CULTIVATING AN INSTITUTIONAL ECOLOGY OF ORGANIZATIONS: COMMENT ON HANNAN, CARROLL, DUNDON, AND TORRES*

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Hannan, Carroll, Dundon, and Torres's article on the European automobile industry, "Organizational Evolution in a Multinational Context" (1995, henceforward Hannan et al.) is the most recent example of their concerted efforts to develop a density-dependent model of organizational evolution. Our purpose is not to take issue with their paper per se. Indeed, we regard incorporation of geographic heterogeneity, and spatial and temporal heterogeneity more broadly, as a positive step. But we take issue with their conceptualization of legitimacy and question the plausibility of the underlying social processes implied by the density-dependence model.

As in their earlier work, Hannan et al. assert that "no practical alternative to an indirect approach has yet been advanced for studying legitimation as (taken-for-grantedness) for long-lived populations of organizations" (p. 511). Their conclusion is based on three premises: (1) Cognitive legitimacy, as measured by organizational density, is the most relevant facet of institutionalization; (2) organizational density counts are comparable across time and populations, while other measures are post hoc and period- or population-specific; and (3) legitimation is not a variable to be measured, but a process that relates organizational density to founding and failure.

We dispute these premises. Density-dependence arguments, we assert, confine thinking about legitimation to a narrow range of institutional phenomena. Our goal is to broaden and reorient analyses of the legitimation process. We present alternative measurement strategies and examine the robustness of recent findings. We illustrate how ignoring the basic historical properties of organizational forms undermines the ostensible temporal comparability of organizational density counts as well as findings purported to support the model itself. We conclude that the density-as-process view of legitimation is difficult to maintain in light of recent nonconforming findings.

CONCEPTUAL STATUS OF DENSITY: COGNITIVE AND SOCIOPOLITICAL LEGITIMACY

The new institutionalists highlight several factors that contribute to the legitimacy of an organizational form or practice. Zucker (1977) treats institutionalization as a process, emphasizing that legitimacy is a cognitive phenomenon reflected in taken-for-granted assumptions. Meyer and Rowan (1977) and DiMaggio and Powell (1983) stress that legitimacy is embedded in relational networks and normative codes of conduct. Thus, they view institutionalization as a process through which certain activities or forms come to be regarded as obligatory, *and* as a state in which widely shared norms and values are buttressed by cultural, professional, and political expectations or even mandated by law. Drawing on this literature, organizational ecologists suggest a distinction between cognitive and sociopolitical legitimacy (Aldrich and Fiol 1994).

Density-dependence theory focuses on cognitive legitimacy: An organizational form is legitimate "when there is little question in the minds of actors that it serves as the natural way to effect some kind of collective action" (Hannan and Carroll 1992:34). Hannan et al.'s view sits in strong contrast to the sociopolitical approach,

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which emphasizes that embeddedness in relational and normative contexts influences an organizational form's legitimacy by signaling its conformity to institutional expectations. Density-dependence arguments assume that sociopolitical factors are largely derivative of population growth. Institutionalists view these two facets of legitimacy as complementary and fundamentally interrelated. Although cognitive legitimacy can be achieved without sociopolitical approval, the latter is considered to be a vital source of, or impediment to, the former. Indeed, because contemporary organizational forms rarely operate in isolation from the state, the professions, and broader societal influences, sociopolitical legitimacy cannot be ignored. Crudely put, without roads and people eager to drive you cannot develop an automobile industry. This point is aptly illustrated in Sloan's (1963) account of the transformation of the U.S. automobile industry into a mass market business. Sloan, who led General Motors in the 1920s and 1930s, argued that the ascendancy of the automobile was due to the spread and improvement of roads, the novelty and fashion of the annual model, and the ability of manufacturers to persuade consumers to trade in used cars and buy new ones on installment.

