and change in discourse for a given identity tend to enhance the probability of form emergence. As the cultural-constitutive elements tied to the identity of a potential form receive more and more attention from professionals within the U.S. health care field, the regulatory legitimation of that identity becomes increasingly likely. Moreover, short-run increments or decrements of the carrying capacity—often triggered by social movements affecting community discourse—have an independent “bandwagon” effect on the likelihood that form emergence will occur. These effects continue to hold when a control is added to the model specification for the number of existing organizational forms having a given identity (see model 2), although the statistical significance of the social movement parameter (ΔK) is reduced substantially to the $P < .10$ level.

Table 4 summarizes the result of adding density-dependent (models 3–5) and mass-dependent parameters (models 6–8) to the specification. The basic nonmonotonic density-dependent model improves model fit considerably over a nested density-independent model (model 3 vs. model 1, likelihood ratio $\chi^2 = 30.86$; change in $df = 2$; $P < .001$). Consistent with ecological theorizing, the positive first-order density

TABLE 4
 POISSON REGRESSION MODELS OF FORM EMERGENCE IN THE HEALTH CARE FIELD, 1965-94

VARIABLE	MODEL					
	Density-Dependent Specifications			Mass-Dependent Specifications		
	3	4	5	6	7	8
Intercept	-8.058** (.314)	-6.485** (.700)	-8.480** (1.199)	-8.219** (.345)	-6.687** (.642)	-7.694** (1.174)
Lag emergence [$F(t - 1)$] .....	.872 (1.105)	.760 (1.083)	.796 (1.119)	.815 (1.131)	.721 (1.109)	.777 (1.130)
Discourse (K) .....	.339** (.093)	.356** (.087)	.305** (.084)	.119* (.068)	.101+ (.065)	.084+ (.066)
Change in discourse (ΔK) ...	.285* (.155)	.280* (.137)	.233* (.136)	.162 (.145)	.135 (.124)	.116 (.127)
Log N	1.371** (.246)	1.488** (.249)	1.531** (.245)	...	...	...
$N^2/1,000$	-.792** (.262)	-.831** (.220)	-.807** (.217)	...	...	...

Log(mean) .....	...	...	...	.926**	.975**	.953**
				(.132)	(.133)	(.134)
$M^2/10,000$ .....	...	...	...	-.073*	-.068*	-.062*
				(.036)	(.039)	(.038)
Coevolution ($C/10$) .....	...	-.089*	-.017	...	-.005**	-.003
		(.038)	(.050)		(.002)	(.003)
Period 1 (1965-73) .....	...	...	1.437*	...	...	.754
			(.654)			(.732)
-2 log likelihood (df)	250.84 (6)	245.06 (7)	239.77 (8)	246.45 (6)	239.04 (7)	237.93 (8)

NOTE.—All covariates are lagged by one year. N of cells = 30,720.

+ $P \leq .10$.

* $P \leq .05$.

** $P \leq .01$, one-tailed tests.

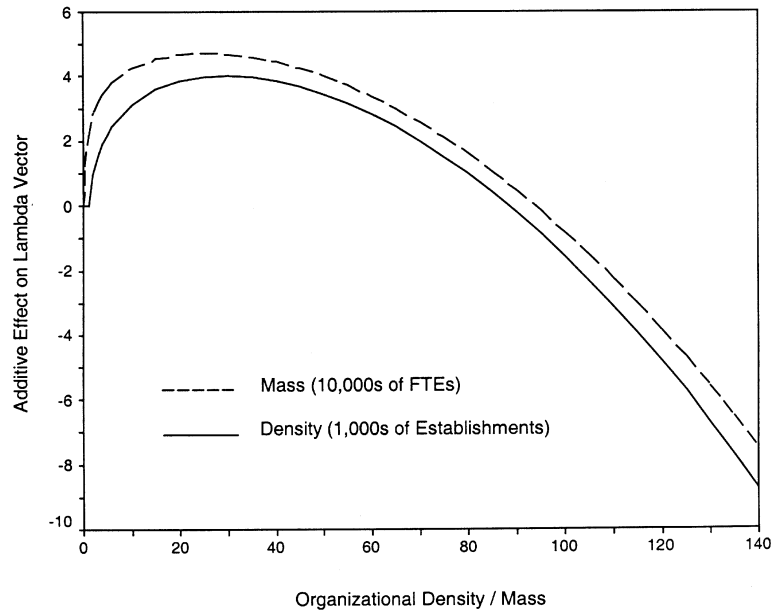


FIG. 2.—Effect of organizational density and mass on the emergence of new health care forms.

