

# Paradise Lost: Age-Dependent Mortality of American Communes, 1609-1965

James A. Kitts, *Columbia University*

*Theorists agree that the risk of folding changes as organizations age, but there is little consensus as to the general form or generative processes of age-dependent mortality. This article investigates four such processes (maturation, senescence, legitimation and obsolescence), which have been taken as competing accounts. Using two analytical levers – elaborating on the time shapes of these processes and distinguishing aging of organizations from aging of their templates (designs) – this paper differentiates these four processes and tests them jointly. Analysis of mortality rates for American communes from 1609 through 1965 strongly supports the proposed effects of maturation and senescence at the organization level and legitimation at the level of organizational templates. Results give weaker evidence that obsolescence of templates influenced mortality and that environmental drift exacerbated obsolescence.*

Seven decades of research have examined temporal patterns of organizational mortality. Most theorists posit that the risk of organizational failure is not constant over time, but changes as organizations age. However, they have variously argued that the risk of failure falls, rises or first rises and then falls over time, producing a liability of *newness*, *aging* or *adolescence*, respectively. These theories have been tested primarily in populations of firms where empirical results have been notoriously inconsistent.<sup>1</sup> With theorized and documented liabilities at both ends of the age spectrum and in between, we are left considering a number of plausible processes but have limited understanding of how they fit together to produce observed patterns of organizational mortality. The scope conditions for contending theories have been unclear, making it difficult to reconcile apparently contradictory findings.

*I acknowledge the support of a National Science Foundation grant, SBR 98-01691 and the Cornell Presidential Research Scholar fund. I also thank the Center for Communal Studies, the William Hinds American Communities Collection, Donald Pitzer, Timothy Miller, Michael Barkun, Michael Avissar and David Baharvar. For feedback on drafts, I thank Heather Haveman, Martin Schulz, Debra Minkoff, Michael Macy, Glenn Carroll, Paul Ingram, Lori Yue, Ryan Michigan, Rodney Stark and David Strang. Direct correspondence to James A. Kitts, Graduate School of Business, Columbia University, 704 Uris Hall, 3022 Broadway, New York, NY 10027. E-mail: jak2190@columbia.edu.*

In this article, I will extend recent efforts (Hannan, Carroll, Dobrev, Han and Torres 1998) to clarify the generative processes underlying the observed patterns of age dependence, distinguishing multiple “clocks” that may influence an organization’s risk of mortality. First, I will separate the aging of individual organizations from the aging of their “templates” (organizational designs). Second, I will differentiate processes that exert their strongest impact early on each aging clock from processes that become important at advanced ages. These extensions may allow us to understand the role of four distinct processes in generating observed patterns of age-dependent mortality.

I will maintain that two dynamics may be modeled meaningfully at the level of individual organizations. Prominent theories – which I call *maturation* arguments – describe processes that improve robustness and performance of organizations over time, due to accumulating organizational capabilities (Hannan 1998; Sapienza, Autio, George and Zahra 2006) and social capital. Such processes are generally described as having an observable impact on mortality risks during an organization’s early years. On the other hand, the same accumulation of resources and routines that benefited the organization early on may also increase friction, eventually leading to stagnation and ossification. Such processes are generally described as affecting organizations at advanced ages. Following earlier work, I refer to this process as *senescence*. Within theoretically specifiable bounds, I argue that this pair of processes generates a long-term curvilinear effect of organization age on mortality.

While these processes of maturation and senescence govern age-dependent mortality at the organization level, parallel dynamics of *legitimation* and *obsolescence* may operate at the level of organizational templates. Novel organizational designs grow more reputable over time; a template’s longevity demonstrates robustness to potential members, customers or sponsors, benefiting organizations based on the template.<sup>2</sup> However, a template also falls out of fit with the environment over time, and this diminishing fit – or obsolescence – can result in a higher mortality risk. As with the organization-level clock, the process of legitimation is typically described as operating early in the aging process whereas obsolescence is described as having an observable effect at later ages. Within theoretically specifiable bounds, I argue that these two processes imply a curvilinear effect of template age on mortality of organizations using the template. To refine our understanding of the constituent processes, I further suggest that the rate of environmental drift should moderate this effect: Rapid drift will lead obsolescence to operate more quickly and thus dominate legitimation at an earlier stage in the aging process.

Using archival data on 357 years of communal experiments in America, I model age-dependent mortality on multiple clocks to allow

a clearer view of these four processes. I also address the hypothesis that obsolescence increasingly drives the effect of template age as environmental drift accelerates.

### **Positive and Negative Age Dependence: Liability of Newness or Liability of Aging?**

The most intuitive model of age dependence, supported by decades of empirical work (Carroll 1983), holds that the risk of failure begins relatively high and diminishes over time. In the classic account for this “liability of newness,” Stinchcombe (1965:148-49) described newly founded organizations as gatherings of strangers. As such, they increase efficiency by developing roles, routines and stable working relations among organization members. This dynamic has been described (Hannan 1998) generally as an accumulation of “capabilities” and an improvement in “position” for the organization. Aging is then a proxy for an organization’s accumulation of internal social capital (e.g., building working relations among organization members) or external social capital (e.g., building relations between the organization and outside actors). I refer to this entire class of liability of newness accounts concisely as *maturation* arguments.

Revisions of the theory have proposed a “liability of adolescence” (Brüderl, Preisendörfer and Ziegler 1992; Brüderl and Schüssler 1990; Fichman and Levinthal 1991): The risk of organizational failure begins low, due to a cache of resources available at founding, then rises to a peak during the early years as the cache is expended. After this precarious adolescence, the risk of failure falls as predicted by the liability of newness theory. A few empirical studies have supported this non-monotonic age dependence, notably including analyses of political advocacy organizations (Edwards and Marullo 1995; Minkoff 1993) and worker cooperatives (Staber 1989).

The early evidence for a declining risk of failure over time (perhaps allowing for an early “honeymoon” period) seemed overwhelming. However, this aggregate pattern could also result from compositional changes in populations of organizations, rather than changes in the risk of failure for individual cases over time. We should expect aggregate failure rates to fall with age because failures of “frail” organizations will select for robust organizations at higher ages (Freeman, Carroll and Hannan 1983). Indeed, some research has found that negative age dependence disappears or reverses when important case heterogeneity is controlled (Barnett and Carroll 1987). The greatest threat of spurious negative age dependence appears to be heterogeneity in organization size. If large size guards against failure – a “liability of smallness” (Aldrich and Auster 1986; Delacroix and Swaminathan 1991) – then size heterogeneity will produce negative age dependence, whether size differences exist from the start or

develop over time. While some scholars found the liability of newness to be robust to population heterogeneity (Carroll and Delacroix 1982) and size at founding (Freeman, Carroll and Hannan 1983; Hannan 1989), a review by Barron, West and Hannan (1994) noted that only two of those studies (Delacroix and Swaminathan 1991; Haveman 1992) had used dynamic measures of organization size.

The paucity of evidence for negative age dependence in empirical research that controlled for size and other sources of heterogeneity led Barron et al (1994: 414) to suggest that the liability of newness hypothesis should be "laid to rest." They reviewed recent research supporting the pattern of positive age dependence – a liability of aging – characterizing two explanations as a liability of obsolescence and a liability of senescence. In the first, slow and imperfect adaptation amid environmental change leads organizations' products, routines and infrastructures to lose fit over time. This *obsolescence* (Carroll 1983) hampers old and favors young organizations that were designed to match the contemporary environment. In the second, organizations may ossify as they grow older, becoming buried in accumulated routines or structures that reduce efficiency. This *senescence* (Barron et al. 1994) hampers old and rigid organizations independently of environmental fit. A key distinction between these two explanations is the role of drift (Ranger-Moore 1997): Obsolescence depends on the rate of contextual change (which diminishes organization-environment fit) but senescence does not.

While this research area remains vital, we do not seem any closer to consensus on a common shape of age-dependence in mortality. In a review of 18 studies using dynamic measures of organization size, Hannan (1998) observes that nine have indicated a liability of aging and nine have indicated a liability of newness or adolescence. Empirical results thus remain inconclusive, suggesting that age dependence models are incomplete or misspecified, or that scope conditions fail to delimit each theory's domain. Aiming to refine the scopes of contending theories, recent work in logical formalization (Hannan 1998; Polos and Hannan 2002) has reviewed and integrated a variety of arguments on a single master clock of organization age. I provide two complementary innovations here, distinguishing aging of individual organizations from aging of organizational designs and elaborating on the time shapes of the constituent processes.