The exclusive emphasis on one facet of legitimation misses its multidimensional nature. We need to measure *other* aspects of legitimation and examine how diverse social processes combine with organizational density to contribute to the legitimacy of organizational forms. After all, we have no direct evidence that taken-for-grantedness is central to explaining population dynamics; sociopolitical legitimacy can be inferred from the effects of density on vital rates with equal ease. In making this point we are not suggesting that legitimacy must be measured *directly*, but, rather, that it should be gauged *differently* from organizational density using greater measurement precision and contextual realism.[1] Theoretical models must balance competing pursuits of generality, realism, and precision (Levins 1966). Density-dependence arguments emphasize only generality, however. We concur with Singh (1993) that progress in the study of the legitimation of organizational forms can be enhanced by a move toward greater precision and realism, even at the expense of some generality. Although we think a similar point underlies Hannan et al.'s concern with *different observables*, replacing country-level density with European density does little to enhance either precision or realism, and, arguably, may diminish both.

Hannan et al.'s interest in respecifying density-dependent legitimation at a higher level stems from their idea that cultural images flow more freely across social system boundaries than do material resources. They conclude that competitive environments are country specific, while institutional environments are spatially diffuse.[2] This is the fundamental sociological insight of their paper, and their findings tend to support it.[3] However, in their reliance on organizational density, they ignore three measurement opportunities suggested by their own discussion of legitimation.

First, as Hannan et al. point out (p. 512), the print media are a basic source of the diffusion of information about organizational forms. Detailed archives of media coverage exist for many industries (including the automobile industry), and content analyses of these public records offer a potentially powerful technique for operationalizing legitimation. One advantage of this approach is that the media differentially select what to communicate about the organizational world (due, for example, to variation in sociopolitical legitimacy or network centrality of organizations). Content analysis is widely used in social movement research (Tarrow

[1] Of course, there are also sound methodological reasons for multiple measures (e.g., Campbell and Fiske 1959).

[2] We do not think sociopolitical legitimacy will typically unfold in broader spatial contexts. Rather, spatial boundaries of sociopolitical processes will likely coincide with the jurisdictions of actors in the relational and normative contexts within which a population is embedded.

[3] Hannan et al. do not actually test their hypothesis that national boundaries constrain competition. Moreover, while the coefficients in their Table 4 are generally supportive of their arguments, in Table 3, where country-level density and European density are estimated together, the theoretically predicted pattern is found for only two of the five countries (France and Italy).

1989; Tilly 1993); indeed, current state-of-the-art work is done from an ecological perspective (Olzak 1992). Hybels (1994) demonstrates the feasibility of media-based legitimacy measures in his analysis of foundings of U.S. biotechnology firms. We think rigorous media-based measures promise high comparability across populations *and* temporal comparability within a given population.

Second, as Hannan et al. note, "Nothing rivaled the heavily publicized road races . . . in spreading the image of the automobile" (p. 512). These races offer a unique opportunity to examine a key source of cognitive legitimacy. In his work on the early U.S. automobile industry, Rao (1994) argues that cumulative victories in certification contests enhanced the reputations of manufacturers in the eyes of risk-averse consumers and financiers. Moreover, by increasing opportunities to disseminate knowledge about the industry, these races established the cognitive legitimacy of the product and its producers. As Rao's study shows, winning these races improved the survival chances of individual manufacturers, and in addition, the cumulative prevalence of these contests lowered the aggregate failure rate. Hannan et al. might object that these races are an idiosyncratic feature of the automobile industry and thus are not generalizable. We think otherwise.

In many industries, special purpose organizations institute certification contests to evaluate products or firms and to rank participants according to preset criteria. For example, *J. D. Powers* ranks cars on predefined performance criteria, thus shaping the public image of their manufacturers. *Moody's* rates insurance companies, classifying them on the basis of their viability. *Consumer Reports* ranks rival products in numerous product categories. *Forbes*, *Business Week*, and *Money* rank mutual funds based on their performance. Certification contests are a common test of products and producers, and their pervasiveness is reflected in the current business practice of benchmarking. More broadly, a wide range of readily observable credentialing activities signal product reliability and heighten the sociopolitical legitimacy of organizational forms, while contributing to the cognitive legitimacy of organizations by diffusing knowledge about them. Accreditation frequently enables organizational forms to create a desirable image and garner resources, as does occupational licensing. Certification by established auditors and investment banks has similar consequences (Beatty and Ritter 1986). Charitable registration may have parallel effects for nonprofit organizations (Singh, Tucker, and House 1986). Status-based competition in a variety of fields yields both material and symbolic rankings, and both serve to enhance organizational accountability (Podolny 1993). In high-tech industries, patents play a similar role, establishing claims to intellectual property and signaling competence to the investment and scientific communities (Powell and Brantley 1992).

