THE STRUCTURE OF FOUNDING TEAMS: HOMOPHILY, STRONG TIES, AND ISOLATION AMONG U.S. ENTREPRENEURS

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The mechanisms governing the composition of formal social groups (e.g., task groups, organizational founding teams) remain poorly understood, owing to (1) a lack of representative sampling from groups found in the general population, (2) a "success" bias among researchers that leads them to consider only those groups that actually emerge and survive, and (3) a restrictive focus on some theorized mechanisms of group composition (e.g., homophily) to the exclusion of others. These shortcomings are addressed by analyzing a unique, representative data set of organizational founding teams sampled from the U.S. population. Rather than simply considering the properties of those founding teams that are empirically observed, a novel quantitative methodology generates the distribution of all possible teams, based on combinations of individual and relational characteristics. This methodology permits the exploration of five mechanisms of group composition—those based on homophily, functionality, status expectations, network constraint, and ecological constraint. Findings suggest that homophily and network constraints based on strong ties have the most pronounced effect on group composition. Social isolation (i.e., exclusion from a group) is more likely to occur as a result of ecological constraints on the availability of similar alters in a locality than as a result of status-varying membership choices.

SOCIOLOGISTS have made major strides toward understanding the conditions under which new organizations and new organizational forms are created, as well as the kinds of social locations that are most likely to spawn their creators. Beginning with Max Weber's ([1904–1905] 1992) analysis of ascetic Protestantism's contributions to the entrepreneurial spirit, sociologists have offered both macro- and microlevel interpretations of entrepreneurial phenomena (Carroll and Mosakowski 1987; Ruef 2000; Stinchcombe 1965). Today, sociologists conduct multilevel investigations, ranging from the personal networks of individual entrepreneurs to the transition of entire societies from socialism to capitalism (Aldrich forthcoming). Yet the mechanisms that may connect individual founders to one another remain poorly explicated.

The emergence of a new formal organization invariably entails a decision regarding who will participate and what they will contribute. Many entrepreneurs begin entirely on their own, although they may turn to oth-

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ers for help with various aspects of the founding process. Others begin with a team, making the enterprise a collective effort. Framed in this way, new organizations are clearly social entities from the beginning, as even solo founders implicitly make choices—or face constraints—that lead them *not* to cooperate with others in the founding process. How an organization begins and whether others are recruited to join the effort can have lasting consequences for its survival and performance. Why do some entrepreneurs go it alone, rather than join with others? On what basis do entrepreneurs in multimember teams choose other founders?

Our interest in entrepreneurial founding teams is linked with two broad themes in recent sociological theory and research. First, new organizations ensure the reproduction of existing populations of organizations and lay the foundation for the creation of new populations. Organizational ecologists have generally focused on dynamics within existing populations, noting that most founding attempts reproduce existing forms of organizations and are incremental rather than novel additions to the organizational landscape (Carroll and Hannan 2000). By contrast, evolutionary theorists have focused on the generation of new organizational populations, analyzing the conditions under which new forms of organizations carve out niches for themselves (Aldrich and Fiol 1994). Whether a new business simply copies an existing form or strikes off into novel territory can depend on the extent to which its founding team exhibits diverse capabilities and perspectives (Ruef 2002b). Investigating the forces that generate variation within founding teams thus carries the potential for explaining organizational innovation more generally.

Second, new organizations affect stratification and inequality in a society by shaping the life chances of entrepreneurs and their employees. Organizational foundings and disbandings generate a great deal of employment volatility through job creation and destruction. Between 1992 and 1996, about 28 million jobs were created in the United States by newly founded organizations (Birch 1997). For employees, organizational foundings create opportunities for advancement and facilitate the acquisition of additional human capital (Carroll and Mosakowski 1987; Haveman and Cohen 1994). For entrepreneurs, new business formation represents a potential for upward social mobility (Bates 1997; Nee and Sanders 1985). Many business owners employ family members in their business ventures, and some pass on their businesses—or the wealth gained from them—to their families (Keister and Moller 2000). To the extent that mobility and status considerations are taken into account by nascent entrepreneurs, these processes will tend to be reflected in mechanisms of inclusion and exclusion among organizational founding teams.

In this article, we consider how achieved and ascribed characteristics of entrepreneurs affect the composition of founding teams and how these characteristics are mediated by the social context of the entrepreneurial effort. From the sociological literature on group formation, we identify five general mechanisms that could influence team membership, including considerations of homophily, functionality, status expectations, network constraint, and ecological constraint. Homophily refers to the selection of other team members on the basis of similar ascriptive characteristics, such as gender, ethnicity, nationality, appearance, and the like (for a review, see McPherson, Smith-Lovin, and Cook 2001).[1] Functional theories consider the extent to which team members possess valuable and complementary achieved competencies that help ensure the success of a collectivity (e.g., Bales 1953; Slater 1955). Drawing on lines of research in expectation states (Fisek, Berger, and Norman 1991) and structuralism (Skvoretz and Fararo 1996), theories of status variation address the greater capacity of high-status individuals (with respect to ascribed *or* achieved characteristics) to attract other team members, compared with low-status individuals. Network perspectives posit that team formation occurs within a preexisting network of strong and weak ties that constrains the

[1] Most classical treatments of homophily (e.g., Lazarsfeld and Merton 1954) have not restricted it to ascriptive characteristics. For a purely homophilous mechanism to apply to achieved characteristics, however, the functional contributions of those characteristics must be ruled out.

founding team's choice of members. Finally, ecological perspectives emphasize the importance of the spatial proximity and environmental distribution of potential group members.

We examine these mechanisms of team composition using the Entrepreneurial Research Consortium's panel study of entrepreneurial dynamics (Reynolds 2000), a unique, nationally representative sample of nascent entrepreneurs. Previous studies of group formation have tended to analyze informal groups that happen to be observed in particular public spaces (James 1953; Mayhew et al. 1995), student project teams that are created in particular classrooms (Mannix, Goins, and Carroll 2002), or more formal teams that are observed in particular industries (for reviews and critique, see Cooper and Daily 1997; Lechler 2001). It is unclear to what extent these samples yield generalizable findings.[2] Another shortcoming of previous research on founding teams is that it has usually included only teams that have already achieved some level of success in organizational development. Such a "success bias" causes investigators to miss numerous founding teams that form but subsequently abandon their entrepreneurial effort and leads researchers to ignore the impact of changes in composition following initial team formation. We avoid such success bias by tracking entrepreneurs from the point when they first begin to take serious steps toward creating a new formal organization.

In addition to this empirical contribution, we also offer a methodological innovation that allows us to avoid success bias in analyzing the composition of entrepreneurial teams. As Goodman (1964) first noted in a path-breaking paper on systems of groups, proper estimation of size distributions and other mechanisms concerning group formation requires that an analyst consider all possible combinations of group members, not just those observed in a given sample. We employ *structural event analysis* (Ruef 2002a) to generate the distribution of possible entrepreneurial teams and compare chance expectations within that distribution to empirical counts of the 816 teams in the national panel study. Poisson regression models are applied to account for deviations from expectations of chance group membership, based on mechanisms of homophily, functionality, status expectations, network constraint, and ecological constraint. We conclude by drawing out the empirical implications of these mechanisms for the ostensible sociability of some entrepreneurs and the relative isolation of others.

MECHANISMS OF GROUP COMPOSITION

In analyzing the formation of entrepreneurial teams, we consider five general mechanisms of group composition (see Table 1), which yield a set of hypotheses (H), corollaries (C), and assumptions (A). The hypotheses follow from the claims associated with each mechanism and some basic empirical generalizations regarding American society; corollaries hold true as a consequence of empirical proof for particular hypotheses. Although our hypotheses are examined in the specific context of organizational foundings, we believe that they may apply more broadly to the formation of task groups within a variety of settings, including established formal organizations.

HOMOPHILY

The mechanism of homophily explains group composition in terms of the similarity of members' characteristics. In principle, these characteristics may refer to social identities that are attached externally to individuals (e.g., ascribed characteristics such as gender, race, or age) or to internal states concerning values, beliefs, or norms (Lazarsfeld and Merton 1954).[3] In either

[2] Arrow, McGrath, and Berdahl (2000, chap. 2) note that most small group research since the 1950s has emphasized experimental designs—with compositional properties manipulated in laboratory settings—rather than the study of naturally occurring groups. This trend has led scholars away from such issues as group formation and composition.

[3] Clearly, identity and cognitive orientation tend to be linked in this explanation. The mechanism of homophily implies that individuals sharing a common identity also tend to share values, beliefs, or norms.