### Age Dependence on Coupled Clocks: Organizations and Organizational Templates

I have discussed four processes – maturation, senescence, legitimation and obsolescence – that have been presumed to underlie observed patterns

in negative or positive age dependence for particular organizational populations. Scholars have regarded these theories as directly competing because they assumed that the processes play out at the same rate and on a single master clock, organization age. They thus assumed that all four processes must begin anew with each organization's founding and proceed with the same shape in time.

My first major contribution is to specify the theoretical loci of the above processes. I point out that organizations may be founded on pre-existing designs, and that the legitimation and obsolescence processes pertain to the age of an organization's design, an entity that may not be coextensive with individual organizations. I will use the term "template" to indicate a relatively stable design that specifies inputs, outputs, core administrative structure and operating procedures. Templates are thus similar to recent conceptions of *routines* (Winter 1990), *models* and *blueprints* (Baron, Hannan and Burton 2001), as well as organizational *forms* (Carroll and Hannan 2000). However, routines, models and blueprints often refer to subcomponents of an organization's design, while organizational forms are taken to be as broad as entire industries and thus may include a variety of specific designs. In my usage, a template is comprehensive: An organization can follow only one template at a time, though any number of organizations may share the same template and any number of templates may coexist within an industry. Templates constrain and channel organizational behavior, and they are publicly recognizable, so organizations sharing a template will also share a common relationship to their environment. For example, within the organizational form of fast food restaurants, Taco Bell franchises operate according to nearly identical routines and share a public identity; each establishment is not founded as an idiosyncratic venture, but shares the reputation and environmental fit with other franchises operating according to the same design.<sup>3</sup>

When sets of organizations are built on uniform blueprints, the aging of the blueprints serves as a distinct clock for age-dependent mortality. Processes operating on this clock need not play out with the same shape in time as processes operating on the clock of organization age. Further, an organization may switch to an older or younger template at any time.<sup>4</sup> Thus, conflating clocks at the organization and template levels may misspecify the constituent processes. Recognizing that some processes transcend the ages of individual organizations but still lacking an independent concept of templates, scholars (e.g., Baum and House 1990) have considered "population age." In introducing the concept of "coupled clocks," Hannan et al. (1998b:306) note, "research that examines the effects of the organization-level clock and ignores the population-level clock will confound the influences of the two clocks." The template concept allows that organizations in a population may use blueprints that

are more obsolete (or more legitimate) than others. I will model these two clocks across a large number of templates to distinguish the proposed organization-level processes from the template-level processes, and distinguish both from calendar time experienced by the entire population.

A second major contribution of this research is to posit differing temporal shapes of these processes. Traditional liability of newness accounts plausibly imply nonlinear effects; that is, organizational capabilities and social capital should accrue fastest for newly-founded organizations, but should be subject to diminishing returns. In contrast, senescence (increasing friction) persists over time and ostensibly applies most to very old organizations. Integrating these prominent theories resolves the superficial contradiction, implying that maturation improves the viability of organizations during their early years while senescence undermines their viability in advanced years. This combination of two established propositions suggests a previously unrecognized empirical prediction: a curvilinear effect of organization age on the risk of mortality.

(H1) Organizations' mortality risk will fall with age during their early years, due to maturation.

(H2) Organizations' mortality risk will rise with age during their advanced years, due to senescence.

Just as I distinguished maturation from senescence at the organization level, I distinguish legitimation from obsolescence by differentiating their time shapes. In legitimation, templates accumulate reputations and institutional support over time. In obsolescence, templates lose alignment with the environment as it drifts over time. As for the processes at the organization level, I reinterpret prominent theories to suggest a way that these two contrary processes may play out in tandem. Conventional usage suggests that legitimation is the *initial* growth of acceptance for a novel organizational design. This benefit of legitimation through simple longevity is subject to diminishing returns, and growing older should not greatly benefit a template that has proven its worth by surviving an initial period. For this reason, obsolescence should dominate as an older template continues to age, after these benefits of legitimation have diminished. I thus predict a curvilinear effect of template age on an organization's risk of failure:

(H3) Organizations' mortality risk will be negatively related to the age of their templates in the early years of template age, due to legitimation.

(H4) Organizations' mortality risk will be positively related to the age of their templates in the advanced years of template age, due to obsolescence.

This model serves as a simple baseline, but the curvilinear effects (including the point in time where the age dependence shifts from negative to positive) will depend on the relative importance of the four processes identified here. The framework that I have presented then provides a way to use information on particular organizational populations to refine and specify the baseline predictions, as well as to understand contradictory findings. For example, I identify a variable here that should serve as a crucial moderator for the balance of legitimation and obsolescence of organizational templates: The rate of organizational drift ostensibly determines the loss of fit between an inertial template and its operating environment. Thus, in rapidly drifting environments, obsolescence may overwhelm legitimation early and may even result in a monotonic positive relationship of template age to mortality. In slowly drifting environments, obsolescence may not overcome legitimation and template age may have a monotonic negative effect on mortality.

Unfortunately, there is no direct measure of important environmental drift over the extremely broad historical period (nearly four centuries) in this study. While short-term environmental change clearly may depend on any number of idiosyncratic processes, I will assume that environmental drift over such coarse time scales generally obeys a pattern of acceleration, consisting of both an increasing rate of change along each dimension of the environment and an increasing number of dimensions as the environment grows more complex (McPherson and Rotolo 1996). Over several centuries, we may thus regard historical time as a crude proxy for the rate of total environmental change. The dependence of obsolescence on environmental drift suggests that the legitimation-obsolescence curve will shift as environmental change accelerates over historical time.

(H5) Obsolescence will increasingly dominate the effect of template age on mortality as historical time progresses, due to accelerating environmental drift.

## The Study

This study applies the above theoretical lens in an analysis of the dissolution of American communes, from 1609 through 1965. As with most research on organizational populations, it uses data gathered from a universe predefined by archival records, in this case those groups that have been historically labeled as communes.<sup>5</sup> This approach corresponds

to the prevailing cognitive definition of the organizational form (Carroll and Hannan 2000; Hsu and Hannan 2005), referring to a set of organizations that are grouped together under a common social identity. In addition to this identity, cases share a family of distinguishing features: *a voluntary association where members unrelated by blood or marriage live together year-round and share property*. Importantly, this category includes a great variety of specific organizational designs and these invite the current study of templates. In order to make the survival analysis meaningful, the analyses exclude any temporary collectives that were intended to survive only a fixed period, or whose founding or folding was decided by an external agent rather than the commune members.

### *Communal Templates*

Most individual communes belonged to any of more than 40 larger social movements, which promoted particular organizational templates inspired by messianic leaders (such as George Rapp, Christian Metz or John Humphrey Noyes) or utopian authors (such as Robert Owen, Charles Fourier or Edward Bellamy). Such templates specified movement doctrines, proposed organizational structures and methods of governance, and often included specific norms for member behavior.

A key question is how to measure the “birth” year of a template. A researcher might see a template as born when the design is proposed to the public, when a social movement gathers to promote that design, or when that design is first implemented empirically. For example, though Étienne Cabet’s novel, *Voyage en Icarie*, described his vision of a utopian society in 1840, it was not until 1848 that Cabet mobilized his French followers to migrate to the New World in order to realize his vision. An Advance Guard founded the first Icarian settlement near Oliver Creek in Texas in May of 1848, but it lasted less than four months. Cabet consolidated his followers and established a large commune at Nauvoo, Illinois, in March of 1849, on property recently abandoned by a Mormon commune. Did its template begin in 1840, 1848 or 1849? Given that communes inspired by utopian literature inevitably fall short of the authors’ original vision, but do model themselves after earlier communes within the same movement, analyses here assume that each template is invented (begins aging) when it is first operationalized in a founding.<sup>6</sup>

Recall that unobserved heterogeneity among organizations may lead to a spurious liability of newness at the population level, because “frail” organizations will fold first. This study guards against spurious negative age dependence by arranging cases into *types*, or clusters of communes with similar features, aiming to capture the distribution of underlying frailty. Unlike specific templates, we cannot identify a date of invention for

commune types to track their ages over time.<sup>7</sup> This clustering suffices for the purpose of specifying the baseline hazard of mortality, allowing future work to investigate the relationship between internal characteristics of communes and survival. The descriptions below give some distinguishing details of the nine types, beginning with three classes of social movements: Messianic Communes, Ethnic Colonies and Utopian Socialist Collectives.

