

Attachment, Decay, and Social Network

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Attachment, Decay, and Social Network

To study decay in attachment to an organization, I analyze data on women who obtained an MBA from the University of Chicago's Graduate School of Business (GSB). I measure attachment in terms of network embedding: An alumna is attached to the GSB to the extent that people close to her graduated from the GSB. Behavioral data corroborate the network data in that alumnae measured to be more attached are more likely to have joined an alumni club and made a financial contribution to the school. The hypothesis is that alumnae attachment will decay over time, more slowly when the school is deeply embedded in an alumna's network, more quickly when disruptive events compete for the alumna's time and energy. As expected, attachment declines across the years after graduation (linearly for the first twenty years to about half its initial level), and decay is inhibited when connections with GSB graduates are embedded in stable relations of family, work, or long-term friendship. Decay is remarkably robust to events after graduation (which account for only 2% of explained variance in attachment). In other words, an alumna's attachment today was largely determined while she was in school. The results should be of practical value to people who design programs to build personal attachment to organizations, and of theoretical interest to scholars who study such connections.

On a recent flight overseas, I sat next to the admissions director in an elite school for women. She was not happy about flying so far from home, but there was in her experience no substitute for speaking in person to prospective students and their parents. It showed commitment to the prospective student's parents, who typically had a choice about where to send their daughters to school. More, it was her primary check on all involved being the "right sort of people." Intellectual ability would be a serious consideration, but the admissions director was not making this long flight to interview applicants who were merely intelligent. That could be determined in large part from the written record. She was travelling in service of the school's alumnae network. Four prospective students in the destination city were daughters of alumnae. The other six were all daughters of alumnae friends recommended to the school by alumnae. The admissions director explained that daughters who turned out to be unsuitable would not be rejected so much as gently referred to a colleague in a school "more suitable to the young woman." The immediate result would be personal contact and professional advice to a family on

the important issue of the daughter's future. The targeted end result was the school more firmly embedded in the social network among the families — this is your school, you and yours have a friend in the business.

The admission director's work on the alumnae network frames the research question for this paper. People vary in their attachment to the college or university from which they matriculated. For some, the school is an essential part of personal or professional identity: I am a graduate of XYZ university. At the other extreme are people for whom school is irrelevant to their current lives. It is a memory, no more or less important than a neighborhood in which they once lived or a person they once dated. This paper is about alumnae attachment and decay for a representative sample from the University of Chicago's Graduate School of Business (GSB). I am interested in the GSB alumnae as a study population, but the women are more broadly interesting as a strategic opportunity to study how attachment varies over time as a function of the situation in which attachment was initially formed and the intervention of subsequent events.

ATTACHMENT AND SOCIAL NETWORK

By attachment I refer to the emotional connection between a person and an organization; nuances of which have spawned a great many scholarly views on concepts of attachment, commitment, and identity (e.g., see Whetten and Godfrey, 1998).

Broadly speaking, there are two strategies for research on the emotional connection. The more often used strategy is to describe dimensions of a person's feelings about the organization. For example, how does the person feel about organization policy, leadership, the value of continued association with the organization, and so on (e.g., see Cohen, 1999, on dimensions; Abrahamson and Anderson, 1984, on attachment to educational versus other kinds of organizations; Whetten and Godfrey, 1998; Elsbach, 1999, for review and discussion).

A second research strategy, the one adopted here, is to infer attachment from the social network around a person. The intuition is that we are who we see reflected in the eyes of our friends. The idea has early precedent in the sociology of

a "looking-glass self" (Cooley, 1902) and a sense of self created by conflicting affiliations (Simmel, 1922; and Coser, 1975, for broad review of later work around Merton's, 1957, analysis of role sets), the social psychology of personality defined by the field of influences surrounding a person (e.g., Lewin's, 1936, field theory), and the psychiatry of diagnosis and treatment in terms of the interpersonal forces on a person (e.g., Sullivan's, 1953, interpersonal theory of psychiatry).¹

More precisely, the second strategy is about network embedding. Attachment increases with the extent to which an organization is embedded in the network around a person, and embedding increases as the person has strong relations to individuals affiliated with the organization. An organization is relevant to you as it is relevant to your friends, colleagues, and acquaintances. The organization comes up in conversation. It is a component in important relationships.