Table 1. Five General Explanations of Task-Group Composition

Theory	General Claims	Empirical Hypotheses, Corollaries, and Assumptions [a]
Homophily	Task groups tend to be composed of members with similar ascriptive characteristics (e.g., gender, ethnicity).	H_1: All-male and all-female teams will be more common than will mixed-gender teams.
		H_2: Ethnically homogeneous teams will be more common than will mixed-ethnicity teams.
Functional	Task groups tend to be composed of members with diverse achieved characteristics (e.g., leadership, occupational competency).	H_3: Teams with occupational diversity will be more common than teams lacking diversity.
		H_4: Occupational diversity will increase as a function of team size.
Status expectations	Individuals with high-status characteristics are more likely to attract other task-group members than are individuals with low-status characteristics.	H_5: Teams composed only of high-status members will be more common than those composed entirely from lower statuses.
		C_1: Given H_5, low-status persons will be more likely to be isolated than those from other backgrounds.
Network	The presence of prior network ties in a task group affects the extent to which the group exhibits diversity in ascribed and achieved characteristics.	A_1: Teams including family ties will have less ethnic diversity than teams lacking such ties.
		A_2: Teams including partner pairs will have greater gender diversity than teams lacking such ties.
		H_6: Teams composed of prior business acquaintances will have less occupational diversity than teams lacking such ties.
Ecological	Task groups tend to be composed of members in the same geographic locale and/or industry.	H_7: Homogeneous teams become more likely under conditions of residential/industrial segregation.
		C_2: Given H_1 and H_2, individuals that represent the numerical minority in a region/industry will be more likely to be isolated than others.

[a] All hypotheses assume that the size distribution and marginal probability for each team are controlled for, under a model of statistical independence.

case, the similarity of individuals disposes them toward a greater level of interpersonal attraction, trust, and understanding—and, consequently, greater levels of social affiliation—than would be expected among dissimilar individuals. This tendency toward homophily should be especially noticeable in groups such as organizational founding teams, which require sizable investments of time and resources (Bird 1989).

Although homophily may be analyzed in terms of ascribed characteristics, achieved characteristics, or internal psychological states, we restrict our operational definition of homophily to ascribed characteristics for several reasons. First, by excluding achieved characteristics (education, occupation, income) we prevent arguments regarding homophily from slipping into functional arguments regarding the efficacy of a social group. This is especially pertinent for groups that are task-oriented, such as business founding teams. Second, the similarity of group members in terms of psychological

states is often endogenous to the group-formation process itself. Moreover, homophily in this regard may result as much from the *misattribution* of shared understandings among affiliated individuals as from actual shared understandings, because individuals tend to assume that others with whom they have structural bonds think as they do (Jussim and Osgood 1989; McPherson et al. 2001).

One of the most widely studied ascriptive characteristics driving homophily is gender. Gender homophily has been identified in a variety of task-oriented settings, including work establishments (Kalleberg et al. 1996), voluntary organizations (McPherson and Smith-Lovin 1982, 1987), and managerial networks (Ibarra 1997). Although representative data for founding teams is sparse, researchers have found that men's business discussion networks contain few women and thus contribute to gender homogeneity (Aldrich 1999:85–86; Carter 1994). Women's business support groups, often formed as a reaction to male dominance in entrepreneurial activities (Aldrich 1989), may further enhance homophily. Insofar as gender is a highly visible ascribed characteristic driving attributions of similarity and difference in emergent organizations, we propose that:

Hypothesis 1: All-male and all-female organizational founding teams will be more common than will mixed gender teams.[4]

A second ascriptive dimension that generates strong network homophily is ethnicity (Marsden 1987; McPherson et al. 2001). Studies of many task-group settings—such as workplaces (Kalleberg et al. 1996; Reskin 1999) and classrooms (Schofeld 1995)—reveal substantial homogeneity in ethnic composition, especially among white ethnic majorities. For entrepreneurial founding teams, the literature has also tended to emphasize solidarity within ethnicities, but primarily among minority and immigrant groups (e.g., Aldrich and Waldinger 1990; Wilson and Martin 1982). Variations of in-group preferences across ethnicities may result from a number of factors, including ecological constraints on the availability of other entrepreneurs sharing a common ethnicity, discriminatory status expectations, and unmeasured network effects. With respect to baseline expectations, however, the existing literature supports the proposition that:

Hypothesis 2: Ethnically homogeneous organizational founding teams will be more common than will mixed-ethnicity teams.

FUNCTIONALITY

In opposition to the principle of homophily, many functionalist theories of task-group composition argue for the importance of *diversity* among members, especially with respect to achieved characteristics, such as leadership skills and task expertise. Pioneering research by Bales (1953) and Slater (1955) on small-group settings emphasized the dual necessity of socio-emotional leadership and task leadership. Subsequent research and theorizing on organizational founding teams has explored the extent to which entrepreneurs draw on diverse, complementary skills that may lie beyond the abilities of any individual founder, especially in high technology industries (Gartner 1985:703; Vesper 1990). Eisenhardt and Schoonhoven (1990) linked team diversity to functional performance, noting that organizational growth among semiconductor firms was higher for organizations with heterogeneous founding teams. At a more microlevel, Ancona and Caldwell (1992) reported benefits of functional diversity for communication and innovation in their study of product teams.[5]

We anticipate that new formal organizations in general, rather than just those in high–tech environments, may benefit from having founders with a diverse set of work experiences and occupational backgrounds. Having a chef, a restaurant manager, and a

[4] All hypotheses are subject to the usual *ceteris paribus* conditions. In particular, this means that the marginal distribution of different groups (e.g., men and women) is controlled for, that the probability of joint occurrences from these groups is addressed, and that predictions are advanced net of group size.

[5] Ancona and Caldwell (1992) also identified a potential drawback in that functional diversity might impede successful collaboration.

marketing agent on the founding team, for instance, can enhance the success of a new restaurant. By the same token, a precision manufacturing facility may profit from the entrepreneurial skills of an industrial engineer, an experienced machine operator, and a shop-floor supervisor. Following a functionalist logic, if potential founders anticipate such benefits of skill diversity in advance, then we expect that:

Hypothesis 3: Teams with founders from diverse occupational backgrounds will be more common than will teams lacking functional diversity.

This hypothesis regarding diversity is subject to two important caveats. First, occupational attachments can be a source of homophily, as well as diversity, insofar as occupations provide a common basis of socialization and, possibly, interpersonal relationships. What predominates in a given situation may depend on contact opportunities among individuals from different occupations as well as on the functional salience of occupational diversity per se—as opposed, for example, to diversity in education, previous work roles, and nonoccupational skills. We address this issue in Hypothesis 6.

Second, the desire for a functional division of labor may be contingent on the size of an entrepreneurial team. As Durkheim ([1893] 1949) emphasized, functional specialization tends to increase with group size, largely as a mechanism for the reduction of interpersonal competition. In groups that are characterized by large numbers of members and intensive interaction, a lack of differentiation in functional competencies can lead members to engage in turf battles over resources or work responsibilities. Insofar as teams are subject to similar dilemmas resulting from overlapping competencies, a functionalist logic suggests that:

Hypothesis 4: The occupational diversity of founding team members will increase with team size.

STATUS EXPECTATIONS

Arguments about the mechanisms of homophily and functionality treat distinctions within task groups—based on ascribed or achieved characteristics—as simple nominal ones. However, an extensive literature in social psychology notes that such nominal distinctions tend to be translated into rank-ordered status relationships insofar as they become tied to performance expectations (Berger et al. 1977; Skvoretz and Fararo 1996).[6] Even those ascriptive characteristics that are logically irrelevant to task performance (e.g., gender and race in most task situations) become subject to a "burden of proof process" in which group members must demonstrate that those characteristics are, in fact, substantively irrelevant (Fisek et al. 1991). Consequently, widely held cultural biases regarding status (e.g., of men over women, of ethnic majorities over minorities, etc.) are likely to affect processes of task-group formation and composition.[7]

The principle impact of status expectations on group composition tends to involve differential homophily among status groups. Assuming that only two status groups (A and B) are salient, with A being high-status and B being low-status, we expect that A individuals will have a strong associative preference for other A individuals, while B individuals will also have an associative preference for A individuals (which may not always be fulfilled). One consequence of this pattern is that the observed level of homophily among the elite As will be high, while the observed level of homophily among the lower status Bs will be lower (or perhaps negligible, in the absence of a general homophily mechanism). Bs would rather associate with the higher status As than with one another. Operationally, such status-varying homophily may involve ascribed characteristics (e.g., gender) or achieved characteristics (e.g., occupation), leading to the following predictions for our sample of founding teams:

[6] Blau's (1977) theory of macrostructure likewise distinguishes between *nominal* and *graduated* parameters that may affect social interaction. Unlike the more micro-oriented theories in social psychology, however, he does not account for ways in which nominal parameters may be translated into graduated parameters (or vice versa).

[7] However, the gender effects found in early research on status expectations are probably weaker now in the general population than they were several decades ago.