Third, Hannan et al. describe how "France quickly . . . became the center of the [automobile] industry in terms of technical development, scale of production, and number of firms" (p. 516). Thus, the early information that shaped legitimation of the automobile industry most likely diffused from France to other countries. In fact, early on, the French did exert a pervasive influence: Their heavy designs eclipsed lightweight buggy designs and were copied by non-French producers (Thomas 1965). Yet, France plays no special role in Hannan et al.'s analysis. French producers are combined with all others in European density counts. And, contrary to the implied spatial diffusion process, their country-level density coefficients imply that around the turn of the century legitimation effects were outweighed by within-country competition in each country's industry (see Hannan et al., Table 2, p. 521). One way to examine the macro-diffusion process with greater precision would be to analyze the effects of organizational density in France on the founding rate in other countries. However, France was influential not only in terms of its number of firms, but because of the character of French automobiles. Thus, connecting the diffusion process with French *organizational* density is less precise and realistic than measuring the density of French *designs*, defined as the number of French and non-French producers using French automobile designs. Indeed, one is tempted to reverse the causal order in this (and other) case(s): Underlying technologies are reflected in the evolution of an industry, and technological change (e.g.,

the emergence of a dominant product design) is a critical factor that influences industrial dynamics.

OPERATIONAL STATUS OF DENSITY: AHISTORICISM AND COMPARABILITY

A primary rationale for studying organizational density is that data are available and purportedly comparable, but we fail to see how data convenience ensures comparability. In the case of Hannan et al., comparability is marred by inattention to some basic historical properties of organizational forms. We first develop this point and then show how this inattention undermines other recent density dependence studies as well.

Ahistoricism poses two problems. The first stems from inadequate specification of organizational forms. The evolutionary trajectories of diverse long-lived organizational forms appear to follow a common path (Hannan and Carroll 1992). The number of organizations grows slowly initially, then increases rapidly to a peak. Once the peak is reached, the number often declines as a few large organizations begin to dominate many smaller ones. This pattern is of substantive interest because it has implications for the distribution of power in organizational populations. Populations of newspaper publishers, labor unions, breweries, and banks follow this basic pattern (Hannan and Carroll 1992), as do European automobile manufacturers, which evolved from highly fragmented national industries comprised of small craft producers, to a concentrated international industry dominated by a small number of mass producers. Indeed, early on, automobile manufacturers didn't actually exist—in 1894 the world's leading car company, Panhard et Levassor, was a machine-tool company (Womack, Jones, and Roos 1990:21). Yet, because the organizational form is defined simply as "firms that make autos for sale," early craft producers are treated as equal to Citroën, Fiat, Mercedes, Morris, Renault, and Volkswagen, which by the mid-1950s were mass-producing cars at a scale comparable to major U.S. facilities. Clearly the shift from craft to mass production changed the face of the auto industry, and with this change, we argue, the meaning of organizational density was transformed as well.

A second, closely related problem is that density-dependence theory is commonly tested in long-lived populations, like European automobile manufacturers, that have become concentrated over time. Since density-dependence arguments assume that all members of a population contribute to and experience competition (and legitimation) equally, no single organization or small group of organizations can dominate competition. Consequently, density dependence can explain the shape of the growth trajectory of organizational populations to an equilibrium size, but cannot explain their subsequent concentration (Hannan and Carroll 1992). When tested in populations that have become concentrated, interpretations of density-dependent legitimacy are obscured in two ways (Baum forthcoming). The meaning of low organizational density varies greatly between the early and late periods of a population's history. In early low-density conditions, no single organization or group dominates; new entrants are typically similar to incumbents. By comparison, in late low-density conditions, organizations tend to differ considerably in size and strategy, and one or a few large organizations often dominate the market. Second, when density is low early and late in a population's history, the interpretation of the linear density term is unclear: Although early low density has a specific role in density-dependence theory (i.e., legitimation), late low density remains unexplained. Early and late low organizational density conditions, however, seem likely to have parallel effects on vital rates (although for very different reasons) that are not distinguished by empirical estimates: Large organizations that control substantial market segments are unlikely to fail, and increasing concentration may create opportunities for new, specialized entrants (Carroll 1985). Thus a supportive linear density term may indicate late market power and resource partitioning, not early organizational legitimation (Baum forthcoming).