term suggests that the probability of form emergence initially increases with the number of organizations of another form having a similar identity. Thus, one would expect that the sociopolitical legitimation and resource base of an organizational form such as abortion clinics may have benefited substantially from the existing infrastructure and legitimacy achieved by a related form, such as family planning centers. At a certain point, though, competitive pressures (represented by the second-order density term) will outweigh the benefits of cross-form symbiosis. The probability of form emergence becomes unlikely when there is a saturated niche of organizations with a similar identity to the novel arrangement. Under such circumstances, existing populations of organizations are likely to incorporate aspects of potential organizational forms within their own structural identities.

The density-dependent effect can be seen most clearly by plotting it as an additive component of $\lambda(t)$ in the Poisson regression (see fig. 2).²⁰ Observed densities for different regions of the form identity space range between 0 and around 200,000 individual organizations. However, for

²⁰ The density-dependent multiplier for the rate of form emergence can be recovered simply by taking the antilog of the additive estimate.

the period between 1965 and 1994, the regulatory legitimization of new health care forms is only observed in regions of the identity space containing between 0 and 55,000 organizations. A number of new organizational arrangements appear toward the upper end of this range, where the estimated rate of form emergence is nearly 50 times ($e^{4.0}$) higher than that evidenced for completely empty niches. Novel arrangements in this region include IPAs, PPOs, and insurance/risk pools. To some extent, these forms are able to draw upon the legitimacy achieved by existing forms having related identities, such as health maintenance organizations and indemnity insurance carriers. At the same time, these niches are not yet as competitive as those faced by forms in niches beyond the mark of around 60,000 establishments: for example, solo physician practices or dental clinics.

Some organization theorists will suggest that these results may be biased insofar as the densities of organizational populations such as dental clinics and indemnity insurance carriers are not strictly comparable given substantial differences in the size of individual facilities. A basic mass-dependent specification (model 6) addresses this concern. Weighting organizational populations by their respective number of full-time employees, I continue to find a significant nonmonotonic effect of existing populations on the emergence of new forms. In fact, the pattern of mass dependence is very similar to that of density dependence when population mass is evaluated in terms of tens-of-thousands of employees (see fig. 2). The probability of form emergence peaks for organizational niches having around 250,000 employees and declines thereafter. Like the density-dependence specification, the model thus explains why a form identity such as that of solo physician practice fails to attract novel organizational forms (over half a million physicians, nurses, and allied health workers have been employed in this traditional organizational context since the mid-1970s).

The mass-dependence model also resolves some empirical puzzles left unexplained by the density-dependence specification. Specifically, general hospitals in the United States have numbered slightly fewer than 6,000 organizations during much of the study period—a sweet spot for form emergence as far as the density-dependence model is concerned, with over 11 times ($e^{2.43}$) the emergence rate of an empty niche. Most observers of the health care field would contend, however, that the hospital's identity as an acute-care provider seems especially unlikely to be mimicked by entrepreneurs creating new health care forms. The mass-dependence model explains why—with an aggregate number of between 1.3 and 3.7 million employees during the study period, the population of general hospitals occupies a highly saturated niche that will seem unappealing to many organizational innovators.

Models 4 and 7 add the coevolutionary dynamics (C) of forms with nonmatching identities to the density- and mass-dependence models, respectively. As expected, the health care field has primarily been exposed to competitive dynamics between these forms. When a potential form has an identity that differs from that of an existing form along one or two dimensions, then the competitive pressures from the existing organizational population tend to be strong. Consider the competition faced by hospice organizations when they received regulatory legitimation from the Hospice Medicare Reimbursement Act in 1983. Employing the mass-dependence model, baseline estimates for hospice form emergence are very propitious at the time, revealing an emergence rate of 0.1501 as opposed to the 0.0012 ($e^{-6.7}$) expected for an empty form niche with no professional discourse being directed at form identity attributes [$M(t) = K = \Delta K = 0$].²¹ When competition from nursing homes and skilled nursing facilities (SNFs) is incorporated into the equation, the estimate of hospice form emergence decreases to 0.1066 (applying a rate multiplier of 0.71). The opposition of nursing home and SNF advocates to the related, though dissimilar identity of hospices is captured by the strong competitive effect.