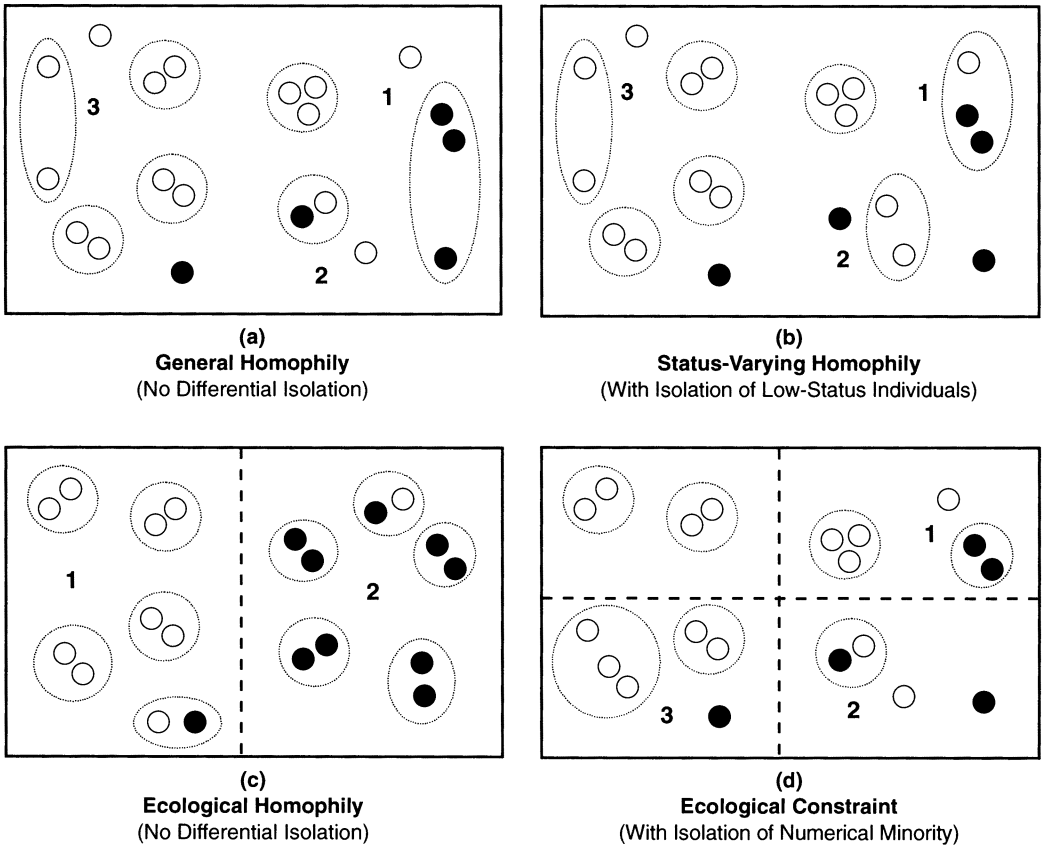

Figure 1. Patterns of Homophily and Isolation

Hypothesis 5: Organizational founding teams composed only of high-status persons (e.g., males, members of the ethnic majority, professionals) will be more common than those created entirely from other statuses.

For some sociodemographic dimensions, this tendency toward high-status homophily appears to be widely institutionalized in contemporary society. For example, the term "old boys network" connotes homophily among male managers and entrepreneurs. Similarly, the legal recognition of a professional partnership or corporation (Burke and Zaloom 1970) increases the likelihood of homophily within professional occupations—though it is more typically described in the guise of professional autonomy and self-determination (Freidson 1986). For other sociodemographic dimensions, the direction of status-varying homophily is less clear. Thus, the literature on ethnic entrepreneurship implies a tendency *away* from high-status homophily, as minorities and immigrants, regardless of occupation, form stronger in-group bonds than do whites in the face of discrimination and lack of alternative career opportunities (Aldrich and Waldinger 1990).

Status-varying homophily has a second general consequence that bears analysis. If members of an elite status group, A, tend to attract other members of A as well as some upstarts from a lower status group, B, it follows that individuals in B will be at higher risk of social isolation than those in A. Bs who are unable to affiliate with As may even prefer going solo, rather than working with other Bs. Notably, this consequence cannot be derived from general homophily alone (see Figure 1a). Given a population of 15 individuals in group A (white circles), five individuals in group B (black circles), and no status differentiation between the two, a general homophily effect predicts proportionate

isolation of A and B individuals, with a relatively high proportion of other individuals in homogeneous groups (1 and 3) and only a few in heterogeneous groups (2). But with the activation of status differences (see Figure 1b), homogeneous low-status groups will seek to incorporate proximate high-status individuals in lieu of low-status ones (1) and formerly heterogeneous groups will tend to drop low-status members to conform to a homogeneous, high-status ideal (2). As a result, low-status individuals become disproportionately isolated.[8]

For entrepreneurs, isolation can pose both functional and social psychological problems. Multimember teams enjoy several benefits over solo entrepreneurs (Kamm and Nurik 1993; Lechler 2001), including a more diverse skill set (Vesper 1990), improved capacity for innovation (Ruef 2002b), and higher levels of social and emotional support (Bird 1989). Consistent with a theory of status expectations, empirical evidence suggests that entrepreneurs with a lower ascribed or achieved status are less likely to be members of teams and enjoy these benefits. For instance, while longitudinal trends in the United States point to the increasing proportion of female entrepreneurs, they also suggest that women are disproportionately involved in founding solo proprietorships, rather than partnerships or corporations (U.S. Department of Commerce 1996). More generally, if status-varying homophily applies to sociodemographic dimensions such as gender, ethnicity, and occupation (Hypothesis 5), it follows that:

Corollary 1: Low-status entrepreneurs (women, minorities, blue-collar workers) will be more likely to be isolated than will those from other sociodemographic backgrounds.

Network Constraint

During the process of group formation, the choice of members based on shared identities, functional considerations, or status expectations is inevitably constrained by structural opportunities for social contact. One conduit of structural opportunity involves prior network ties among group members. These ties can be characterized broadly in terms of three concentric circles of social relationships: family members (strong ties), acquaintances and friends (weak ties), and strangers (Aldrich, Elam, and Reese 1996; also see Granovetter 1973). The extent to which the relational composition of a group relies on one concentric circle rather than another has crucial implications for the operation of other mechanisms of group composition.

Family members, particularly spouses and domestic partners, fulfill many requisites of shared identity that are otherwise generated through homophily. They interact frequently and tend to share rewarding experiences. With respect to entrepreneurial activity, family members have many opportunities to discuss the possibility of starting a new organization together. Ideas that might be superficially discussed and dismissed in other contexts often lead, among kin, to more cumulative plans for action. These considerations suggest that a failure to control for the presence of kinship ties in founding teams may lead to inflated estimates of homophily along certain ascriptive dimensions, particularly ethnicity.

For one ascriptive characteristic, however, the reverse is true. The substantial number of heterosexual spouse pairs that attempt to start business or nonprofit organizations together will deflate estimates of gender homophily (Aldrich, Carter, and Ruef forthcoming). To separate choice homophily from the gender heterogeneity induced by spouse pairs, we recognize that teams including spouse pairs will have greater gender diversity than teams lacking such ties. As with kinship ties, we treat this effect not as a hypothesis, but instead as an assumption about the gender composition of spousal pairs.

Among individuals who are not related but who know each other fairly well—such as work associates working for the same employer or in the same industry—some of the same interpersonal dynamics apply as with family members, but with less intensity. Work associates also have opportunities to develop trust and observe one another's strengths and weaknesses. Nevertheless,

[8] Note that a dynamic consequence of Bs' preferences for affiliations with As and their difficulty of doing so is to further raise the already high status of As.

such functional benefits may be offset to some extent when work associates share overlapping competencies. If many work associates have similar work experiences or occupational backgrounds, the principle of functional diversity (Hypothesis 3) is compromised. Functional complementarity depends, in part, on team members having diverse occupations because they come from different organizations with distinctive divisions of labor. On the other hand, when entrepreneurial teams are developed on the basis of collegial ties, we expect that:

Hypothesis 6: Teams including prior business acquaintances will have less occupational diversity than teams lacking such ties.

Ecological Constraint

Aside from network constraint, the sheer numbers and spatial distribution of individuals having distinctive characteristics will influence what associations are likely to form. The importance of geographic proximity in group formation has long been recognized in both the microsociological (Goffman 1963) and macrosociological (Hawley 1950) literatures. Blau's (1977, 1980) program of macrostructural research develops theorems explicitly on the basis of which nominal or rank-ordered characteristics tend to be more common among the population of a region, leading to ecological constraints on patterns of association. Similar ecological constraints operate at a microlevel, but many are so fundamental to processes of group formation that they constitute baseline expectations about which individuals are expected to be found together in a group, rather than predictions of theoretical interest.

Several implications of ecological constraints on association merit further analysis. Organizational ecologists have emphasized the impact of industrial, as well as spatial, context on founding processes (Carroll and Hannan 2000). With respect to individual entrepreneurs, both industry and spatial constraints can generate aggregate tendencies toward homophily or isolation, independently of the group membership choices being made by the entrepreneurs. For purposes of explication in our hypothetical system of 20 individuals in Figure 1, we now assume that group formation is feasible only within two local "quadrants," which may be geographic or industry-based (Figure 1c). Because of residential or industrial segregation, one quadrant (1) is heavily dominated by individuals in group A (white circles), while the other (2) is dominated by individuals in group B (black circles). If we think of the two quadrants as representing car repair shops and beauty salons, for example, then this pattern might be observed for industry sex segregation, with entrepreneurs in the car repair industry having a 90/10 male-female ratio and entrepreneurs in the beauty salon industry having a 10/90 male-female ratio.[9]

Such extreme cases of industrial segregation can lead to pronounced levels of homophily at an aggregate level, even when teams are constituted by random mixing within industries. Eighty percent of the two-person dyads shown in the figure are homophilous, although we would only expect 50 percent to be homophilous given the marginal gender distribution across industries.[10] When the industries are analyzed separately, however, the number of homophilous dyads in each quadrant reproduce statistical expectations, calculated as $.9 \times .9 \times 1$ combination $= 81$ percent of dyads composed of dominant group members. This reasoning leads to the proposition that homophily—at an aggregate level—can be induced by ecological constraints, as well as network and social psychological mechanisms:

Hypothesis 7: Homogeneous founding teams become more likely under conditions of strong residential and/or industrial segregation among entrepreneurs.