### *Messianic Communes*

These include a set of millennialist movements, populated by immigrants (overwhelmingly German Separatists) following a charismatic religious leader. Their settlements were generally large in scale, employing members in both agriculture and manufacturing. Though some experimented with celibacy for periods of time, these groups attempted to expand membership through natural reproduction as well as evangelism within their ethnic group. Examples of specific templates in the Messianic type include the Keilites, Rappites, Zoarites, Muellerites and Inspirationists.

### *Ethnic Colonies*

These were generally large agricultural settlements of Norwegian, Moravian or Russian immigrants, located mostly in Pennsylvania and North Carolina. They typically avoided interaction with outsiders, maintained their native tongues, and practiced a uniform Protestant or Russian Orthodox faith. These settlements eventually abandoned their communal structure and many transformed into municipalities, as did the 18<sup>th</sup> century Moravian settlements at Bethlehem, PA, and Salem, NC.

### *Utopian Socialist Communes*

These were generally short-lived experiments, most of which appeared in 19<sup>th</sup> century mass utopian movements – such as the Owenites, Fourierites and Icarians. Many members were middle- or upper-middle-class intellectuals. Although each of these movements promoted a distinct template, they all sought to be open and egalitarian, while being less restrictive of members' behavior. Unlike the Messianic and Ethnic colonies, these movements were atheistic, deistic or eclectic, and religion was never the core mission. A famous example is New Harmony, the largest Owenite commune, founded in southern Indiana in 1825 on a site previously occupied by the Rappites.

The following three types include independent communes that were not part of larger movements. As previous research (Brumann 2001; Kanter 1968, 1972; Sosis 2000; Stephan and Stephan 1973) showed a lower mortality rate among religious communes, these independent communes are divided into three distinct types: *Independent Religious (Christian)*, *Independent Religious (Non-Christian)* and *Independent Secular*.

### *Independent Religious (Christian) Communes*

These were composed of mostly native-born Anglophone U.S. citizens, unlike the Messianic Communes and Ethnic Colonies. These groups were generally smaller and less focused on a messianic leader or preexisting millennial movement, and sought to live according to mainstream Christian ideals. Typical cases include Christian pacifist cooperative houses. For example, the Massachusetts Hopedale Community, founded in 1842 by Unitarian Adin Ballou, engaged in Practical Christianity, combining communal vocations with religious observance and advocacy for various social causes, including public education, pacifism, temperance and the abolition of slavery.

### *Independent Religious (Non-Christian) Communes*

Most of these communes, founded on the West Coast in the early 20<sup>th</sup> century, gathered devotees of eastern religion and mysticism. Each followed a charismatic religious leader and espoused a monastic lifestyle, but was not part of an established external order such as Roman Catholic monasteries. For example, members of the Universal Brotherhood and Theosophical Society at Point Loma, California, submitted to Katherine Tingley's spiritual leadership, wore uniforms and worked for communal enterprises, while giving up their children to communal care.

### *Independent Secular Communes*

These include a range of secular socialist and anarchist colonies. They did not belong to larger communal movements, lacked any cohesive religious or ethnic base, and were dispersed from coast to coast. Appearing mostly in the late 19<sup>th</sup> century and in the 20<sup>th</sup> century, they were generally unstable and short-lived. For example, Kaweah Cooperative Commonwealth, inspired by Laurence Gronlund's adaptation of Marxism and drawing members from the San Francisco International Workers Association, was one of several 19<sup>th</sup> century socialist communes that implemented a currency based on labor time notes.

Each of the next three types is an individual communal movement that merits separate consideration because of its large size, distinctiveness and anomalously high or low mortality rate. Treating each of these movements as a type allows it to have a unique multiplier in the mortality models. These three large movements are the *Shakers*, *United Order* (Mormon) *Colonies* and *Jewish Agricultural Settlements*.

### *Shakers*

Commonly remembered for their craftwork and their celibacy, the Shakers were a prominent and often persecuted millennial sect. With

doctrinal roots in mid-18<sup>th</sup> century England, the movement established more than two dozen communes from shortly after the Revolutionary War. Beginning in New York and New England, the movement eventually spread as far west as Indiana and as far south as Florida. They sought to recruit members by proselytizing, like the other movements, but they also adopted orphaned or unwanted children. The membership reached its peak in the mid-19<sup>th</sup> century, but their enterprises remained financially secure and their last members still lived communally at Sabbathday Lake in Maine and Canterbury in New Hampshire at the end of the observation period. Although the Shakers were the longest-lived communal movement in America, no individual commune lasted this entire period.

### *United Order Colonies*

These short-lived communal settlements of the early Church of Jesus Christ of Latter-Day Saints appeared in waves during the 1830s (under Joseph Smith) and 1870s (under Brigham Young). These Mormons met hostility as they migrated westward. Conflicts at Missouri settlements began in 1832, culminating in the 1838 “Mormon War,” when Governor Lilburn Boggs issued an Order of Extermination to drive the remaining Mormons from Missouri. Conflicts continued after they resettled in Nauvoo, IL, and Joseph Smith was killed by a mob in 1844. After fleeing to Utah, they clashed with the federal government, resulting in the largely uneventful “Utah War” of 1857-58. With the prohibition of polygamy in 1862 and its enforcement in the 1880s, hundreds of Mormons were imprisoned. Despite their tumultuous history, Mormon accounts (e.g., Kraut 1997) blame the failure of their communal efforts on their members’ inability to adjust to the United Order economy. These accounts focus in particular on the settlers’ tendency to speculate in and hoard private property. Of course, the Mormon Church has grown throughout the study period, but the establishment of communal settlements under the United Order has ceased.

### *Jewish Agricultural Settlements*

These were waves of short-lived rural resettlement projects, most founded by Yiddish-speaking Russian immigrant Jews from 1880 through 1910, in the wake of the pogroms in Czarist Russia. Many settlements were affiliated with the socialist *Am Olam* movement, which sought to resettle Jewish refugees in communes in the United States and Palestine, inspired by the various American utopian socialist experiments. The settlements in America were distributed across 27 states, with the greatest concentration in New Jersey and significant numbers in Kansas, Michigan and the Dakotas. Refugees received aid from a variety of philanthropic organizations – such as the Montefiore Agricultural Aid Society and the

Hebrew Emigrant Aid Society – but these charities did not necessarily promote communal organization and HEAS specifically advised against it. Most of the agricultural enterprises were unprofitable, due to poor site selection and planning, inexperience in farming and other idiosyncrasies. The few Jewish settlements with successful business operations – such as Carmel or Alliance in New Jersey – nevertheless rapidly abandoned their communal structure. Although few settlements were explicitly atheistic, members had varying levels of religious observance and religion was not the core mission. No settlements followed a charismatic leader, although the communists at New Odessa in Oregon admired humanist gentile William Frey, and treated him as *de facto* leader.

Archival research identified three other populations of communal groups – Roman Catholic Monasteries, Hutterian Colonies and New Deal Communities – but these are excluded because survival analysis is not an appropriate analytical lens for them. Founding and folding of monasteries and New Deal communities reflect central planning by the Catholic Church and the federal government, respectively. The New Deal settlements emerged and dissolved in concert by state decree – under the mandate of the Division of Subsistence Homesteads, the Federal Emergency Relief Administration and the Resettlement Administration. Unlike the utopian experiments considered here, the Hutterites maintained an established communal lifestyle by tradition and family inheritance, growing entirely through natural reproduction rather than recruitment. The apparent founding and folding of Hutterite settlements simply reflected fission due to natural population growth in settlements and choices to migrate between locations (such as a mass emigration to Canada to escape persecution during World War I). In this sense, Hutterite settlements during the study period were not utopian experiments or social movement organizations, but rather traditional endogamous communal societies, similar to indigenous tribes. Also, both the Hutterites and the Catholic monastic orders lived communally in Europe long before immigrating to America, so even the invention dates for their templates and their first American communes are problematic.

Note that communes may change from one template to another, but no such changes were radical enough to alter a commune's type during the study period. For example, Brook Farm's transformation into a Fourierist collective (Brook Farm Phalanx) was actually quite modest and left the commune within the Utopian Socialist type. In a contrasting anomalous case, Sidney Rigdon and 16 followers living communally (as *The Family*, inspired by the utopian movements of Owen and Rapp) at Kirtland, Ohio, converted to Mormonism together. Kirtland soon became the site for a United Order colony of more than 3,000 members, led by Joseph Smith. Following historical scholarship, these are coded as two distinct communes.