In developing new organizational forms, entrepreneurs thus face two strategic alternatives. One is to build organizational forms that have identities that are quite similar to existing arrangements occupying moderately populated niches. This permits entrepreneurs to draw upon the social legitimacy and resource base of the established forms, as well as the approval of organizations manifesting those forms. Alternatively, entrepreneurs can seek out organizational identities that are highly dissimilar from existing arrangements. This approach minimizes the threat of coevolutionary competition, but also entails considerable effort in attracting resources and demand to a novel form.

A final set of models was estimated to determine if the endogenous impact of the community ecology on form emergence continues to obtain when period effects are controlled for. As noted earlier, a punctuated equilibrium model would hold that many of the legitimating events directed at new health care forms can be explained by broader regulatory regimes (e.g., the Johnson administration's Great Society program and the Nixon administration's reactions to it). The results presented for models 5 and 8 reveal that the years between the passage of Medicare/Medicaid and the HMO act did see increased levels of form emergence

²¹ The primary reason for the high baseline estimate of hospice form emergence is the close alignment of this organizational form's identity with home health agencies (HHAs). Historically, most hospice programs in the United States have operated as home care services for the dying (Lindheim 1981). The cognitive legitimation achieved by HHAs by the early 1980s was clearly a major impetus in support of hospice care.

(although the period dummy is only statistically significant in model 5). The inclusion of the period effect does not mitigate the basic patterns of density and mass dependence found for organizational forms with similar identities. However, the coevolutionary dynamics between dissimilar form identities are no longer significant once the punctuated equilibrium is incorporated; and we find that carrying capacity (K)—already marginally significant in model 7—evidences an even lower t -ratio in the mass-dependence specification including the effect. These findings suggest that some parameters of the community ecology are more robust than others with respect to the shocks of exogenous events: density- and mass-dependent patterns of form emergence for particular identities are relatively immune to these exogenous shocks, while coevolutionary and carrying capacity dynamics are likely to reflect (be partially correlated with) institutional transformations.

SENSITIVITY ANALYSES

Given the computationally intensive nature of the sensitivity analyses, all were conducted with the most parsimonious density- and mass-dependent specifications (corresponding to models 3 and 6 in table 4). The initial sensitivity analysis removed quasi-structural zeros from the identity space, leaving $172 \times 30 = 5,160$ observations. As shown in table 5 (models 3a and 6a), the smaller set of observations affects the statistical significance of the parameter estimates in the density- and mass-dependent model slightly. Thus, the social movement parameter drops to the $P < .10$ level in the density-dependent model and the estimate for the competition term $M(t)^2$ drops from the $P < .05$ to the $P < .10$ level of significance in model 6a.

Two QAP Poisson regression models were executed for the same specifications in order to further examine the robustness of the results. A constrained QAP was run to determine if the community ecology model was sensitive to small temporal perturbations in the distribution of the regulatory events.²² The sensitivity analysis was conducted by treating regulatory legitimation not as a discrete event, but as a random draw from a uniform distribution centering on the years identified in table 2. For each year t , new timing markers could be drawn from the distribution ($t - 2, t + 2$). These revised timing markers were repeatedly permuted and entered into Poisson regression models over 200 iterations. As shown in table 5 (models 3b and 6b), the mean t -statistics for the constrained

²² The QAP is referred to as “constrained” since a design matrix is imposed on the possible random permutations of the identity space. When no such restrictions are imposed, the term “unconstrained” QAP is employed.

TABLE 5
SENSITIVITY ANALYSES OF DENSITY- AND MASS-DEPENDENT POISSON REGRESSION MODELS

VARIABLE	MODEL					
	Density-Dependent Specifications			Mass-Dependent Specifications		
	3a	3b	3c	6a	6b	6c
Intercept	-6.341** (.329)	...	...	-6.440** (.354)	...	...
Lag emergence [$F(t - 1)$] .....	.786 (1.069)	...	...	.852 (1.095)	...	...
Discourse (K) .....	.226** (.088)	$P < .01$	$P = .06$	.116* (.067)	$P = .05$	$P = .04$
Change in discourse (ΔK) .....	.224 + (.143)	$P = .04$	$P = .07$	.169 (.144)	$P = .09$	$P = .09$
Log N .....	.865** (.214)	$P < .01$	$P = .01$	...	...	...
$N^2/1,000$	-.468** (.203)	$P = .01$	$P = .01$	...	...	...
Log(mean) .....	...	...	...	.539** (.127)	$P < .01$	$P = .03$
$M^2/10,000$ .....	...	...	...	-.047+ (.030)	$P = .04$	$P = .05$
-2 log likelihood (df)	217.35 (6)	...	...	217.17 (6)	...	...