Ecological constraint may have implications for isolation as well as team homo-

[9] We assume that entrepreneurs choose from a restricted range of options when considering which industries to enter. Thus, in the short run, they succumb to the constraints we have identified.

[10] The overall gender distribution is a 50/50 mix. Under a model of random mixing, we would expect 25 percent ($.5 \times .5 \times 1$ combination) of the dyads to involve two males, 25 percent ($.5 \times .5 \times 1$) to involve two females, and 50 percent ($.5 \times .5 \times 2$ combinations) to involve a mixed gender dyad.

phily. In his macrostructural theory, Blau (1977) notes that a population representing the numerical minority along some sociodemographic characteristic would be forced into greater levels of association with a population representing the numerical majority, as the minority population becomes proportionately smaller. In an elaboration on this model, Blau (1980) considers the possibility that members of a numerical minority may be at disproportionate risk of isolation, given the effects of homophily and propinquity (see Figure 1d). The likelihood that members of different groups will associate with one another is affected not only by their relative proportions in the population, but also by their degree of geographical dispersion or segregation. Group formation may only be feasible within local geographic "quadrants." In contrast to a system lacking ecological constraints (see Figure 1a), some geographically dispersed groups that are members of a numerical minority may not be able to find one another, leaving their solo members isolated. Naturally, the problem of ecological constraint also affects groups composed of members from the numerical majority (quadrant 3 in Figure 1d), but in those cases it is easier for the resulting isolates to reorganize themselves with proximate and similar alters. These considerations suggest that:

Corollary 2: Individuals who represent the numerical minority along any sociodemographic dimension will be more likely to be isolated than will those in the numerical majority.[11]

For many ascribed and achieved characteristics, Corollary 2 produces consequences similar to those anticipated because of status-varying homophily (Corollary 1). Our nationally representative sample suggests that female nascent entrepreneurs in the United States are only half as common as male entrepreneurs. Corollary 2 predicts, therefore, that female nascent entrepreneurs will be less likely to find associates with whom to found a new organization, given conditions of general homophily and ecological constraint. The same result, however, could be derived from a status-varying pattern of group formation in which women are less willing to associate with other women, even when geographic proximity is not a significant issue. Distinguishing between the two causes of isolation thus requires careful attention to the salience of general homophily and status-induced differential homophily.

[11] In contrast to Hypothesis 7, Corollary 2 assumes a relatively low level of residential or industrial segregation. High levels of segregation can reduce isolation among members of a numerical minority, while the random dispersion of a minority group among the majority necessarily leads to the former's isolation under conditions of general homophily and ecological constraints on association.

DATA, MEASURES, AND METHOD

Data

We use data from the Panel Study of Entrepreneurial Dynamics (PSED) to analyze the compositional properties of organizational founding teams. Between July 1998 and January 2000 a total of 64,622 individuals in the United States were contacted by telephone using a random-digit dialing process to identify those in the process of starting a business ("nascent entrepreneurs"). The data employed here are organized into three subsamples, which correspond to different funding sources and different data collection periods. The Entrepreneurial Research Consortium (ERC), which consisted primarily of academic institutions, financed data collection for a mixed-gender sample of nascent entrepreneurs. Another subsample was limited to an oversample of women entrepreneurs and funded by the National Science Foundation (NSF). Subsequently, the National Science Foundation provided funding for a third subsample—an oversample of minorities engaged in business start-up activities.

The research design for the PSED specified two phases for data collection. In the first phase, a marketing research firm telephoned households as part of a national survey that involved contacting 1,000 adults (500 females and 500 males 18 years of age or older) each week. Multiple phone calls (at least three) were made to contact each person. When an adult 18 years of age or older was identified and agreed to respond to the

survey, a phone interview was administered. Two items were randomly inserted at different points in the survey and were used to determine whether the respondent qualified as a nascent entrepreneur: (1) "Are you, alone or with others, now trying to start a business?" and (2) "Are you, alone or with others, now starting a new business or new venture for your employer?" If the respondent answered yes to either of the questions, two additional questions were used to qualify whether the respondent was actively involved with the start-up process, and whether he or she would share ownership in the business. Affirmative responses to both additional questions were necessary for individuals to be considered "nascent entrepreneurs." Individuals who qualified as nascent entrepreneurs were invited to participate in a national study conducted through the University of Wisconsin and promised a cash payment.[12]

In the second phase of the data collection, the names, telephone numbers, and basic sociodemographic information of individuals who met the screening criteria were forwarded to the University of Wisconsin Survey Research Laboratory (UWSRL), where a detailed phone interview was conducted followed by a mailed questionnaire. More complete details about the sampling procedures can be found in Shaver et al. (2001).

Sample and Weights

The final sample of PSED respondents totals 830 nascent entrepreneurs. Of these, 7 respondents indicated that "nonpersons" expected to own more than 50 percent of the venture. We removed these cases from analyses, reasoning that they were influenced unduly by corporate interests rather than by the initiative of individual entrepreneurs. Six respondents indicated that their new venture had positive cash flow for more than 90 days before the initial interview by UWSRL. We considered these efforts to be infant businesses and removed them from the analyses. Finally, one respondent indicated that their start-up involved a team, but failed to provide sociodemographic information that could be used to classify the respondent's gender or race/ethnicity. The case was disqualified. The elimination of these 14 cases reduced the sample size to 816 nascent entrepreneurs.

Because several of the subsamples described above involved oversampling of certain subgroups of the population, we employed post-stratification weights for each respondent based on estimates from the U.S. Census Bureau's Current Population Survey. The post-stratification scheme was based on gender, age, education, and race/ethnicity. More complete details about the computation of the weighting scheme can be found in Reynolds (2000).

Measures

The data of interest here come from items on the phone interview that were designed to collect information about: (1) characteristics of people who were helping to start the venture, and (2) relationships among the founding members (if applicable). During the UWSRL phone interview, respondents were asked, "How many people will legally own this new business—only you, only you and your spouse, or you and other people or businesses?" If the respondent indicated others would share ownership in the venture, they were asked to identify up to five who would have the highest level of ownership, and the ownership percentage to be held by each team member.[13] The respondent was then asked to provide information about each cofounder, including gender, ethnicity (white, African American, nonwhite Hispanic, Asian, other), primary occupation (open-ended response later classified into four categories: professional/technical; administrative/managerial; sales/service; operative/production), and the nature of the

[12] Offering incentives to gain participants, or to convert nonrespondents, has become a common practice in survey organizations (Singer, Van Hoewyk, and Maher 2000). A traditional method used to increase response rates in mail surveys, the practice has been expanded to telephone projects using random-digit dialing.

[13] Although this data collection procedure may truncate the team size distribution, less than 1 percent of the teams in the ERC sample involved more than six members (Reynolds 2002, personal communication).

Table 2. Descriptive Statistics for Organizational Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

Variable	Number of Cases	Response	Weighted Count/Proportion
Size of team	816	One member	395
		Two members	312
		Three members	55
		Four members	31
		Five+ members	23
Industry of team	800	Primary/manufacturing	.19
		Personal service	.17
		Retail/wholesale	.28
		Business/professional Service	.36
Gender of member	1,423	Male	.62
		Female	.38
Gender composition of multimember team	421	All male	.29
		All female	.07
		Mixed-gender	.64
Ethnicity of member	1,347 [a]	White	.72
		Black	.17
		Hispanic	.09
		Asian	.02
Ethnic composition of multimember team	399 [a]	Single ethnicity	.86
		Multiple ethnicities	.14
Occupation of member	1,089 [b]	Professional	.30
		Administrative	.28
		Sales/service	.21
		Operative/production	.21
Occupational composition of multimember team	303 [b]	Single occupation	.32
		Multiple occupations	.68
Relational composition of multimember team	421	With spouses/partners	.53
		With nonspouse family member	.18
		With business associates	.15

[a] Excludes multimember teams involving other ethnicities or with missing information.

[b] Excludes multimember teams with any missing information on occupational composition.

relationships among all team members (spouses/partners; relatives/family members; business associates/work colleagues; friends/acquaintances; strangers before joining the team; other).

The dependent variable in our analysis involves the number of founding teams conforming to a particular combination of sociodemographic and relational characteristics. In turn, those characteristics—and the design parameters that describe how they are combined—serve as the independent variables. Our methodological approach employs the 816 sampled founding teams as its units of analysis, while incorporating information on the 1,423 individual persons that make up the teams (see Table 2).[14]

The size distribution of the teams in our weighted sample follows the truncated Poisson distribution that has been noted more

[14] A few teams also involved institutional founding members; these members are ignored in the following analyses.

generally for free-forming groups (Coleman and James 1961; White 1962), with a substantial number of solo entrepreneurs (395) and relatively few large teams (e.g., 23 founding teams involving five or more entrepreneurs). The majority of the entrepreneurs in the sample are white (72 percent) males (62 percent) involved in professional (30 percent) or administrative (28 percent) occupations. We also report some aspects of team composition for the 421 multimember founding teams (i.e., excluding "solo" entrepreneurs). These statistics indicate that most multimember teams involve a mixture of men and women (64 percent), relatively few incorporate members from more than one ethnicity (14 percent), and over half include married couples or cohabitating partners (53 percent). The majority of multimember teams (68 percent) display some functional diversity, drawing on more than one occupational category.