The foregoing arguments lead us to question tests of density dependence in populations that have experienced both early and late low-density conditions. We examine density dependence studies published since

1990 to assess the implications of including late low-density periods.[4] Founding studies (including Hannan et al.) support the theory's predictions in 23 of 31 (74 percent) samples. Among failure studies, support is lower (12 of 22 samples, or 55 percent).[5] Notably, support for density dependence is stronger in samples that have passed their peak density, jumping to 82 percent (14 of 17 samples) for foundings and 64 percent (7 of 11 samples) for failures. Thus, the findings of numerous studies supporting density-dependence theory may be undermined by the incorporation of information on the decline of the population, which density-dependence theory is not designed to explain. This is especially true for studies by Hannan and his colleagues, many of which test the density-dependence model in organizational populations that have evolved (often well) beyond their peak densities.

EMPIRICAL STATUS OF DENSITY: PROXY VERSUS PROCESS

Hannan et al. defend their continued exclusive focus on organizational density with a series of interrelated arguments. Their first claim is that cognitive legitimacy defies direct measurement, and consequently, it makes sense to study variables that can be easily observed and compared across populations and over long periods of time, such as density and vital rates. This indirect measurement approach has been criticized because confirming findings cannot be interpreted precisely: Estimates reveal little about the theoretical explanations designed to account for them (Singh 1993). Critics question the legitimacy interpretation of density effects, suggesting that legitimation is invoked ex-post facto and that density estimates are proxies for a wide range of other possible effects (Delacroix and Rao 1994; Petersen and Koput 1991; Zucker 1989).

These critiques appear to have led to the *density-as-process* argument, in which legitimation is no longer a variable to be measured, but a process that relates density to founding and failure rates. Thus, Hannan and Carroll (1992) claim that "growth in density *controls* . . . [legitimation] processes—it does not reflect them" (p. 69). These competing proxy and process views suggest different effects of adding covariates. According to Hannan and Carroll (1992:70–71), if density is an indirect indicator of legitimation, measuring legitimation more directly would dampen the first-order effects of density or lead them to disappear altogether. But from the density-as-process view, the inclusion of such covariates implies a sharpening and strengthening of the legitimation effects of density. Ultimately, however, Hannan and Carroll conclude that multicollinearity would make it impossible to test their expectations; thus they cut off debate.

Although Hannan et al. now endorse a strong distinction between taken-for-grantedness and external endorsements (note 3, p. 511), in earlier writings (Hannan and Carroll 1992:41) they clearly identify sponsorship by powerful actors and organizations as an important mechanism through which organizational forms can gain acceptance and cognitive legitimacy. Baum and Oliver (1992) explain the legitimation of an organizational form in terms of such endorsements and pro-

[4] We do not include in our summary Hannan and Carroll's (1992) multiple subanalyses of U.S. brewers at regional, state, and city levels. Since many *nonlocal* density specifications also support density dependence predictions, these analyses appear undermined by misspecification of the spatial boundaries. We include one supportive unpublished study of U.S. automobile manufacturers by Rao (1992) for its comparative relevance. Aside from Rao, we do not include unpublished papers in Table 1.

[5] In Table 1, we can also examine Hannan and Carroll's (1992) claim that nonsupportive studies fail to incorporate data on the early years of a population's history (i.e., are left-truncated). Founding studies support the density-dependence predictions equally for left-truncated (three of four samples, or 75 percent) and complete samples (20 of 27 samples, or 74 percent). Among failure studies, however, support is higher for complete (10 of 16 samples, or 63 percent) than for left-truncated samples (2 of 6 samples, or 33 percent). But, in the unsupportive, left-truncated studies, the coefficients do not consistently yield the purely competitive effect implied by Hannan and Carroll's argument. So although there is some evidence that support for density-dependent organizational failure is stronger in studies of untruncated population histories, the results of unsupportive truncated studies do not conform to their expectation.