NOTE.— N of cells = 5,160. 3a and 6a remove structural zeroes; 3b and 6b report constrained QAP; and 3c and 6c report unconstrained QAP.

+ $P \leq .10$.

* $P \leq .05$.

** $P \leq .01$, one-tailed tests.

QAP runs reveal virtually no difference with the parametric estimates shown in models 3a and 6a. Some estimates (e.g., the second-order, mass-dependent term) increase in significance from the $P < .10$ to the $P < .05$ level. On the whole, the sensitivity analysis demonstrates that the findings are remarkably robust with respect to temporal variation in the timing of form emergence and that most of the predictive power of the community ecology specification comes from cross-sectional variations of density, mass, and carrying capacity between different form identities.

The unconstrained version of the QAP Poisson regression allowed random permutation of the entire identity space. In this case, pseudo t -tests were conducted by examining how many bootstrapped permutations produce estimates as significant as those yielded by the parametric specification. While the carrying capacity effect (K) is slightly weaker in the density-dependence model (now only significant at the $P < .10$ level), the density terms themselves continue to be highly significant. And the statistical significance of terms in the mass-dependent specification is largely unchanged. Consequently, there is some assurance that the results are not biased unduly by spatial autocorrelation.

DISCUSSION

Employing a community level of analysis, I have shown that form emergence in the health care arena over the past 30 years has been influenced by the aggregate numbers and size of existing organizational forms. This impact is most pronounced for organizations having similar identities to emerging organizational forms. To a point, the increasing density and mass of the existing organizational populations serves to legitimate novel arrangements with corresponding identity attributes, enhancing the probability of regulatory legitimation for those new forms. Beyond that critical point, highly saturated niches tend to deter the appearance of new arrangements due to competition among existing organizations. Such competitive dynamics are also evident for organizational forms having dissimilar identities, although their impact on emerging forms tends to be highly correlated with factors that are exogenous to the community ecology (e.g., the political effects of the Great Society initiatives).

The community ecology models presented in this article should, of course, be regarded as preliminary. Given the relatively small number of form emergence events considered for the health care field, the models have been parsimonious by necessity. A number of additional parameters might be incorporated for analyses that target fields with greater numbers of emerging forms, longer periods of temporal coverage, or comparisons of multiple organizational fields. These analyses could evaluate hypotheses

that have remained unexplored in the present article. How does the maturity of organizational forms in a community ecology affect form emergence? Are legitimation and competitive effects for older existing forms different than the effects for younger forms? How sensitive are the findings to the particularities of the health services arena? What are the implications of shifting to other indicators of form emergence (e.g., technical innovation)? What are the microdynamics that underlie changes in form identities and carrying capacity? What strategies do community participants invoke to effect these changes and influence form emergence?

The present analyses have also not addressed the issue of form deinstitutionalization and demise (see Davis, Diekmann, and Tinsley 1994). While there are some health care forms in the community ecology that have become “extinct” during the period of study—for example, HSAs, which were effectively eliminated by the repeal of federally sponsored community health planning in January 1987 (Sofaer 1988)—their numbers are relatively small compared to those of proliferating health care forms. Future research should consider the dynamics of form demise, both as an independent variable affecting the emergence of new organizational forms and as a dependent variable in its own right.

A final notable omission in the present article involves the potentially rich intersection between research on organizational classification (e.g., McKelvey 1982) and processes of form emergence. The development of new types of organizational arrangements is not only likely to be affected by the topology of carrying capacity, density, and mass distributions constructed on the basis of distinctions among form identities, but also by the evolutionary pattern of classification exhibited by those form identities themselves. Pólos et al. (1998) suggest that some patterns of classificatory rules tend to be more stable—inhibiting the emergence of form identities—while other patterns are less stable—promoting the reconstitution of old identities and development of new ones. For the organizational forms included in the present analysis, this insight can be pursued in an exploratory fashion by examining the hierarchical structure that is generated by clustering form identities based on differences in the identity space. Figure 3 shows the resulting dendrogram for the organizational forms that existed prior to 1965, while figure 4 shows the dendrogram that results with the addition of new forms during the following three decades.²³

²³ The hierarchical clustering algorithm applied here calculates the distance between two clusters as the average distance between all pairs of organizational forms in which one member of the pair is from each of the clusters (the so-called average linkage between groups method). Distances between forms are defined in terms of squared Euclidean distances for the underlying identity space.