Statistical Methodology

We employ a structural event analysis (Ruef 2002a) to predict the number of entrepreneurial teams matching some set of compositional characteristics, considering all possible teams (not just those that actually form). The risk set of possible teams is enumerated using counting rules drawn from combinatorial analysis (see Appendix A). Each potential team is treated as a case for purposes of analysis, leading to a Poisson distribution of team counts (Goodman 1964). These counts can then be predicted via the following Poisson regression:

$$P[f(E_i) = y] = e^{-\lambda}(\lambda^y / y!), \qquad (1)$$

where λ is defined in terms of the conditional probability for structural event occurrence $\lambda = f(p[E|r], r)$, and r specifies the size of each team. A baseline probability for each group, under an assumption of random population mixing (see Appendix A), is included as a fixed parameter in every Poisson regression. All other design parameters reflect deviations from random mixing and are estimated using maximum-likelihood techniques.

Because the number of possible teams grows exponentially for analyses involving multiple sociodemographic dimensions, bootstrap techniques are used to analyze large, sparse matrices. In these cases, we construct a sample by selecting all cells with a nonzero observed count of founding teams, all other cells involving solo entrepreneurs or dyads, and one percent of the cells with an expected team size of three or greater and no observed team counts.[15] Structural zeros—those cells where a marginal frequency is zero—are removed from the sample. Weighted maximum-likelihood techniques are used to derive the corresponding estimates.

RESULTS

We test the theoretical claims advanced in Table 1 via a series of analyses that address compositional properties among entrepreneurial founding teams, beginning with a simple descriptive analysis of gender homophily (see Table 3). Using rote enumeration, we see that there are 20 possible teams involving unrestricted combinations of the two gender roles ([M]ale and [F]emale). The same quantity can be derived from the respective counting rule (see Appendix A, equation A-1), which yields 2 + 3 + 4 + 5 + 6 = 20 structural events for a system of two roles ($|N| = 2$) and no more than five participants per group ($r(H) = 5$). Categorizing teams further by the presence of spouse/partner ties, there are 20 possible gender combinations with no spouses or partners, 18 possible combinations with one spouse/partner pair (i.e., excluding solos), and 11 possible combinations with two spouse/partner pairs. The corresponding 49 structural events are shown in Table 3.

Inspection of the observed counts indicates that over a third (18) of the possible structural events are not actually realized for this sample; one gender combination (MFFFF) is not observed for any of the subsamples based on the presence of spouse/partner pairs. The expected counts in the table are derived using the multinomial formula (Appendix A, equation A-2) and knowledge of the marginal distributions.

[15] The sampling rate for the bootstrap methodology is based on the low sampling error anticipated for this sample size. The results are virtually identical when the rate is doubled or tripled.

Table 3. Observed and Expected Cell Counts for Gender Composition of Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

Structural Event	Observed Count	Expected Count
Teams without Spouses/Partners		
M	228	245.9
F	166	148.1
MM	73	46.7
FF	27	17.0
MF	20	56.3
MMM	28	10.7
FFF	2	2.3
MFF	3	11.7
FMM	11	19.3
MMMM	9	2.4
FFFF	1	.3
MMFF	2	5.3
MFFF	2	2.1
FMMM	2	5.8
MMMMM	10	1.6
FFFFF	1	.1
MMFFF	0	3.5
FFMMM	2	5.8
MFFFF	0	1.1
FMMMM	4	4.8
Teams with One Spouse/Partner Dyad		
(MM)	2	75.1
(FF)	0	27.4
(MF)	191	90.5
(MMM)	0	2.7
(FFF)	0	.6
Teams with One Spouse/Partner Dyad (Continued)		
(MFF)	4	2.9
(FMM)	7	4.8
(MMMM)	0	1.5
(FFFF)	0	.2
(MMFF)	1	3.3
(MFFF)	2	1.3
(FMMM)	7	3.7
(MMMMM)	0	.3
(FFFFF)	0	.0
(MMFFF)	1	.6
(FFMMM)	1	1.0
(MFFFF)	0	.2
(FMMMM)	1	.9
Teams with Two Spouse/Partner Dyads		
(MMMM)	0	.8
(FFFF)	0	.1
(MMFF)	5	1.7
(MFFF)	0	.7
(FMMM)	0	1.8
(MMMMM)	0	.2
(FFFFF)	0	.0
(MMFFF)	1	.4
(FFMMM)	1	.7
(MFFFF)	0	.1
(FMMMM)	0	.6

Note: The sum of observed counts may not equal marginal totals because of rounding errors. Parentheses indicate spouse/partner relationships; N = 816.

Shaded areas indicate homogeneous multimember teams.

Men make up 62 percent of the entrepreneurs in the weighted sample, while women make up the remaining 38 percent. The distribution for the five size categories is: 395, 312, 55, 31, and 23. Finally, we note that 52 percent of the four-person founding teams do not include any spouse or partner pairs. Thus, to use one illustrative example, the expected number of founding teams without a spouse/partner pair composed of two men and two women is calculated as $[4!/(2! \times 2!)] (.62^2 \times .38^2) (31) (.52) \approx 5.3$, more than twice the observed cell count. In many cases, we find that observed counts of single-gender teams (see shaded areas in table) exceed expectations, while counts of mixed-gender teams are lower than expectations. Exceptions to the rule tend to occur when spouse/partner ties exist within the founding teams.

To further examine the interaction of gender homophily and network constraint, we conducted a structural event analysis using Poisson regression models (see Table 4, Models 1 through 3). Model 1 illustrates

Table 4. Coefficients from Poisson Regression Models Testing Gender Composition of Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

	Baseline Models			Models Controlling for Network Ties	
Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.976*** (.050)	6.894*** (.069)	8.207*** (.189)	6.714*** (.244)	6.725*** (.244)
Team size	—	−.782*** (.034)	−1.188*** (.069)	−1.052*** (.068)	−1.056*** (.068)
Size Category					
1 member	—	—	−1.043*** (.135)	.315 (.201)	.232 (.205)
2 members	−.230** (.076)	—	—	—	—
3 members	−1.969*** (.144)	—	—	—	—
4 members	−2.542*** (.187)	—	—	—	—
5 members	−2.886*** (.219)	—	—	—	—
Homophily					
Gender homophily	—	—	−.355+++ (.104)	1.611+++ (.171)	1.457+++ (.236)
Status-varying homophily	—	—	—	—	.195 (.201)
Minority isolation [a]	—	—	—	—	.189+ (.102)
Opportunity Structure					
Partners/spouses × Gender homophily	—	—	—	−6.258+++ (.730)	−6.253+++ (.730)
Model fit (G^2)	438.94	517.43	458.90	78.72	74.34
Degrees of freedom (design/fixed)	5/7	2/7	4/7	5/8	7/8

Note: Numbers in parentheses are standard errors. Number of structural events = 49; number of teams = 816.

[a] Women represent the gender minority.

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

+$p < .05$ ++$p < .01$ +++$p < .001$ (one-tailed tests)

how a structural event analysis can be used to recover the distribution of group sizes for a particular sample. The specification implicitly includes a fixed parameter log $p(E|r)$ with a coefficient constrained to 1.0, which accounts for the probability of observing a given gender composition under an assumption of random mixing (see Appendix A, equation A-2). The fixed parameter is calculated based on the marginal distributions of gender and of spouse/partnership ties across different team sizes (d.f. = 7).[16] The specification also includes an intercept and four design parameters for different team sizes.

[16] One degree of freedom is employed for the marginal gender distribution, four degrees of freedom are employed for the distribution of groups with a single spouse/partner dyad across team sizes two through five, and two degrees of freedom are employed for the distribution of groups with two spouse/partner dyads among team sizes four and five.

Adding the intercept (which corresponds to the number of founding "teams" with only a single member) to the respective coefficient estimates and taking the antilog allows us to recover the marginal size distribution (e.g., the number of four-member founding teams is $e^{5.976-2.542} = e^{3.434} = 31$).

Following the distributional implications of Goodman's (1964) model for group formation, Model 2 replaces the four size dummy variables with a single parameter for group size. Consistent with previous observations of free-forming groups (e.g. Coleman and James 1961; Mayhew et al. 1995), the parameter estimate reflects the fact that the observed frequency of founding teams varies inversely with size. This parsimonious model specification is then used as a baseline for a test of the homophily mechanism in Model 3, which adds two new design parameters. The parameter for homophily identifies whether a team is all-male or all-female (= 1) or of mixed composition (= 0). Surprisingly, the results suggest a strong *negative* effect for gender homophily ($p < .001$), with homogeneous groups appearing at a rate that is .70 ($e^{-.355}$) times that of comparable heterogeneous groups. This apparent tendency away from gender homophily seems to reflect the large number of heterosexual spouse and partner dyads on these entrepreneurial teams: 217 teams in the weighted sample included one spouse/partner pair and 7 teams included two.[17]

To what extent is gender heterogeneity induced by structural opportunity (e.g., selection of spouses as team members), and to what extent does it occur because of choice of dissimilar alters? Models 4 and 5 explore this issue by including a design parameter for single-gender teams with partner or spouse dyads. The results provide a more accurate picture of tendencies toward homophily (Model 4). Consistent with Hypothesis 1, there is now significant *positive* gender homophily ($p < .001$), with homogeneous teams being five times ($e^{1.611}$) more likely than heterogeneous teams, net of romantic relationships. The specification in Model 4 illustrates the importance of separating the effect of the network constraint mechanism from the homophily mechanism.