## Methods

### *Data and Measurement of Commune Life Spans*

The data were gathered in extensive archival research with coding performed by assistants who were not familiar with the hypotheses. Coders first consulted secondary sources, including retrospective encyclopedias (e.g., Bestor 1970; Fogarty 1980; Oved 1988; Pitzer 1997; Stockwell 1998) and contemporaneous encyclopedias (e.g., Hinds 1973[1878]; Nordhoff 1966[1875]; Noyes 1966[1870]). They referred to more than 100 specialized sources for details on particular communes or movements (e.g., Arndt 1992; Brewer 1986; Guarneri 1991; Herscher 1981). For most cases, it was possible to compare several independent sources (including primary sources, such as membership registries and articles of incorporation as well as memoirs, correspondence and newsletters) to correct errors in the historical record.<sup>8</sup>

These efforts provided information on 1,082 communes existing at some point during a 357-year observation period (1609-1965), including 12 types of commune. This study focuses on the nine types whose life spans are taken to be informative from the standpoint of the theory (excluding Catholic monasteries, New Deal communities and Hutterian colonies), leaving 732 cases. However, this number includes 118 cases that are mentioned in at least one source, but that have incomplete life history information in the available sources.<sup>9</sup> These must be excluded from the survival analysis. Although statistical analyses assume that the excluded cases are missing at random, it seems intuitive that small and short-lived communes would receive less attention in the historical record, resulting in incomplete duration data. Selection on size does not appear to be a severe problem here, as there is no significant difference of mean peak sizes for cases with incomplete and complete records. As for selection on duration, Sosis and Bressler (2003) found that commune longevity was not related to the number of pages published on each case, in a smaller sample of archival sources. Although the dataset does include records of even ephemeral communes, it is plausible that some short-lived communes may have escaped anyone's notice, and thus did not receive mention in any of the published or unpublished sources. It is important to note, then, that selection bias on very brief duration will work against the hypothesized form of age dependence, so conclusions will be conservative.

Organizational mortality is recorded when the communal structure dissolves. This study concerns survival of an organization in a particular form, not survival of the members, business enterprises, broader social movements or the impact of innovations by those movements. Thus, if an organization abandons communal structure and continues as an incorporated town (Northampton, MA; New Harmony, IN; Winston-

Salem, NC), a firm (Oneida Silversmiths; Amana Refrigeration), or nonprofit organization (Oberlin College), the death of the commune is coded in the year of this dissolution.

Although no cases are left-truncated by the research design, some are censored by surviving through the end of the study period. The analysis treats these right-censored cases as valid data for all years within the study period. Removing the incomplete records leaves 614 complete life histories, including 508 organizational deaths and 106 right-censored cases. This produces a case-year file with a total of 9,406 valid annual observations.

### *Independent Variables*

For each year of a commune's existence, *age* is coded as the number of years since its founding and *template age* is coded as the number of years since its (current) template's invention. Templates are measured using the detailed categorization of communal movements given in Pitzer (1997), supplemented by a variety of specialized sources. Also, if historical records indicated that a commune aimed to replicate the design of a previous commune – such as Frances Wright's Nashoba, which was modeled after New Harmony and included Robert Owen and other New Harmony founders as trustees – template age is coded as the parent commune's template age. All independent communes not modeled after existing cases are treated as employing idiosyncratic templates, so template age and commune age are indistinguishable. For each case, the *drift clock* is coded as the study-year that a commune's template was founded (coded from 0 to 356). Examining the interaction of the drift clock with template age will show how the template aging processes may be changing as long-term historical time progresses.

As in most studies of organizational mortality, size observations are not available for every year of every case's existence. Missing observations are linearly interpolated from the nearest known sizes before and after a gap in observation.<sup>10</sup> Approximately 20 percent of cases have no reliable size records. For these cases, values are imputed with normally distributed random values with the same mean and standard deviation as the corresponding commune type.<sup>11</sup> Note that this noise may attenuate an observed relationship between commune size and mortality. Results are robust to treatment of missing data.

The models conventionally guard against spurious negative age dependence by including dummy variables for *types*, or sets of similar cases that may have distinctive baseline mortality rates. Given that communes' hazard of mortality may vary with historical context (Kitts 2000a), the strongest relevant shifts in the environment are accounted for by dividing observations into five qualitatively different periods (1609-1784; 1785-1865; 1866-1918;

1919-1948; 1949-1965), delineated by the endings of major American wars. These five periods represent pivotal stages in American history as well as communal history. Kitts (2000b) provides a detailed description of these historical periods, including a discussion of the broader legitimacy of the communal form. To control for regional differences that may affect mortality risks, observations are coded by region (Northeast, Midwest/Plains, West, South). Lastly, three dynamic measures of organizational population density (density of the entire organizational form, density within a commune's own type, and density within a commune's geographic region) are included as control variables.

## Results

Nonparametric analyses will describe the changing risks of mortality as communes age and will also inform the selection of parametric model. For each age ( $t$ ) where at least one death occurs, the Kaplan-Meier estimator  $S(t)$  represents the cumulative proportion of cases surviving beyond  $t$ :

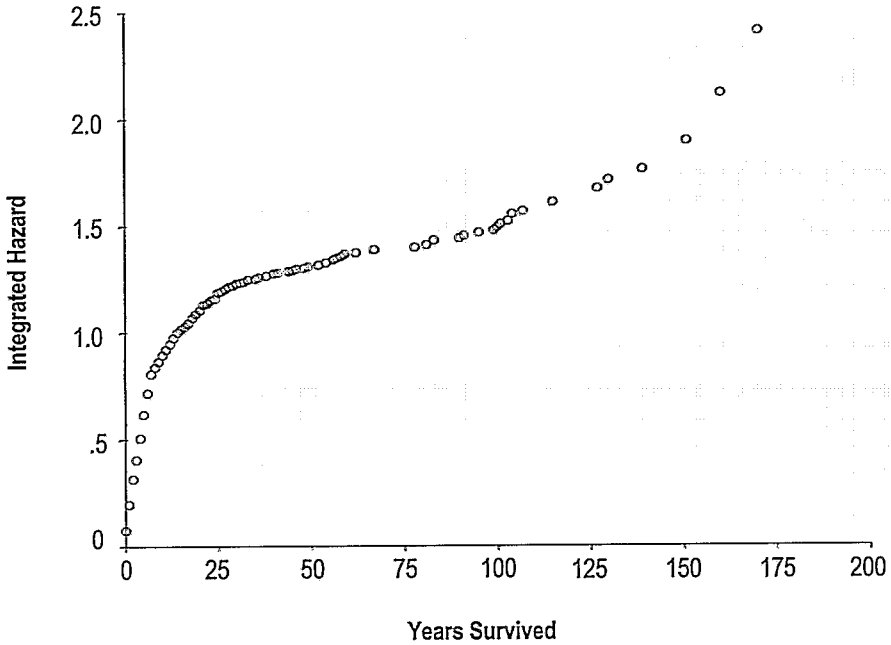
$$S(t) = \prod_{k=1}^K \frac{S_k}{R_k}$$

where  $K$  is the total number of time points before  $t$  when at least one death occurred, and  $S_k/R_k$  is the proportion of cases surviving ( $S_k$ ) beyond each time point  $k$ , of those at risk ( $R_k$ ) of dying at that point in time. The negative log of this stepfunction is an estimate of the cumulative hazard of mortality, or  $\hat{H}(t) = -\log(S(t))$ . Figure 1 shows these estimates of the cumulative mortality rate. The instantaneous risk of mortality is indicated by the steepness of the curve at each point in time, where a straight line would indicate a constant risk.

This function begins as a steep climb but dampens over the first 25 years, suggesting a liability of newness during that period. The curve then steepens after age 100, suggesting a liability of aging during the advanced years. The shape of the integrated hazard function suggests that a simple quadratic specification is adequate; there is no evidence of a liability of adolescence for American communes.

While the shape of the curve in Figure 1 appears to support the form of age dependence at the organization level described in H1 and H2, the high hazard during the early years could be an artifact of heterogeneity among cases or environments. To statistically control much of this heterogeneity—and distinguish time dependence at the organization and template levels—the mortality rate is modeled using event history analysis. Specifically, the model predicts the hazard of dissolving in year  $t$ , given that the commune has survived until year  $t$ , as a function of a set of covariates. To enhance comparability with previous studies, the probability of mortality

Figure 1. Kaplan-Meier Estimate of the Integrated Hazard of Mortality



for case  $i$  in year  $t$  (denoted  $\pi_{it}$ ) is modeled using a complementary log-log link function:  $\log(-\log(1 - \pi_{it}))$ . This model allows estimation of parameters identical to continuous time hazard models using data that are grouped into coarse annual intervals (Allison 1982; Petersen 1993).