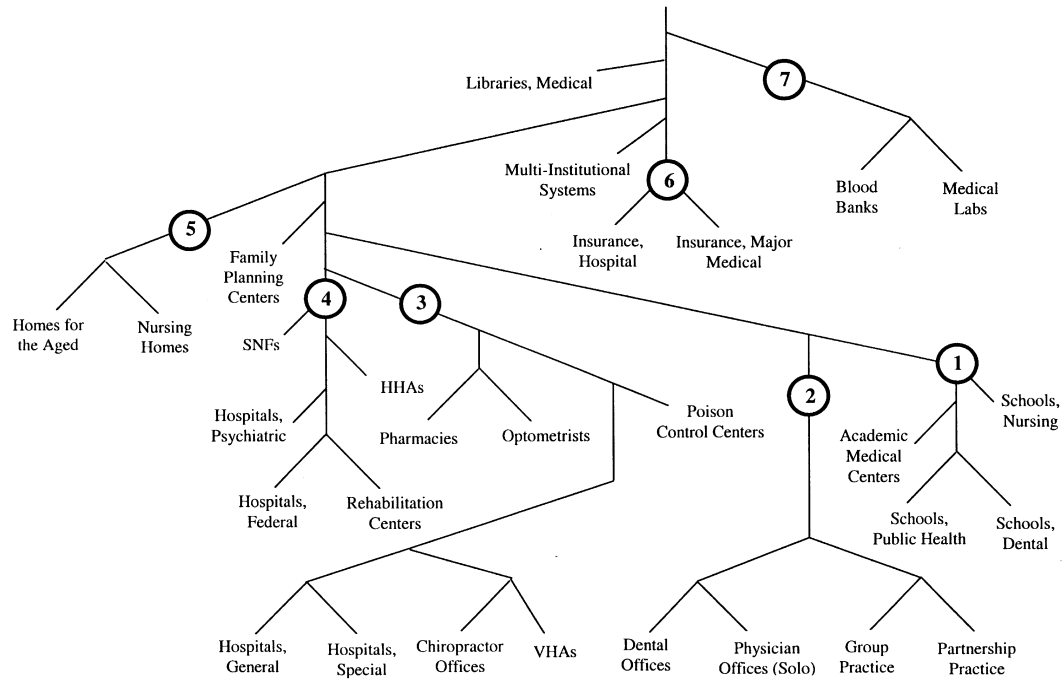
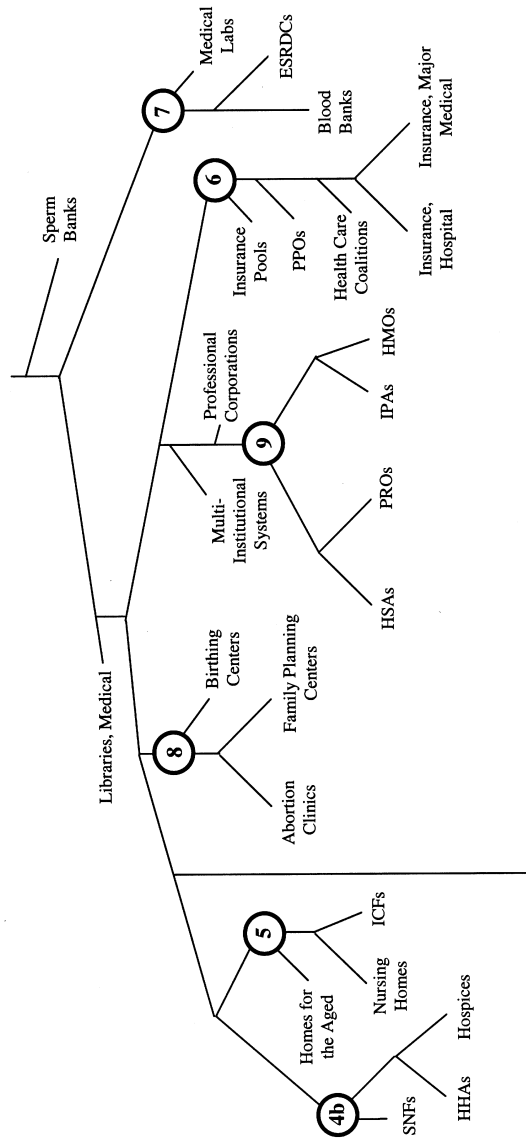