Model 5 extends the analysis, considering whether there is substantial status-varying homophily—with all-male teams being more common than all-female teams—and whether female entrepreneurs tend to become disproportionately isolated. Contrary to status expectations theory (Hypothesis 5), there is no evidence that male entrepreneurs are more likely to band together than are female entrepreneurs. Nevertheless, there is disproportionate isolation of women in this sample, with solo female entrepreneurs appearing 1.21 times as often as expected based on the marginal distribution of gender. Given that entrepreneurial team formation is subject to general homophily but not status-varying homophily, we suggest (following Corollary 2) that the principal reason for the isolation of women may be ecological constraint. Because female entrepreneurs are far less common than male entrepreneurs, they may experience greater difficulty in finding other women with whom to start a business in their industry.

This explanation of gender homophily and differential isolation assumes that there is not a strong tendency toward gender segregation, particularly across industrial sectors. If gender segregation is high, then homophily may result as an artifact of ecological constraints on contact opportunities (Hypothesis 7). To explore this possibility, we split our founding team sample into subsamples based on industry categories—primary/manufacturing, retail/wholesale, personal services, business/professional services—and examined the gender distribution and level of homophily within each category (see Table 5).[18] There is some evidence of industrial sex segregation, with one sector—including primary and manufacturing industries—exhibiting a skewed gender distribution and no significant

[17] The other new parameter in Model 3 controls for "teams" composed of a single entrepreneur, which are tautologically homophilous. The corresponding parameter estimate is not substantively interesting in and of itself, but permits consistent estimation of the model independently of the way that gender homophily is coded for solo entrepreneurs.

[18] To eliminate the confounding influence of network constraint, this analysis excludes teams with spouse or partner dyads.

Table 5. Gender Composition and Coefficients for Gender Homophily of Founding Teams by Industrial Sector: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

Industrial Sector	Gender Composition (Percent Male)	Gender Homophily Coefficients		Number of Events
		Coef.	(S.E.)	
Primary/manufacturing	88	.618	(.422)	105
Personal services	64	1.790***	(.438)	97
Retail/wholesale	61	1.323***	(.321)	163
Business/professional services	65	1.849***	(.304)	216
All sectors		1.570***	(.179)	581 [a]

Note: Numbers in parentheses are standard errors.

[a] Limited to teams reporting start-up industry (N = 800) and excluding teams with spouses/partners.

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

intraindustry homophily. On the whole, however, estimates of intraindustry homophily tend to be similar to the level of homophily for the sample as a whole. This suggests that gender homogeneity is not generally an artifact of ecological constraints on team formation.

Table 6 presents a structural event analysis for a second major dimension of ascriptive homophily—ethnic composition. The basic risk set of structural events is again determined by counting rule (equation A-1 in Appendix A), calculated as 4 + 10 + 20 + 35 + 56 = 125 potential events for a system of four ethnic identities ($|N| = 4$) and maximum team size of 5. Differentiating between teams that contain kinship ties and those that do not, we obtain another 121 potential events (the basic risk set minus the four types of ethnicity for solo entrepreneurs), for a total of 246 structural events. Because of incomplete ethnic information among some founding teams, we restrict our sample to 778 teams for this analysis.

Models 1 and 2 again illustrate how the team size distribution can be modeled using nonparametric and parametric specifications, respectively. These models are substantively identical to the first two shown in Table 4, except they take account of data attrition owing to missing information on ethnicity. Model 3 addresses the prediction that ethnically homogeneous teams will be more common than heterogeneous teams (Hypothesis 2). We enter a parameter into the model based on the Shannon-Weaver entropy (H) of ethnic composition in each team.[19] The estimated level of ethnic homophily is high, with homogeneous teams being 46 times as likely to occur as expected by chance. In particular, this finding reflects the fact that homogeneous minority teams are common, despite the relative rarity of minority entrepreneurs in the population as a whole. For instance, we observe four teams composed of four African American entrepreneurs, although only .02 team is expected under a model of random mixing.

To some extent, ethnic homogeneity may be generated through kinship ties in the entrepreneurial teams. Model 4 reveals that family networks do increase ethnic homophily, as we assumed, but are not the only source of it. Teams involving both familial networks and ethnic diversity are extremely rare—only one case in our weighted sample matches this pattern. However, even controlling for this opportunity structure, ethnically homogeneous teams occur at a rate that is 27 times expectations. Examining differential levels of homophily among ethnic groups (Model 5), we find that minorities have a significantly higher tendency toward homogeneity than do whites. White entrepreneurs

[19] The measure of diversity is computed as:

$$H = -\sum_{i=1}^{n}\left(\frac{\log y_i}{\log n}\right)y_i,$$

where n is the number of ethnic categories, and y_i is the proportion of team members within each category i (Shannon and Weaver [1949] 1963). Ethnic homophily is simply $1 - H$.

Table 6. Coefficients from Poisson Regression Models Testing the Ethnic Composition of Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

	Baseline Models			Models Controlling for Network Ties	
Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.938*** (.051)	6.864*** (.071)	4.078*** (.352)	4.533*** (.351)	2.770*** (.390)
Team size	—	−.791*** (.036)	−.909*** (.070)	−.887*** (.072)	−.818*** (.072)
Size Category					
1 member	—	—	−1.064*** (.122)	−1.005*** (.122)	−2.448*** (.153)
2 members	−.248** (.078)	—	—	—	—
3 members	−1.946*** (.145)	—	—	—	—
4 members	−2.548*** (.191)	—	—	—	—
5 members	−2.997*** (.235)	—	—	—	—
Homophily					
Ethnic homophily	—	—	3.833+++ (.297)	3.297+++ (.304)	6.378+++ (.382)
Status-varying homophily	—	—	—	—	−1.693+++ (.133)
Minority isolation [a]	—	—	—	—	.184+ (.111)
Opportunity Structure					
Family ties × Ethnic homophily	—	—	—	4.990+++ (1.552)	5.498+++ (1.580)
Model fit (G^2)	557.70	627.45	335.95	315.07	194.56
Degrees of freedom (design/fixed)	5/7	2/7	4/7	5/8	7/8

Note: Numbers in parentheses are standard errors. Number of structural events = 246; number of teams = 778. Ethnic information is missing for 38 teams.

[a] Blacks, Hispanics, and Asians represent ethnic minorities.

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

+$p < .05$ ++$p < .01$ +++$p < .001$ (one-tailed tests)

are only .18 times as likely to develop monoethnic teams as are African Americans, Asians, and nonwhite Hispanics. Nevertheless, despite the propensity of many minority entrepreneurs to work within ethnic enclaves, they are still 1.20 times more likely to be isolated than white entrepreneurs, given ecological constraints on contact opportunities with other minority entrepreneurs (Corollary 2).

We turn next to the question of functional diversity, examining occupational composition within these founding teams (Table 7). Model 3 addresses the prediction that functionally diverse teams will be more common than expected under a model of random mixing (Hypothesis 3), again using an entropy measure of team composition (see footnote 19). The resulting coefficient estimate suggests a statistically nonsignificant effect for occupational diversity. Moreover, contrary to Hypothesis 4, there is a pronounced ten-

Table 7. Coefficients From Poisson Regression Models Testing the Occupational Composition of Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

	Baseline Models			Models Controlling for Business Ties	
Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.892*** (.053)	6.872*** (.078)	6.846*** (.418)	6.865*** (.418)	6.907*** (.427)
Team size	—	−.889*** (.041)	−.537** (.181)	−.564** (.183)	−.568** (.184)
Size Category					
1 member	—	—	−.418 (.251)	−.409 (.251)	−.498 (.265)
2 members	−.447*** (.084)	—	—	—	—
3 members	−2.323*** (.176)	—	—	—	—
4 members	−2.826*** (.222)	—	—	—	—
5 members	−3.223*** (.269)	—	—	—	—
Functionality					
Occupational diversity	—	—	.466 (.838)	.415 (.836)	.323 (.858)
Diversity × team size	—	—	−.850* (.337)	−.766* (.340)	−.754* (.342)
Status-varying homophily	—	—	—	—	−.103 (.214)
Minority isolation [a]	—	—	—	—	.224+ (.122)
Opportunity Structure					
Business ties × Occupational diversity	—	—	—	−.928 (.607)	−.932 (.609)
Model fit (G^2)	245.76	294.47	225.71	223.28	219.78
Degrees of freedom (design/fixed)	5/7	2/7	5/7	6/8	8/8

Note: Numbers in parentheses are standard errors. Number of structural events = 246; number of teams = 665. Occupational information is missing for 151 teams.

[a] Operations/production workers represent the occupational minority.

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

+$p < .05$ ++$p < .01$ +++$p < .001$ (one-tailed tests)

dency *away* from occupational specialization with increases in team size. Rather than emphasizing complementarities among different functions, larger founding teams seem to be characterized by homophily, even for achieved attributes such as occupation, once baseline interaction probabilities are taken into account.