Table 1. Summary of Studies Testing the Density-Dependence Model, 1990–1994

Population	Sign of Coefficient: Density	Sign of Coefficient: $(Density)^2$	Source
Organizational Foundings			
U.S. labor unions, 1836–1985[b]	+	–	Hannan and Carroll (1992);
U.S. craft labor unions, 1836–1985[b]	+	–	Ranger-Moore, Banaszak-Holl,
U.S. industrial labor unions, 1853–1985	n.s.	–	and Hannan (1991)
U.S. breweries, 1633–1988[b,c]	+	–	
San Francisco newspapers, 1800–1975[b]	+	–	
Argentina newspapers, 1800–1900	+	–	
Ireland newspapers, 1800–1975[b]	n.s.	n.s.	
Manhattan banks, 1791–1980[b]	+	–	
Manhattan commercial Banks, 1792–1980[b]	+	–	
Manhattan savings banks, 1820–1980[b]	+	n.s.	
U.S. life insurance companies, 1759–1937	+	–	
U.S. stock life insurance companies, 1787–1937	+	–	
U.S. mutual life insurance companies, 1759–1937	+	–	
Pennsylvania telephone companies, 1879–1934	–	+	Barnett (1990; Barnett and Amburgey (1990)
U.S. semiconductor firms, 1947–1984	+	+	Hannan and Freeman (1989); Freeman (1990)
Toronto voluntary social service organizations, 1970–1982[a]	n.s.	n.s.	Singh, Tucker, and Meinhard (1991)
Toronto daycare centers, 1971–1989[a,d]	+	–	Baum and Oliver (1992); Baum and Singh (1994a, 1994b)
U.S. automobile industry, 1893–1915	+	–	Rao (1992)
New York state life insurance companies, 1842–1904	n.s.	+	Budros (1993, 1994)
German breweries, 1861–1988[b]	+	n.s.	Carroll, Preisendoerfer, Swaminathan, and Wiedenmayer (1993)
U.S. trade associations, 1901–1990[a,b]	+	–	Aldrich, Zimmer, Staber, and Beggs (1994)
Niagara Falls hotels, 1894–1991[a,b]	+	–	Ingram and Inman (1994)
U.S. biotechnology firms, 1971–1992	+	–	Hybels, Ryan, and Barley (1994)
Manhattan analog fax transmission companies, 1965–1992[b]	+	–	Baum, Korn, and Kotha (1995)
Manhattan digital fax transmission companies, 1981–1992	+	–	
Organizational Failures			
U.S. labor unions, 1836–1985[b]	–	n.s.	Hannan and Carroll (1992);
U.S. craft labor unions, 1836–1985[b]	–	+	Ranger-Moore, Banazak-Holl,
U.S. industrial labor unions, 1853–1985	n.s.	n.s.	and Hannan (1991)
U.S. breweries, 1633–1988[b,c]	–	+	
San Francisco newspapers, 1800–1975[b]	–	+	
Argentina newspapers, 1800–1900	–	+	
Ireland newspapers, 1800–1975[b]	–	+	
Manhattan banks, 1791–1980[b]	–	+	
U.S. life insurance companies, 1759–1900	n.s.	n.s.	
Pennsylvania telephone companies, 1879–1934	+	n.s.	Barnett (1990); Barnett and
Southeast Iowa telephone companies, 1900–1929[a]	+	n.s.	Amburgey (1990)
U.S. semiconductor firms, 1947–1984	–	+	Hannan and Freeman (1989); Freeman (1990)

(Table 1 continued on next page)

(Table 1 continued)