FIG. 3.—Dendrogram of organizational forms in the health care field, 1965



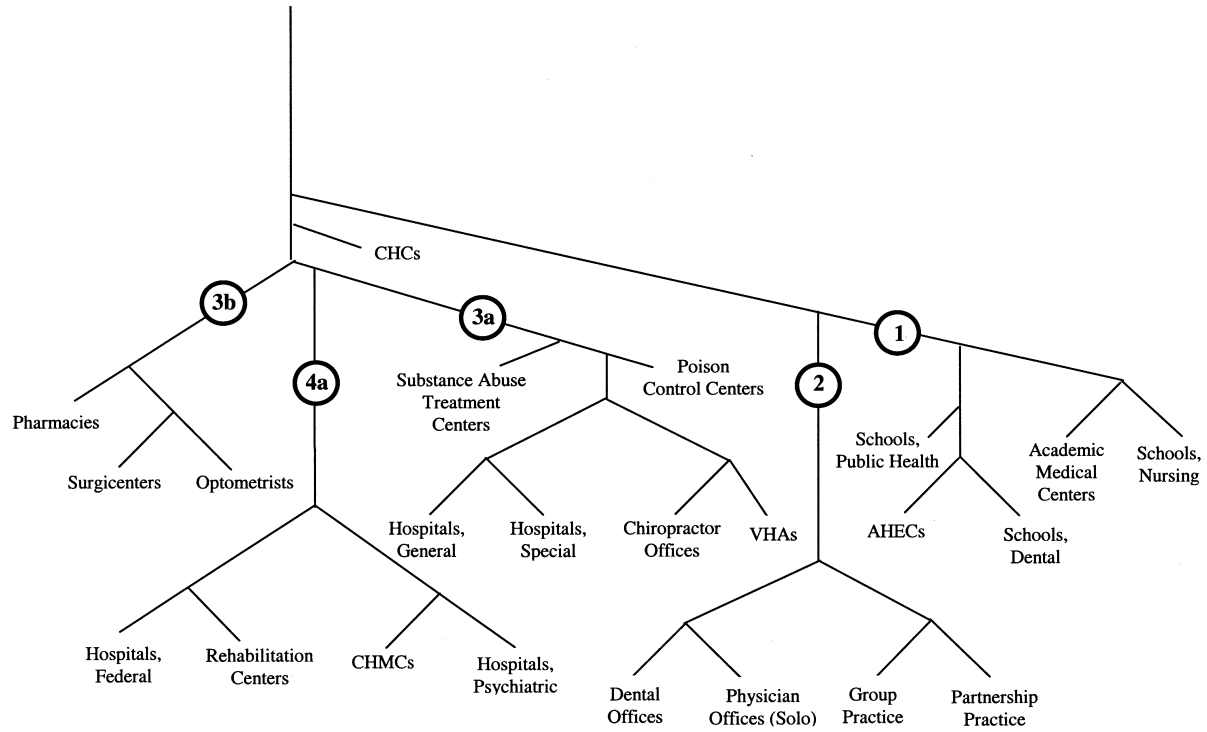


FIG. 4.—Dendrogram of organizational forms in the health care field, 1994

The initial structure of form identities reveals several major clusters of health care forms, including (1) educational organizations, (2) primary care providers, (3) short-term providers and ancillary organizations, (4) long-term providers, (5) residential providers for the elderly, (6) insurance carriers, and (7) medical banks and laboratories. Some other organizational forms do not readily fit into any of the major clusters (e.g., family planning centers). Comparing the initial structure with that of 1994 suggests two ways that new organizational identities may develop from existing ones. First, evolutionary branches may simply be added to the structure of identities as novel forms are constructed as mutations of established constitutive rules. The appearance of a new cluster of organizational forms (8) dealing with reproductive health services can be characterized in this fashion, with abortion clinics and birthing centers developing as evolutionary offshoots of family planning centers. A second modification in the identity structure occurs when existing branches are reconstituted and moved to new regions of the identity space. In the health care field, this dynamic takes place in the segregation of home care and skilled nursing facilities (4*b*) from more institutionalized providers of long-term care (4*a*). It could be argued that this segregation process serves as a precondition for the development of new long-term providers that tend to be opposed to institutionalized care (e.g., hospice organizations).