Models 4 and 5 examine the extent to which this low level of occupational diversity is induced by prior network relationships—in particular, the presence of former business associates on founding teams.[20] We

[20] Simple bivariate statistics suggest that the network density of business relationships in multimember teams has a slight (nonsignificant) negative correlation with the number of occupations represented ($r = -.04$). The lack of association between the two variables suggests that we

Table 8. Occupational Composition and Coefficients for Occupational Diversity of Founding Teams by Industrial Sector: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

Industrial Sector	Occupational Composition: Percent Production/ Operative	Percent Sales/ Service	Percent Administrative	Percent Professional	Occupational Diversity Coefficients	Number of Events
Primary/manufacturing	41	20	21	17	−.980 (.583)	110
Personal services	24	23	25	29	−1.513** (.549)	117
Retail/wholesale	21	22	28	29	−.540 (.506)	167
Business/professional services	14	22	31	33	−1.530** (.468)	218
All sectors					−1.312*** (.260)	613 [a]

Note: Numbers in parentheses are standard errors.

[a] Limited to teams reporting occupational composition and start-up industry (N = 654); excludes teams with business associates.

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

constructed our measure of business ties within founding teams by counting any prior business-related association between two members of the team as an indication that the team's founding was influenced by business ties. As shown in Model 4, business ties do not decrease occupational diversity significantly (cf. Hypothesis 6). Inclusion of this effect only slightly attenuates the level of homogeneity from other structural and psychological mechanisms. The entrepreneurs in larger teams continue to show a pronounced tendency to congregate based on occupational similarity, rather than attention to functional diversity.

Model 5 completes the model specification, estimating parameters for the extent of disproportionate homophily among high-status occupations (professionals and paraprofessionals), as well as disproportionate isolation among low-status occupations (production and operations workers). Consistent with our findings for gender and ethnicity, there is no evidence of differential homophily among high-status entrepreneurs (contrary to Hypothesis 5), whereas there is evidence of a tendency toward differential isolation for blue-collar operatives and production workers. More specifically, entrepreneurs from a blue-collar background are 1.25 times more likely to be isolated than would be expected under a model of random mixing. Again, following Corollary 2, we suggest that this is a likely consequence of ecological constraint combined with a general tendency toward occupational homophily. Because organizational founders from a blue-collar background represent only 21 percent of all nascent entrepreneurs, they are slightly less likely to find other blue-collar workers with whom they can go into business.

As for the case of gender composition, occupational homophily may result from the segregation of occupations across industrial sectors or from the homogeneous selection of team members within sectors. A cross-tabulation of team member backgrounds and start-up industries reveals some segregation in this respect, with those founders having production or operative experience being more common among primary/manufacturing start-ups and those founders having administrative or professional experience being more common among business service/professional firms (see Table 8). Still, the sector-specific marginal distributions suggest that there is considerable potential for occupational diversity, even considering the ecological constraints imposed by industry.

are not dealing with occupational subcultures. Network density is computed using the conventional formula for undirected graphs (Wasserman and Faust 1994).

Table 9. Coefficients from Poisson Regression Models Testing the Gender, Ethnic, and Occupational Composition of Founding Teams: Panel Study of Entrepreneurial Dynamics, 1998 to 2000

Independent Variable	Model 1 Coef.	(S.E.)	Model 2 Coef.	(S.E.)	Model 3 Coef.	(S.E.)
Intercept	3.082***	(.554)	2.602***	(.571)	.777	(.607)
Team size	−.269	(.193)	−.370	(.199)	−.306	(.197)
Size Category						
1 member	−1.017***	(.259)	.021	(.329)	−1.550***	(.358)
Homophily						
Gender homophily	−.580+++	(.125)	1.362+++	(.222)	1.263+++	(.273)
Status homophily (males)	—		—		.275	(.222)
Ethnic homophily	4.056+++	(.341)	3.599+++	(.337)	6.734+++	(.421)
Status homophily (whites)	—		—		−1.732+++	(.147)
Functionality						
Occupational diversity	.550	(.847)	.528	(.882)	.533	(.882)
Diversity × Team size	−.869*	(.359)	−.848*	(.378)	−.867*	(.367)
Status homophily (professionals)	—		—		−.126	(.220)
Isolation						
Women	—		—		.214+	(.115)
Ethnic minorities	—		—		.150	(.116)
Blue-collar workers	—		—		.289+	(.131)
Opportunity Structure						
Partners × Gender homophily	—		[F] [a]		[F] [a]	
Family Ties × Ethnic homophily	—		[F] [a]		[F] [a]	
Business ties × Occupational diversity	—		−.731	(.578)	−.699	(.585)
Model fit (G^2)	1514.65		1274.63		1162.44	
Degrees of freedom (design/fixed)	7/33		8/38		14/38	

Note: Numbers in parentheses are standard errors. Number of structural events = 23,110; number of teams = 639. Occupational or ethnic information is missing for 177 teams.

[a] Indicates parameters that are fixed due to empirical zeros.

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

+$p < .05$ ++$p < .01$ +++$p < .001$ (one-tailed tests)

Further evidence concerning the impact of ecological constraint can be found in the sector-specific estimates of occupational diversity. To simplify these analyses, we ignore interaction effects with team size and only estimate a single design parameter for occupational diversity. Founding teams in some industrial sectors—such as personal, business, and professional services—display the same trend away from occupational diversity observed in aggregate-level analyses. For other industrial sectors—including extractive, manufacturing, and retail/wholesale businesses—the tendency away from occupational diversity is not statistically significant. Although there is still no support for Hypothesis 3, the variability in sector-specific levels of occupational composition suggests that a small amount of the homogeneity observed among larger teams in the aggregate analysis is generated through ecological constraints (consistent with Hypothesis 7).

Given that occupation tends to be correlated with gender and ethnicity, the question remains whether the apparent occupational

homophily within these teams is not simply derivative of homophily along ascriptive dimensions. We examine this issue using a combined structural event analysis of all three factors. Considering gender, occupation, and ethnicity together yields 32 role combinations at the individual level—white male professionals, white female professionals, black male professionals, black female professionals, etc. The basic risk set is therefore $s(H) = 32 + 528 + 5{,}984 + 52{,}360 + 376{,}992 = 435{,}896$ possible structural events (equation A-1). Because prior network ties may influence diversity and homogeneity in these groups, we parse multimember teams further into those that contain romantic, familial, and/or business ties and those that do not, leading to $2 \times 2 \times 2 \times 435{,}896 - 224 = 3{,}486{,}944$ structural events. After bootstrap sampling, 23,110 cases are considered in the analysis (see Table 9).

Controlling for structural opportunity, the impact of homophily and functional considerations on team composition can be seen in Model 2.[21] The tendencies toward ascriptive homophily and away from occupational diversity (in larger teams) are highly significant and comparable in magnitude to estimates from models that exclude other factors (see Tables 4, 6, and 7). As shown in Model 3, there is no evidence of differential homophily among males or professionals, while in-group preferences among whites are substantially lower than those observed for ethnic minorities. The variation of in-group preferences explains why ethnic minorities do not exhibit disproportionate levels of isolation, but women and blue-collar workers are likely to become solo entrepreneurs. The relative magnitude of isolation among the latter two social identities also provides additional support for the existence of ecological constraints on team formation, as isolation is predicted to be a function of the numerical prevalence of each identity under conditions of general homophily (Corollary 2). Accordingly, women, who represent 38 percent of the entrepreneurial population, should be less isolated than entrepreneurs from blue-collar backgrounds, who represent only 21 percent of the population. While our findings are consistent with this pattern of prevalence, it should be emphasized that the difference in the magnitude of the two estimates is quite small (an incidence rate ratio of 1.24 as opposed to 1.34, respectively).

As in previous analyses, strong network ties have a substantial impact on team composition, with ties among spouses/partners decreasing the gender homophily of entrepreneurial teams and ties among family members increasing ethnic homophily (cf. Models 1 and 2 in Table 9). Weak ties, on the other hand, do not play a statistically significant role in this analysis. Specifically, the presence of business acquaintances on the teams does not reduce occupational diversity markedly, once other factors are taken into account.

DISCUSSION

Using a nationally representative sample of organizational founding teams, we have tested for the operation of five mechanisms affecting the composition of entrepreneurial groups. We found strong support for one mechanism that influences group composition: homophily with respect to both ascriptive *and* achieved characteristics (in particular, gender, ethnicity, and occupation). We found mixed support for two other mechanisms—network and ecological constraint. The network constraint imposed by "strong" ties, such as romantic relationships and family ties, was quite pronounced, but "weak" ties, measured in our study by business acquaintances, imposed no significant network constraint. Our findings also suggest that ecological constraint contributes to the disproportionate isolation of numerical minorities—such as women and blue-collar workers—in the population of entrepreneurs. On the other hand, ecological segregation of these groups by industry does not appear to be a dominant factor driving team homophily.

We found little empirical support for two other mechanisms of group composition: functional diversification of achieved char-

[21] After removing cases with missing information on occupation and ethnicity, there are no founding teams with same-sex partners or with multi-ethnic family members. Consequently, the corresponding interaction effects are included as fixed, rather than empirical, parameters.

acteristics and differential homophily based on status expectations. Although baseline estimates of functional diversity were consistently insignificant, we found an unexpected tendency *away* from occupational specialization in larger teams. Contrary to Durkheim's ([1893] 1949) familiar argument, pressures for solidarity in these groups do not seem to favor the weak bonds of functional interdependence but instead contribute to functional homophily. Additional longitudinal research is required to identify how growth (or decline) in each team may lead to evolutionary changes in the mechanisms of group composition.