Table 1 shows the maximum likelihood parameter estimates (with standard errors in parentheses) for the models.

In Model 1, the linear term (*Age*) is negative and significant and the quadratic term ( $Age^2/100$ ) is positive and significant, supporting H1 and H2. Models 2 through 4 demonstrate further robustness of this result as more control variables are added. Model 2 includes log-size of communes and eight dummy variables to allow distinct rates for nine commune types (reference category: *Independent Secular*). Model 3 adds controls for environmental variation between five historical periods (reference category: 1609-1784), four geographic regions (reference category: *Northeast*), and between years of war and peace, as well as a conventional quadratic specification of organizational population density (Carroll and Hannan 2000). Model 4 employs a better-fitting specification of density that is investigated theoretically in Kitts (2000b). Including all of these covariates attenuates the estimated liability of newness as expected, but both the initially negative and later positive effects of age remain strong and significant. Partial differentiation of the estimated regression equation

**Table 1: Complementary Log-Log Models: Effects of Commune Age on the Hazard of Mortality**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
<b>Independent Variables</b>	B (SE)	B (SE)	B (SE)	B (SE)
Age	-.0734*** (.0053)	-.0581*** (.0054)	-.0390*** (.0058)	-.0405*** (.0059)
Age <sup>2</sup> /100	.0438*** (.0037)	.0392*** (.0038)	.0333*** (.0042)	.0369*** (.0045)
<b>Control Variables</b>				
Ln(Size)	—	-.1808*** (.0361)	-.2485*** (.0373)	-.2422*** (.0376)
<b>Type</b>				
Messianic	—	-.5563** (.1977)	-.9861*** (.2147)	-1.0663*** (.2186)
Shaker	—	-1.5019*** (.2799)	-2.0745*** (.3024)	-2.4905*** (.3257)
United Order	—	.4586* (.1795)	.1979 (.1857)	.0617 (.1935)
Ethnic Colony	—	-.1270 (.2089)	-.4741 (.2482)	-.5539 (.2576)
Utopian Socialist	—	.1238 (.1430)	-.0732 (.1494)	-.1123 (.1521)
Jewish	—	.5057** (.1916)	.4583* (.2011)	.4836 (.2015)
Independent Religious (Christian)	—	-.3862** (.1324)	-.3280* (.1347)	-.4399** (.1414)
Independent Religious (Non-Christian)	—	-1.3511*** (.3661)	-1.0804** (.3696)	-.8570** (.3769)
<b>Region</b>				
South	—	—	.4816** (.1584)	.9161*** (.2294)
Plains	—	—	.5042*** (.1268)	.8014*** (.1683)
West	—	—	.6401*** (.1477)	.9354*** (.1969)
<b>Context</b>				
1785-1865	—	—	-.3906 (.4691)	.1701 (.3110)
1866-1918	—	—	-1.0552* (.5069)	-.3638* (.3587)
1919-1948	—	—	-1.8068** (.5205)	-1.1752** (.3705)
1949-1965	—	—	-2.7248*** (.5144)	-2.2552*** (.4932)

Table 1 *continued*

Independent Variables	Model 1	Model 2	Model 3	Model 4
	B (SE)	B (SE)	B (SE)	B (SE)
War	—	—	-.0086 (.1255)	.0044 (.1259)
Density	—	—	.0361 (.0219)	-.0045 (.0069)
Density <sup>2</sup> /100	—	—	-.0219 (.0210)	—
Type-density	—	—		.0270** (.0093)
Local-density	—	—		.0255* (.0111)
Constant	-2.0532*** (.0585)	-1.2328*** (.1601)	-1.4669*** (.3244)	-1.5019*** (.3161)
Model $\chi^2$	307.087*** <i>df</i> = 2	427.900*** <i>df</i> = 11	589.441*** <i>df</i> = 21	605.879*** <i>df</i> = 22

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  (two-tailed tests)

N = 9,406 observations

with respect to age reveals a minimum hazard of mortality at about 55 years, within the observed range of age.<sup>12</sup> The results summarized in Table 1 thus consistently support H1 and H2.

The models shown in Table 2 consider the effects of template age on organizational mortality, distinguishing the processes of maturation and senescence from legitimation or obsolescence of the organizational template.

Model 6 shows that the effects of commune maturation and senescence are robust to the inclusion of template age. Models 5 and 6 further show a curvilinear relationship of template age to the risk of mortality, as the linear term (*Template Age*) is negative and significant (supporting H3) and the quadratic term (*Template Age*<sup>2</sup>/100) is positive and significant (supporting H4). Partial differentiation of Model 7 with respect to template age reveals a minimum hazard at about 91 years, within the observed range. Thus, increasing template age in the lower range guards against mortality for communes following the template, but increasing template age in the higher range increases their risk of mortality. Figure 2 uses the parameter estimates in Model 6 to plot the estimated multiplier of the mortality rate, demonstrating both curvilinear relationships.

Lastly, models 7 and 8 consider *drift clock*, which for each organization represents the point in historical time when its template was invented. The main effect of drift clock is not of direct theoretical interest here. Historical time is relevant only as a proxy for the rate of environmental drift, which

**Table 2: Complementary Log-Log Models: Effects of Commune Age, Template Age and Drift Clock on the Hazard of Mortality**

Independent Variables	Model 5	Model 6	Model 7	Model 8
	B (SE)	B (SE)	B (SE)	B (SE)
Template age	-.0274*** (.0041)	-.0170** (.0062)	-.0457** (.0147)	-.0494** (.0165)
Template age <sup>2</sup> /100	.0168*** (.0025)	.0093* (.0041)	.0056 (.0089)	.0126 (.0111)
Drift clock	—	—	-.0098** (.0031)	-.0098** (.0031)
Drift clock x Temp/100	—	—	.0001 (.0067)	.0089 (.0076)
Drift clock x Temp <sup>2</sup> /10 <sup>4</sup>	—	—	.0116* (.0051)	.0021 (.0063)
Age	—	-.0256** (.0080)	—	-.0240** (.0082)
Age <sup>2</sup> /100	—	.0270*** (.0059)	—	.0251*** (.0061)
Constant	-1.5181*** (.3112)	-1.4759*** (.3149)	-2.796 (.4816)	-1.571 (.4821)
Model $\chi^2$	589.019*** <i>df</i> = 22	613.532*** <i>df</i> = 24	607.601*** <i>df</i> = 25	626.560*** <i>df</i> = 27

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  (two-tailed tests)

N = 9,406 observations

is modeled as a moderator of the relationship between template age and mortality. The interaction of drift clock with the quadratic specification of template age is significant by a likelihood ratio test comparing fit of models 7 and 5 ( $\chi^2 = 18.58$ ;  $df = 3$ ;  $p < .01$ ) or models 8 and 6 ( $\chi^2 = 13.03$ ;  $df = 3$ ;  $p < .05$ ), but significance levels of individual parameter estimates are unstable due to multicollinearity in models 7 and 8. Figure 3 allows me to cautiously interpret the interaction effects estimated in the best-fitting model (8).

Figure 3 shows that the interaction of template age and drift clock is as predicted in H5, as can be observed by tracing the effect of template age on the hazard of mortality at different levels of the drift clock. For templates invented at early points on the drift clock (slow environmental drift), template aging generally diminished the risk of mortality for communes following the template. For templates invented at late points on the drift clock (fast environmental drift), this pattern reverses, suggesting that obsolescence increasingly dominates legitimation as environmental change accelerates over historical time. However, the obsolescence effect and the interaction of template age with calendar time are not as robust