A complete depiction of form emergence will probably need to incorporate the path dependencies of identity structures, noting when new branches are likely to arise and when old ones are likely to be reconstituted. At present, the principal analytical difficulty with this approach is that methods for extracting classification hierarchies tend to be committed a priori to treelike structures, in which more specific organizational forms (e.g., schools of nursing) are descendents of individual parent forms that exhibit a more generic identity (e.g., medical education organizations). Many of the most interesting organizational forms are more properly seen as the evolutionary product of two or more parent forms. Identities that fall on the boundary of organizational communities are especially likely to be constituted as such hybrids—consider the case noted earlier concerning child guidance clinics, which borrow from the identities of mental health organizations, corrective organizations, and generic educational forms. A treelike identity structure is clearly inadequate to represent the emergence of such organizational forms. Moreover, previous theory suggests that circumstances witnessing the lack of a treelike identity structure are those most inclined to a reconstitution of organizational forms (Pólos et al. 1998), given the fact that successor forms inherit conflicting rules from disparate origin forms. From both a theoretical and methodological standpoint, then, the incorporation of more general identity structures into analyses of form emergence is a desirable development.

CONCLUSION

The diversity of organizational arrangements within a society is of significant academic and practical interest since it represents a repository of solutions to perceived social needs in arenas such as education, trade, the arts, and medical care (Hannan and Freeman 1989). Sources of increasing or decreasing organizational diversity cannot simply be sought in the exogenous economic, legal, and cultural environments that surround modern administrative structures, but may also be evident in the numbers and distribution of those administrative structures themselves. The endogenous sources of diversity include demographic features of existing organizational populations. They also subsume the constitutive rules emphasized by neoinstitutional scholars as the basis of identities that bound those populations (Scott 1995; Porac and Thomas 1990).

The analyses pursued in this article contribute in several ways to our understanding of organizational diversity, focusing in particular on the emergence of novel organizational forms. I have argued that the development and disappearance of organizational forms is most appropriately studied at the level of the organizational community. This level of analysis avoids some of the idiosyncracies associated with the study of individual organizational forms, while allowing more attention to be directed at relationships among form identities than would be possible in broader societal comparisons. The community level of analysis also permits a nuanced description of the pattern and timing of form emergence—a topic which will be of interest in its own right to scholars of form imprinting effects (see Stinchcombe 1965; Hannan and Carroll 1992). Perhaps the most obvious advantage of the community level is that it represents a practical foundation for data-gathering efforts across a range of related organizational populations. While demographic information is unlikely to be as detailed as that typically employed for studies of individual population ecologies (featuring entry and exit data on individual organizations), aggregate characterizations of population density and mass are generally sufficient to consider the interdependencies of organizational forms. As organizational theory continues to embrace open systems conceptions, future research into the nature of these interdependencies appears to be a natural course for studies of form emergence.

APPENDIX: MEASURING THE IDENTITY OF ORGANIZATIONAL FORMS

In this article, differences in the identities of organizational forms are measured using quantitative discourse analysis. Previous sociological implementations of this measurement strategy have applied multidimen-

sional scaling (MDS) techniques to extensive textual corpora in order to locate form identities within a small number of underlying dimensions (see Mohr and Guerra-Pearson 1996; Ruef 1999). Recent work in cognitive psychology has suggested that the number of dimensions actually employed by individuals in distinguishing between a variety of social objects can be quite large, while algorithmic implementations of MDS are frequently limited to no more than half a dozen dimensions. These findings have led to the refinement and elaboration of earlier MDS strategies in the form of latent semantic analysis (LSA) techniques (Landauer and Dumais 1997).