Population	Sign of Coefficient: Density	Sign of Coefficient: (Density)^2	Source
Toronto voluntary social service organizations, 1970–1982[a]	+	–	Singh, Tucker, and Meinhard (1991)
Bavarian breweries, 1900–1981[a,b]	n.s.	–	Swaminathan and Wiedemayer (1991)
Toronto daycare centers, 1971–1989[a,d]	–	+	Baum and Oliver (1992); Baum and Singh (1994a, 1994b)
Manhattan hotels, 1898–1990[a,b]	–	n.s.	Baum and Mezias (1992)
German breweries, 1861–1988[b]	–	+	Carroll, Preisendoerfer, Swaminathan, and Wiedenmayer (1993)
U.S. trade associations, 1901–1990[a,b]	–	+	Aldrich, Zimmer, Staber, and Beggs (1994)
U.S. credit unions, 1980–1989[a]	n.s.	n.s.	Amburgey, Dacin, and Kelly (1994)
New York City credit unions, 1914–1990[b]	–	+	Barron, West, and Hannan (1994)
U.S. automobile industry, 1895–1912	+	n.s.	Rao (1994)
Manhattan analog fax transmission companies, 1965–1992[b]	+	n.s.	Baum, Korn, and Kotha (1995)
Manhattan digital fax transmission companies, 1981–1992	–	+	

[a] Sample design left-truncated (i.e., some organizations fail before observation period begins).

[b] Sample has declined in numbers from its peak by 25 percent or more.

[c] Support for founding and failure when sample left-truncated to 1800, 1878, and 1891.

[d] Support for founding when sample further left-truncated to 1978.

pose that, in contexts where relations with community and government are dense, legitimation may be accounted for by a population's relational embeddedness. They model the embeddedness of a population in its institutional environment by measuring relational density (the number of relationships between the members of a population and community organizations and government agencies). In addition to greater precision and contextual realism, relational density has the potential advantages of comparability across organizational contexts and temporal comparability within contexts, when the nature and form of relations remain stable over a population's history. While initial estimates in their study of daycare centers support curvilinear density dependence predictions for both founding and failure rates, the "legitimating" effects of initial increases in organizational density disappeared after the inclusion of relational density and the relationship between organizational density and founding and failure rates became purely competitive. Thus, Baum and Oliver (1992) test the proxy-versus-process prediction, and their results support the proxy view. Their findings have been replicated in Hybels et al.'s (1994) study of the founding of U.S. biotechnology firms in which they use strategic alliances to measure embeddedness in relational and institutional contexts. These studies suggest that the initial density-as-proxy formulation of legitimacy was more accurate and, in addition, that organizational density may be a proxy for relational as well as (or instead of) cognitive legitimacy.

TOWARD AN INSTITUTIONAL ECOLOGY OF ORGANIZATIONS

Legitimation is a core sociological concept; nevertheless, its dual nature, as *both* process and outcome, has posed thorny measurement problems. Given these difficulties, density dependence has considerable appeal. It is

relatively simple to count the number of organizations in a population and to assume that growth in numbers captures "legitimation." We urge researchers studying organizations to resist this temptation to simply count and to explore new dimensions and measures of legitimation. Contrary to Hannan et al.'s claims, we think there are several promising *non*density-based alternatives to studying the legitimation of organizational forms that are both fine-grained and generalizable.

Organizational ecologists have made considerable progress in demonstrating that cultural understandings play a basic role in the ecological dynamics of organizational populations. We applaud these efforts, but contend that the *evolutionary* dynamics of organizational populations transcend density dependence to include sociopolitical forces that provide vital support for organizational development. We stress as well that the development of population-wide norms and practices and support from key institutional actors is, in part, the product of competitive struggles, and thus is vulnerable to resource constraints. There is much that ecological and institutional arguments have to offer one another. Clearly, for ecological theory to move from demographics to truly evolutionary analyses of organizations, it must use better and more robust tools to incorporate the historical processes that link organizations through time (Baum and Singh 1994c). Similarly, for institutional analysis to capture the dynamic aspects of institutionalization, it must yield insights into the differential nature of ecological interaction and replication (Powell 1991). We suggest that future efforts, comparable to those devoted to analyzing density dependence, focus on constructing an *institutional ecology* of organizations—a more sophisticated theoretical understanding of the co-evolving nature of cultural understandings, organizational forms, and resource constraints.

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