Figure 2. Multiplier of the Mortality Rate by Commune Age and Template Age

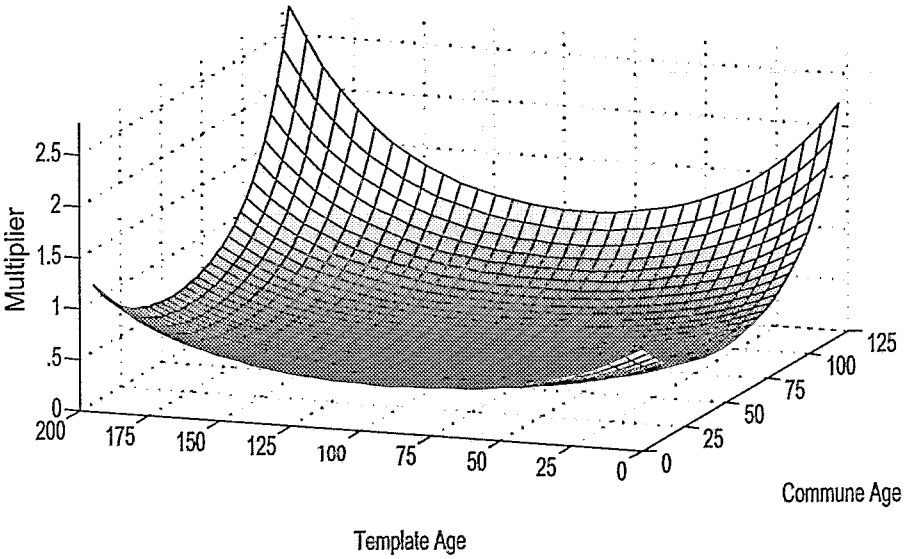
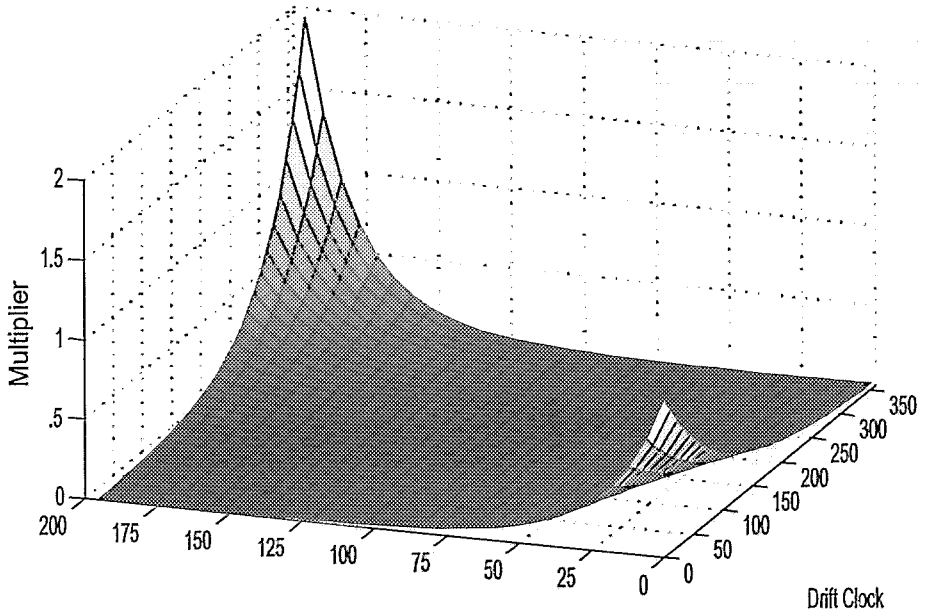


Figure 3. Multiplier of the Mortality Rate by Template Age and Drift Clock



as the results for maturation, senescence and legitimation, so we should see these final results as only suggestive.

## Discussion

How shall we reconcile the curvilinear age dependence that I predict (and find) at the organization level with a body of empirical evidence that has variously supported the liabilities of newness, aging or adolescence? First, I argue that the process of senescence should typically operate on a very coarse time scale, exceeding the scope of observation in many previous studies. Examining only the first few decades of an organizational population would obscure the proposed curvilinear effect because no organizations (or templates) would be old enough to suffer from the positive age dependence processes. Similarly, a population where mortality rates are uniformly high, and thus all organizations die young, may never show long-term senescence. Second, I note that most empirical work has used parametric models that constrained time dependence to be either monotonic (Gompertz or Weibull models) or the inverse curvilinear pattern (log-logistic or log-normal models). Some recent research (Hannan, Carroll, Dobrev and Han 1998; Ingram and Inman 1996) using less constrained models of time dependence (piecewise exponential) has similarly found diminishing mortality over most of the life course, followed by a resurgence of mortality in advanced age. Hannan et al. (1998a) suggested that multiple processes may drive patterns of mortality in tandem, leading to liabilities of newness *and* aging as I find here.<sup>14</sup>

Results generally support the argument for time-dependent legitimation of novel organizational templates and, fitting the assumption of accelerating environmental drift, an opposite positive age dependence at the template level (obsolescence) seems to be working against this legitimation effect over historical time. However, evidence of obsolescence is weaker when controlling for age at the organization level. This may suggest that my measure of template age inadequately represented the environmental fit of organizational designs or it could indicate that the commune as a marginal organizational form is much more troubled by illegitimacy than by obsolescence. In populations of organizations that do not face public doubts about their viability, time-dependent legitimation may be less crucial. It is also plausible that communes were so poorly fit at their birth that aging had little impact in the form of obsolescence. Lastly, obsolescence and senescence may be difficult to distinguish for membership organizations such as communes. Consider the Shaker movement, which deteriorated even as religious commitment endured, repression diminished and their communal industries flourished. The movement was clearly obsolete in the 20<sup>th</sup> century, unable to attract new members (even among orphans that

they had raised), and so the membership grew older and less productive (Bainbridge 1984; Brewer 1986, 1987). Personally observing a Shaker commune, Nordhoff (1966[1875]) noted the poor recruitment and aging core membership as early as 1874. This suggests that the lack of environmental fit exacerbates a demographic form of senescence, although data are not available to address this conjecture over the entire population.

Like all students of age dependence in organizational mortality, I provide only qualitative predictions of the shape of the mortality risk in time. I expect senescence and obsolescence to play out over several decades typically, but note that no formal theory is available to allow me to specify a numerical value *ex ante* for how long the *early years* will last and when senescence will appear in the *advanced years*. In fact, I recognize that the time scales for these four processes will depend on particular features of the organizational population and its environment, so argue that it would be a mistake to specify an invariant time scale. Beyond predicting the qualitative shape of the relationship of age to mortality in this baseline model, I suggest that the next step is to identify the *intervening variables* that affect this shape by altering the rate or importance of maturation, senescence, legitimation and obsolescence. For example, this study shows how the effect of template age apparently changed as acceleration of environmental drift over several centuries made obsolescence occur more rapidly.

## Conclusion

The inconsistent evidence for theories of age-dependent mortality in organizational populations suggests that we should revise our theoretical lenses to design more powerful empirical tests. In this article I integrate a variety of prominent but seemingly contradictory propositions by differentiating their domain of applicability and time shape. Looking at established theories of age dependence, I distinguish processes that operate at the organization level (maturation and senescence) from processes that operate for organizational designs (legitimation and obsolescence). I then differentiate those processes that ostensibly dominate early in the aging process (maturation and legitimation) from processes that dominate later (senescence and obsolescence).

Although previous scholarship regarded the liabilities of newness and aging as opposites, my elaborating the time shape of maturation and senescence allows these insights to be integrated and validated jointly. I point out that various organization-level mechanisms proposed to explain the liability of newness (which I have called "maturation" accounts) typically operate as an initially steep but dampening function of age, while the organization-level mechanisms that have been proposed to explain the

liability of aging (senescence) typically persist as the organization ages. Thus, we should expect a curvilinear effect of age on the risk of mortality. My analysis of the life spans of American communes over nearly four centuries strongly supports this prediction.

Previous work on the liability of newness has appealed to processes of time-dependent legitimation, while previous work on the liability of aging has appealed to obsolescence. I argue that these processes apply to organizational templates, which will not be coextensive with individual organizations when the latter are founded based on preexisting designs. When legitimation and obsolescence were modeled as functions of organization age, they may have been conflated with processes that play out within individual organizations. Research has also failed to distinguish the different temporal shapes of legitimation and obsolescence processes. My argument that legitimation operates as an initially steep, but dampening, function of template age and that obsolescence persists as the template ages suggests a curvilinear effect of template age on the risk of mortality for organizations using the template. Analysis of historical data on American communes strongly supports the hypothesized legitimation during a template's early years and less consistently supports obsolescence in a template's later years.

The predicted curvilinear age dependence at the levels of organizations and templates follows from a straightforward synthesis of prominent theories. I go beyond this baseline model to propose that the rate of environmental drift is a crucial moderating variable for the balance of the legitimation and obsolescence processes. Indeed, accelerating drift over nearly four centuries of historical time may have moderated the effects at the template level as legitimation yielded to obsolescence over time. Both the long-term detrimental effect of template age and the interaction of template age with historical time were weaker and less robust than the other findings, however, so there is little evidence that obsolescence was ever an overwhelming problem for communal designs. Even so, these results encourage us to think in a more sophisticated way of the processes underlying age-dependent mortality, showing how they may be integrated analytically in light of deep knowledge of organizational populations. The framework that I have presented directs our research agenda toward identifying intervening variables that affect the balance of these four processes.