I applied LSA in order to assess the location of form identities within a multidimensional space. Input data matrices for the LSA were constructed by cross tabulating symbol occurrences by individual text items. For the corpus considered here, the rectangular input matrix consisted of more than 13 million cell entries (13,941 texts \times 988 symbols). The objective of the LSA was to reduce these raw discourse frequencies to a set of independent principal components that characterize essential differences among symbols, while capturing as much variance as possible from the original input matrix. This goal is comparable to that of conventional factor analytic and multidimensional scaling techniques, with two important methodological complications. First, it is typically inappropriate to treat discourse frequencies as being measured on an interval scale—these are often ordinal characterizations (e.g., with cell entries of “1” for texts that feature a particular symbol and “0” for those that do not). This consideration has led sociologists working with discourse data to apply methods such as nonmetric MDS (Mohr and Guerra-Pearson 1996) as opposed to techniques that make stronger parametric assumptions, such as conventional exploratory factor analysis. The second complication concerns the size of the input data matrix. Whereas existing MDS approaches to evaluating differences among organizational forms examine only relatively direct co-occurrence information between forms (see Ruef 1999), the LSA perspective maintains that most perceptions with respect to symbol identities are induced indirectly through other mediating symbols (Landauer and Dumais 1997). For instance, the LSA approach would hold that much of the information concerning the relation between hospitals and health maintenance organizations is developed in discourse on other mediating symbols (e.g., capitated payments) rather than in discourse that directly contrasts and compares the identities of hospital and HMO forms. The incorporation of this indirect information into the input matrix leads to computational requirements that lie outside the scope of multidimensional scaling.

In order to address these methodological issues, a nonmetric principal components analysis (Gifi 1990) was applied to assess similarities among

symbols in the health services discourse. The input data matrix H (consisting of n symbol variables \times m texts) was reduced to a matrix X of object scores (n symbols \times p dimensions) in terms of the loss function (σ):

$$\sigma(X,A) \equiv SSQ(H - XA'),$$

where A is a $m \times p$ matrix of loadings, p is the number of dimensions in the reduced object space, and SSQ refers to a sum of squares fit criterion. The loss function is equal to zero when a reduced p -dimensional solution is able to reproduce the original data matrix perfectly. In contrast to conventional (metric) principal components analysis, functional relations among variables in the input matrix are not assumed to be linear. An alternating least squares algorithm (PRINCALS) was used to estimate object scores and loadings.

An important question in performing a latent semantic analysis is how many dimensions (p) should be included in the reduced object and loading matrices. For conventional factor analytic and MDS techniques, the considerations weighed most heavily are often ones of interpretability and explained variance with respect to the original data matrix. The large size of input matrices submitted to latent semantic analysis renders these criteria somewhat suspect. Given the possibility of nonlinear transformations and object matrices exceeding half a dozen dimensions, direct interpretation of LSA solution spaces can be problematic (see Gifi 1990, pp. 60–61). Conventional rules of thumb with respect to fit statistics (e.g., adding no more dimensions once dimensional eigen values reach values less than $1/m$) are also inappropriate, since they grossly inflate the number of solution dimensions required for large textual corpora.

The resolution offered in the existing literature on latent semantic analysis is to select dimensionality in terms of the predictive value of solution spaces when they are subsequently fed into explanatory models or in terms of satisfying the parametric assumptions of those explanatory models. Landauer and Dumais (1997) found that LSA solution spaces of 300 dimensions performed best in mimicking similarities in symbol meanings drawn by human subjects when general corpora of texts were considered. For specialized corpora, such as those targeting organizational forms in particular fields, the required dimensionality may be considerably smaller. In order to evaluate proper dimensionality for the health services discourse on form identities, I first considered parametric assumptions of the Poisson regression models predicting form emergence. Patterns of form emergence were found to most closely approximate a Poisson distribution when the underlying LSA solution space had $p = 10$ dimensions; other solutions tended to yield overdispersion (unequal distribution means and variances).

A sensitivity analysis was then conducted to consider the impact

that solutions with different dimensionality might have on estimates of form emergence. The basic density-dependent specification (table 4, model 3) was used for comparison purposes. Significance levels for density-dependent effects and the impact of absolute carrying capacity were remarkably consistent across different LSA dimensionalities. The effect of changes in carrying capacity varied, though, becoming more pronounced for lower dimensional solutions ($P < .10$) and less pronounced for higher dimensional solutions ($P > .10$). The sensitivity analysis thus suggests that conclusions with respect to the impact of carrying capacity variation be interpreted with caution.

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