Our results concerning minority isolation are also provocative, suggesting that isolation in a founding team formation process can proceed without recourse to the stereotyped performance expectations associated with status-varying homophily. In short, social isolation can be produced largely by ecological, rather than psychological, mechanisms. However, as observed for the nonwhite ethnicities in our sample, *reverse* status homophily—particularly that producing greater in-group preferences among numerical minorities—may help combat the effects of ecological isolation.

Implications for Theory

We studied naturally occurring groups involved in activities of fundamental importance to market-based economies: the emergence of new business start-ups. Our investigation thus goes beyond previous work on groups, which has mainly focused on concocted or well-established social units, such as work teams within established firms (Arrow et al. 2000). Within organizations, individuals usually have little choice in which teams to join or whom they will associate with on such teams. By contrast, the composition of entrepreneurial teams is likely to reflect the influence of patterns of association in which people are embedded within families, friendship circles, workplaces, and residential areas. As such, they provide an excellent context in which to observe the operation of basic social processes, such as homophily.

Our results represent a significant contribution to the accumulated set of empirical generalizations regarding homophily in social relations (McPherson et al. 2001). Even in a situation where we might reasonably expect stringent economic rationality to prevail—and thus lead to choices based on the functional diversification of achieved characteristics—we find that team composition is driven by similarity, not differences. Founders of organizations appear more concerned with trust and familiarity, at this early stage, than with functional competence, leading to a "competency discount" in founder recruitment. Just as in other areas of economic life, commercial exchanges involved in organizational foundings are strongly influenced by socially embedded patterns of associations (DiMaggio and Louch 1998; Zelizer 1994).

Our findings underscore a paradox of group formation that parallels similar structural dynamics identified in dyadic relationships (Burt 1992; Granovetter 1973). Granovetter (1992) described two aspects of network embeddedness that highlight the processes involved in team formation. Relational embeddedness refers to the depth of single dyadic ties, such as their degree of multiplexity and positive emotional investment. Structural embeddedness refers to the extent to which the mutual contacts of a dyad are themselves connected to one another. Our results show that relational embeddedness—prior ties along several dimensions—apparently dampen the functional diversity that Granovetter argued is achieved by weak ties or that Burt (1992) argued is achieved by structural holes.

During team composition, entrepreneurs seek out trusted alters, as well as those with whom they already have strong interpersonal relationships, while avoiding strangers who could bring fresh perspectives and ideas to the organizational founding process. Only 10 percent of the dyadic relationships within the PSED sample involve strangers (Aldrich et al. forthcoming). Interestingly, the number of distinctive occupational categories in teams involving strangers (mean = 2.1) is significantly higher than the number found in teams without strangers (mean = 1.3; t-statistic = 6.5; $p < .001$). Thus, entrepreneurs' tendency to avoid the inclusion of strangers on founding teams tends to decrease functional diversity and may, in the

long run, inhibit the success of new formal organizations.[22]

At the outset, we noted that new organizations can reproduce and challenge the existing social order and that the kinds of organizations people construct are culturally embedded. The composition of entrepreneurial founding teams reflects the tendency toward gender, ethnic, and occupational homophily in the contemporary United States. Our results point to the emergence of social units that, if they persist, will exacerbate the already strong tendencies toward homophily in social relationships. Organizations are a significant sorting point along many dimensions of membership, especially gender and occupation. Our results confirm this tendency. Although McPherson et al. (2001) argue that organizations often create heterogeneity on the dimension of race, our results strongly suggest that, at least for organizational founders, teams are highly homogeneous by race and ethnicity. If homogeneous founding teams also hire employees similar to themselves, then new organizations represent a potent force for solidifying homophily within commercial relationships.

CAVEATS AND FUTURE CONSIDERATIONS

Our knowledge of organizational founding teams is still at a preliminary stage. A more complete description of compositional properties would consider additional characteristics, particularly other achieved characteristics that may be linked to functional diversity. It could be argued that our current occupational measure fails to capture more subtle functional properties of team member contributions. Thus far, we have also had little to say concerning the consequences of team composition and the evolution of compositional properties over time. Team composition may have a substantial impact on the problem of "collective action" in emergent formal organizations—that is, the problem of balancing the contributions of individual team members against the rewards they expect to receive from the collective enterprise (Simon 1945). Is the balance of contributions influenced only by the ascribed, achieved, and network characteristics of individual members? Or is the balance influenced by the composition of the organizational founding team as a whole, or by ecological properties of other teams in a given industry or geographic region? In turn, the balance of contributions and inducements—along with the initial composition of the teams—may influence the evolution of group composition. What members tend to stay and what members tend to leave organizational founding teams? Who is added to these groups? What mechanisms (homophily, functionality, status expectations, network or ecological constraint) govern this evolutionary process? Answering these questions represents an essential step in developing a more comprehensive understanding of the emergence of formal groups and organizations.

[22] Whether the benefits of recruiting trusted alters as team members outweigh the possible costs of excluding strangers can only be assessed via a longitudinal study. If emerging businesses benefit from strong, in-group–based ties among their members, then homophily should have a positive effect on survival. If, however, such ties reduce a team's ability to respond to unforeseen or radically changing circumstances, then homophily may be a handicap for teams.

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APPENDIX A

Structural Event Analysis

COUNTING RULES

The risk set $s(H)$ of a structural event analysis enumerates all possible combinations over a set of roles (N), subject to group size (r) and restrictions on permissible role combinations (Ruef 2002a). When roles within a group can be repeated an indefinite number of times, the number of combinations for a multiset of N roles is calculated as:

$$s(H) = \sum_{r=1}^{r(H)} \binom{r+|N|-1}{r} = \sum_{r=1}^{r(H)} \frac{(r+|N|-1)!}{r!(|N|-1)!}, \quad \text{(A-1)}$$

where r varies over all observed group sizes—including singletons—up to $r(H)$ members (Brualdi 1992:71–73). Thus, a system of two gender roles N = {male, female} allows for three discrete forms of gender composition in structural dyads (r = 2): male-male dyads, male-female dyads, and female-female dyads. Using the counting rule, these combinations are calculated as ($r + |N| - 1$) choose r = (2 + 2 – 1) choose 2 = 3!/2! = 3. To obtain arrangements for the two gender roles not exceeding three persons in size $r(H)$ = 3, one simply sums the respective number of combinations for each possible size category: $s(H)$ = 2 + 3 + 4 = 9 structural events.

Given multiple role dimensions, the role set should identify all possible combinations that may be held by any given group member. For two gender roles {[M]ale, [F]emale} and four occupational roles {[P]rofessional, [A]dministrative, [S]ervice, [O]perations}, there are eight unrestricted role combinations for each individual: N = {MP, MA, MS, MO, FP, FA, FS, FO}. If there are a priori restrictions imposed on role combinations (for instance, if women in a given society are not allowed to hold certain occupations), then the role set must be reduced accordingly.[a]

EVENT PROBABILITY

Probability theory provides the rules for calculating the expected chance of occurrence for any structural event under an assumption of random mixing. We designate the roles (or role combinations) in a set N as elementary events for purposes of statistical analysis and apply the rule of multiplication to determine the probability of joint events. Provided that the roles included in a particular structural event are events in N occurring with probability $p(n_1)$, $p(n_2)$, ... $p(n_k)$, the sampling distribution of joint structural events is given by the multinomial formula:

$$P(E|r) = \frac{r!}{|n_1|!|n_2|!\text{K}\ |n_k|!} \times \left[p(n_1)^{|n_1|} \times p(n_2)^{|n_2|} \times \text{K}\ p(n_k)^{|n_k|}\right], \quad \text{(A-2)}$$

where $r = |n_1| + |n_2| + \ldots |n_k|$. It should be noted that the calculation of all joint event probabilities is conditional on structural events being of a particular size, r. For example, consider a structural analysis of organizational founding teams formed among three occupations: manual workers (n_1), service workers (n_2), and professionals (n_3). If structural events are drawn from a population of entrepreneurs that is 40 percent manual, 30 percent service, and 30 percent professional, then the expected probability of obtaining a three-member founding team with one manual worker and two service sector workers under an assumption of statistical independence is $p(E|3)$ = (3!/(2! × 1!)) ($.40^1 \times .30^2$) = .108. The event probability reflects the fact that there are three different ways to draw the participants. By comparison, the probability of obtaining a three-member team that consists only of manual workers is $p(E|3)$ = (3!/3!) ($.40^3$) = .064.

For some analyses of structural events, joint event probabilities are not only conditional on group size but on other parameters as well. In analyzing the gender composition of groups, for instance, it may be important to control for the presence of romantic relationships that serve to deflate the observed level of gender homophily. Structural events involving these relationships can be separated from other events, and fixed effects can be introduced into models to control for the relationships present within each group-size category.

[a] Relational and group-level characteristics—and the restrictions imposed on them—can also be considered in generating the risk set of structural events. For instance, analyzing a set of two gender roles {M, F} and the presence or absence of a spousal/partner relationship (indicated by parentheses) yields six unrestricted combinations for a dyad: MM, FF, MF, (MM), (FF), (MF).

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