In looking to future work on aging of organizational templates, we must remember that templates are a theoretical locus for the dynamics of time-dependent legitimation and obsolescence. They will not always represent an empirical level of analysis that is distinguishable from organization age or population age. Modeling templates (i.e., obsolescence and legitimation processes) at the level of individual organizations is appropriate for heterogeneous populations, where we can assume that each organization

is founded as an idiosyncratic venture, earning its reputation and growing obsolete on its own unique clock. At the opposite extreme, where organizations are interchangeable within a population (i.e., have a shared fit with the environment and a shared level of legitimacy), it is appropriate to model obsolescence and time-dependent legitimation on a common clock for the entire population. The operationalization of the legitimation and obsolescence processes should thus be guided by knowledge of the study population. Only populations in which designs are publicly articulated as distinct from individual organizations (or entire industries) will allow us to analytically distinguish aging of designs from other clocks. In this study, I have examined an organizational form that includes numerous specific and well-documented designs, and thus have applied uncommon leverage to tease apart the various forms of age dependence.

## Notes

1. A few exceptions include studies of labor unions (Hannan and Freeman 1988), voluntary social service organizations (Singh, Tucker and House 1986), worker cooperatives (Ingram and Simons 2000; Russell and Hanneman 1995), communal agricultural settlements (Ingram and Simons 2002), state bar associations (Halliday, Powell and Granfors 1987), trade associations (Aldrich, Staber, Zimmer and Beggs 1990), fraternal societies (Lehrman 1994), and social movement organizations (Edwards and Marullo 1995; Minkoff 1993, 1999). However, these also do not demonstrate one universal form of time dependence in mortality.
2. The term "legitimation" is often used to denote a process that occurs as a function of the *density* of an organizational population (Hannan and Freeman 1989). However, whether legitimacy may also accrue as a result of longevity remains a distinct theoretical and empirical question. Here, I use legitimacy to denote the time-dependent process. Density-dependent legitimation is the subject of another investigation (Kitts 2000b).
3. Phillips (2002) presents an intriguing alternative approach. He notes that personnel carry routines and resources as they exit one firm to found another. His analysis of "parent-progeny transfer" investigates benefits and risks associated with this type of founding and allows for reciprocal relationships between the life chances of parent and progeny. In contrast to this "genealogical" approach, I propose a "genetic" approach, which models survival as a function of the legitimacy and environmental fit of the organization's "genes."
4. However, note that changing an organizational design is risky (Amburgey, Kelly and Barnett 1993; Baron, Hannan and Burton 2001; Hannan and Freeman 1984; Minkoff 1999).
5. The popular term for these groups has changed over generations (e.g. communistic colonies, communal utopias, utopian experiments, intentional

communities), but scholars and archivists use the terms interchangeably to refer to the same historical movements.

6. To investigate the sensitivity of results to this assumption, supplementary analyses employ an alternative measure, assuming that each template was founded in the year that a social movement emerged (using dates from Pitzer 1997) inspired by the template, rather than the year that a commune was first built on that template. In fact, models using this alternative measure give the same conclusions as the results reported.
7. It should not escape our attention that a clustering of similar organizations may be relevant in other ways. For example, similar organizations will presumably compete more fiercely for members than will dissimilar organizations. Models allow for this effect here by including population density within types as a control variable, but these dynamics are investigated theoretically in Kitts (2000b).
8. Note that available records in encyclopedic sources may duplicate communes with multiple names or that changed locations. We identified problematic cases through matches by location, dates of operation, names of leaders, or other identifying characteristics, and consulted specialized sources to resolve any ambiguities.
9. Of these, six have a missing founding date, 93 have a missing folding date, and 19 are missing both dates. Most of these incomplete cases should be excluded for substantive reasons if more information becomes available. For example, many partial cases seem to have been sparsely mentioned in historical records because they are actually redundant names for included communes. Some others – particularly several Jewish Agricultural Communities that were mentioned in some of the most inclusive lists – were not corroborated by specialist sources and appear to have never lived communally. Also, several cases with unknown founding dates were contemporary communes, probably founded after the end of the study period.
10. If size at founding or folding was missing, values were set to the nearest observed value. Communes often lose members immediately before dissolving, but this pattern is not “wired in” to imputations. This protocol may overestimate size at mortality and thus underestimate a liability of smallness.
11. The log-transformed size observations were approximately normally distributed within types, so imputation did not affect the mean, standard deviation or alter the shape of the distribution of sizes within each type.
12. Note that the mortality rate reaches a minimum when the partial derivative (with respect to age) of this regression equation is equal to zero:  $-.0405 + .000738A = 0$ . This equation can be solved for the critical value of age ( $A^*$ ) under this assumption, yielding  $A^* = \frac{.0405}{.000738} = 54.9$ .
13. All models here include the same controls for types, periods, regions, war, and population density as Model 4. The parameter estimates for these control variables are omitted here for brevity.

14. Notably, Ingram and Simons (2002) showed an analogous curvilinear pattern for profitability as a function of accumulated organizational experience in a population of Israeli communal settlements. Although they studied neither organization age nor mortality directly, the corresponding results merit further investigation.

## References

- Aldrich, Howard, and Ellen R. Auster. 1986. "Even Dwarfs Started Small: Liabilities of Age and Size and their Strategic Implications." *Research in Organizational Behavior* 8(2):165-98.
- Aldrich, Howard, Udo Staber, Catherine Zimmer and John J. Beggs. 1990. "Minimalism and Organizational Mortality: Patterns of Disbanding Among U.S. Trade Associations, 1900-1983." Pp. 21-52. *Organizational Evolution: New Directions*. J. Singh, editor. Sage Publications.
- Allison, Paul D. 1982. "Discrete-Time Methods for the Analysis of Event Histories." Pp. 61-98. *Sociological Methodology*. S. Leinhardt, editor. Jossey-Bass.
- Arndt, Karl J.R. 1992. *George Rapp's Disciples, Pioneers and Heirs: A Register of the Harmonists in America*. University of Southern Indiana Press.
- Amburgey, Terry L., Dawn Kelly and William P. Barnett. 1993. "Resetting the Clock: The Dynamics of Organizational Change and Failure." *Administrative Science Quarterly* 38(1):51-73.
- Bainbridge, William S. 1984. "The Decline of the Shakers: Evidence from the United States Census." *Communal Societies* 4:19-34.
- Barnett, William P., and Glenn R. Carroll. 1987. "Competition and Mutualism among Early Telephone Companies." *Administrative Science Quarterly* 32(3):400-21.
- Baron, James N., Michael T. Hannan and M. Diane Burton. 2001. "Labor Pains: Change in Organizational Models and Employee Turnover in Young, High-Tech Firms." *American Journal of Sociology* 106(4):960-1012.
- Barron, David N., Elizabeth West and Michael T. Hannan. 1994. "A Time to Grow and a Time to Die: Growth and Mortality of Credit Unions in New York City, 1914-1990." *American Journal of Sociology* 100(2):381-421.
- Baum, Joel A.C., and Robert J. House. 1990. "On the Maturing and Aging of Organizational Populations." Pp. 129-42. *Organizational Evolution: New Directions*. J. Singh, editor. Sage Publications.
- Bestor, Arthur. 1970. *Backwoods Utopias: The Sectarian and Owenite Phases, 1663-1829*. University of Pennsylvania Press.
- Brewer, Priscilla J. 1986. *Shaker Communities, Shaker Lives*. University of New England Press.

- \_\_\_\_\_. 1987. "Numbers are Not the Thing for Us to Glory In': Demographic Perspectives on the Decline of the Shakers." *Communal Societies* 7:25-35.
- Brüderl, Josef, Peter Preisendörfer and Rolf Ziegler. 1992. "Survival Chances of Newly Founded Business Organizations." *American Sociological Review* 57(2):227-42.
- Brüderl, Josef, and Rudolf Schüssler. 1990. "Organizational Mortality: The Liabilities of Newness and Adolescence." *Administrative Science Quarterly* 35(3):530-47.
- Brumann, Cristoph. 2001. "Religious Consensus and Secular Dissent: Two Alternative Paths to Survival for Utopian Communes." *Anthropos* 96(1):87-103.
- Carroll, Glenn R. 1983. "A Stochastic Model of Organizational Mortality: Review and Reanalysis." *Social Science Research* 12(4):303-29.
- Carroll, Glenn R., and Jacques Delacroix. 1982. "Organizational Mortality in the Newspaper Industries of Argentina and Ireland: An Ecological Approach." *Administrative Science Quarterly* 27(2):169-98.
- Carroll, Glenn R., and Michael T. Hannan. 2000. *The Demography of Corporations and Industries*. Princeton University Press.
- Delacroix, Jacques, and Anand Swaminathan. 1991. "Cosmetic, Speculative, and Adaptive Change in the Wine Industry: A Longitudinal Study." *Administrative Science Quarterly* 36(4):631-61.
- Edwards, Bob, and Sam Marullo. 1995. "Organizational Mortality in a Declining Social Movement: The Demise of the Peace Movement Organizations in the End of the Cold War Era." *American Sociological Review* 60(6):908-27.
- Fichman, Mark, and Daniel A. Levinthal. 1991. "Honeymoons and the Liability of Adolescence: A New Perspective on Duration Dependence in Social and Organizational Relationships." *Academy of Management Review* 16(2):442-68.
- Fogarty, Robert. 1980. *Dictionary of American Communal and Utopian History*. Greenwood Publishing Group.
- Guarneri, Charles. 1991. *The Utopian Alternative*. Cornell University Press.
- Freeman, John, Glenn R. Carroll and Michael T. Hannan. 1983. "The Liability of Newness: Age Dependence in Organizational Death Rates." *American Sociological Review* 48(5):692-710.
- Halliday, Terence C., Michael J. Powell and Mark W. Granfors. 1987. "Minimalist Organizations: Vital Events in State Bar Associations, 1870-1930." *American Sociological Review* 52(4):456-71.
- Hannan, Michael T. 1989. "Age Dependence in the Mortality of National Labor Unions: Comparisons of Parametric Models." *Journal of Mathematical Sociology* 14(1):1-30.

- \_\_\_\_\_. 1998. "Rethinking Age Dependence in Organizational Mortality: Logical Formalization." *American Journal of Sociology* 104(1):126-64.
- Hannan, Michael T., Glenn R. Carroll, Stanislav D. Dobrev and Joon Han. 1998a. "Organizational Mortality in European and American Automobile Industries Part I: Revisiting the Effects of Age and Size." *European Sociological Review* 14(3):279-302.
- Hannan, Michael T., Glenn R. Carroll, Stanislav D. Dobrev, Joon Han and John C. Torres. 1998b. "Organizational Mortality in European and American Automobile Industries Part II: Coupled Clocks." *European Sociological Review* 14(3):303-13.
- Hannan, Michael T., and John Freeman. 1984. "Structural Inertia and Organizational Change." *American Sociological Review* 49(2):149-64.
- \_\_\_\_\_. 1988. "The Ecology of Organizational Mortality, American Labor Unions, 1836-1985." *American Journal of Sociology* 94(1):25-52.
- \_\_\_\_\_. 1989. *Organizational Ecology*. Harvard University Press.
- Haveman, Heather A. 1992. "Between a Rock and a Hard Place: Organizational Change and Performance under Conditions of Fundamental Environmental Transformation." *Administrative Science Quarterly* 37(1):48-75.
- Herscher, Uri D. 1981. *Jewish Agricultural Utopias in America 1880-1910*. Wayne State University Press.
- Hinds, William Alfred. 1973[1878]. *American Communities*. Citadel Press.
- Hsu, Greta, and Michael T. Hannan. 2005. "Identities, Genres, and Organizational Forms." *Organization Science* 16(5):474-90.
- Ingram, Paul, and Crist Inman. 1996. "Institutions, Intergroup, Competition, and the Evolution of Hotel Populations around Niagara Falls." *Administrative Science Quarterly* 41(4):629-58.
- Ingram, Paul, and Tal Simons. 2000. "State Formation, Ideological Competition, and the Ecology of Israeli Workers' Cooperatives, 1920-1992." *Administrative Science Quarterly* 45(1):25-53.
- \_\_\_\_\_. 2002. "The Transfer of Experience in Groups of Organizations: Implications for Performance and Competition." *Management Science* 48(12):1517-33.
- Kanter, Rosabeth Moss. 1968. "Commitment and Social Organization: A Study of Commitment Mechanisms in Utopian Communities." *American Sociological Review* 33(4):499-519.
- \_\_\_\_\_. 1972. *Commitment and Community*. Harvard University Press.

- Kitts, James A. 2000a. "Analyzing Communal Life Spans: A Dynamic Structural Approach." *Communal Societies* 20:13-25.
- \_\_\_\_\_. 2000b. "An Ecology of Utopia: Density Dependence in Mortality of American Communes, 1609-1965." Paper presented at the American Sociological Association meeting, Washington, DC, August 15.
- Kraut, Ogden. 1997. *The United Order*. Pioneer Press.
- Lehrman, William G. 1994. "Diversity in Decline: Institutional Environment and Organizational Failure in the American Life Insurance Industry." *Social Forces* 73(2):605-35.
- McPherson, J. Miller, and Thomas Rotolo. 1996. "Diversity and Change in Voluntary Groups." *American Sociological Review* 61(2):179-202.
- Minkoff, Debra C. 1993. "The Organization of Survival: Women's and Racial-Ethnic Voluntarist and Activist Organizations, 1955-1985." *Social Forces* 71(4):887-908.
- \_\_\_\_\_. 1999. "Bending with the Wind: Strategic Change and Adaptation by Women's and Racial Minority Organizations." *American Journal of Sociology* 104(6):1666-1703.
- Nordhoff, Charles. 1966[1875]. *The Communistic Societies of the United States: From Personal Observations*. Dover.
- Noyes, John Humphrey. 1966[1870]. *Strange Cults & Utopias of 19th-Century America*. Dover.
- Oved, Yaacov. 1988. *Two Hundred Years of American Communes*. Transaction Press.
- Petersen, Trond. 1993. "Recent Advances in Longitudinal Methodology." *Annual Review of Sociology* 19:425-54.
- Phillips, Damon J. 2002. "A Genealogical Approach to Organizational Life Chances: The Parent-Progeny Transfer and Silicon Valley Law Firms, 1946-1996." *Administrative Science Quarterly* 47(3):474-506.
- Pitzer, Donald E. 1997. *American Communal Utopias*. North Carolina Press.
- Polos, Laszlo, and Michael T. Hannan. 2002. "Reasoning With Partial Knowledge." *Sociological Methodology* 32(1):133-81.
- Ranger-Moore, James. 1997. "Bigger May Be Better, But Is Older Wiser? Organizational Age and Size in the New York Life Insurance Industry." *American Sociological Review* 62(6):903-20.
- Russell, Raymond, and Robert Hanneman. 1995. "The Formation and Dissolution of Worker Cooperatives in Israel, 1924-1992." Pp. 57-95. *Utopia in Zion: The Israeli Experience with Worker Cooperatives*. R. Russell, editor. SUNY Press.

- Sapienza, Harry J., Erko Autio, Gerard George, and Shaker A. Zahra 2006. "A Capabilities Perspective on the Effects of Early Internationalization on Firm Survival and Growth." *Academy of Management Review* 31(4):914-33.
- Singh, Jitendra, David J. Tucker and Robert J. House. 1986. "Organizational Legitimacy and the Liability of Newness." *Administrative Science Quarterly* 31(2):171-93.
- Sosis, Richard. 2000. "Religion and Intragroup Cooperation: Preliminary Results of a Comparative Analysis of Utopian Communities." *Cross-Cultural Research* 34(1):70-87.
- Sosis, Richard, and Eric R. Bressler. 2003. "Cooperation and Commune Longevity: A Test of the Costly Signaling Theory of Religion." *Cross-Cultural Research* 37(2):211-39.
- Staber, Udo. 1989. "Age Dependence and Historical Effects on the Failure Rates of Worker Cooperatives: An Event-History Analysis." *Economic and Industrial Democracy* 10(1):59-80.
- Stephan, Karen H., and G. Edward Stephan. 1973. "Religion and the Survival of Utopian Communities." *Journal for the Scientific Study of Religion* 12(1):89-100.
- Stinchcombe, Arthur L. 1965. "Social Structure and Organizations." Pp. 153-93. *Handbook of Organizations*. J.G. March, editor. Rand McNally.
- Stockwell, Foster. 1998. *Encyclopedia of American Communes, 1663-1963*. McFarland & Co.
- Winter, Sidney G. 1990. "Survival, Selection, and Inheritance in Evolutionary Theories of Organization." Pp. 269-97. *Organizational Evolution: New Directions*. J. Singh, editor. Sage Publications.