Embedding is most associated with transaction cost theory because that is the focus of Granovetter's (1985) influential article on embedding, but there have been exemplary empirical studies with respect to attachment and identity over the preceding decades (see Burt, 1992:251-264, on identity emerging from network embedding; cf. Burke and Reitzes, 1991, for a related view in which embedding and attachment emerge from identity). Influential examples are Bott's (1957) analysis of segregated sex roles emerging from segregated social networks, Hirschi's (1969) survey analysis of differential affiliation and delinquency, Kanter's (1972) analysis of differential affiliation and affective commitment, or Ebaugh's (1988) clinical analysis of role exit as a process of strengthening attachments to people outside the role while weakening attachments to people inside the role (expanding

¹Distinguishing the two research strategies is a frame of reference clarifying the approach taken in this paper, but it is no more than that. Strengths and weaknesses of the two strategies is an open question for future work. I am not certain of the answer (or the value of the question). Network data have the virtues of being more concrete than opinion data (they are about relations with specific people rather than relations with an organization as a whole), less obtrusive (embedding emerges from the pattern of relations among contacts rather than asking respondents directly whether they are attached to an organization), and I will present behavioral evidence on the construct validity of my network measures. On the other hand, network data are more expensive than opinion data (respondent describes relations among contacts in and out of the organization, see below) and subject to their own measurement issues (e.g., Marsden, 1990). What I can say is that ample conceptual and empirical precedent exists for studying attachment as

her earlier work on network processes associated with a nun leaving the convent for a life in the outside world, Ebaugh, 1977; cf., Freeman, 1999, on manager identity and response to organizational loss). More recent examples include Gould's (1995:15) historical analysis of identity in collective protest ("The collective identity of workers as workers only emerges if the social networks in which they are embedded are patterned in such a way that the people in them can plausibly be partitioned into 'workers' and 'nonworkers.'"), and, more directly relevant to the study population in this population, Ibarra's (1999) analysis of junior consultants and investment bankers in career transition from individual contributor and project leader to boundary-spanning roles managing client relationships. Ibarra observes three components in the process of these people learning how to play their new role: observing role models, experimenting with provisional selves, and evaluating results with respect to internal standards and external feedback. In all three of the process components, quotes from the people involved show them doing their identity work within personal relationships with colleagues and clients (Ibarra, 1999: 775, 777, 780).

———— Figure 1 About Here ————

Examples of embedded attachment to university would include having many friends and colleagues who graduated from the school, or having contacts central in your network who graduated from the school. Consider the hypothetical network in Figure 1. The alumna at the center of the network named a dozen core contacts. Strong ties with a sibling and her husband attach the alumna to her family. Strong ties to colleagues attach the alumna to her current employer. She is attached to the GSB through a friend and a colleague who also graduated from the GSB. The level of attachment illustrated in Figure 1 is about average for the alumnae: 12.3 core contacts were named on average, among whom are one or two colleagues who graduated from the GSB, and one close friend who graduated from the GSB. The GSB is more embedded in the network around some alumnae. One young woman had a large network of friends and colleagues who had all graduated from the GSB.

a network phenomenon, and I find interesting properties of attachment revealed by network

At the other extreme were alumnae whose lives had drifted away such that their core contacts at the time of the survey included no GSB graduates.

ATTACHMENT DECAY

Other things equal, relationships can be expected to weaken over time such that some observed today are gone tomorrow. The tendency for relations to weaken and disappear I will discuss as decay, functions describing the rate of decay over time I will discuss as decay functions, and variables in the functions I will discuss as decay factors (Burt, 2000a; 2001).

NETWORK DYNAMICS

At minimum, decay occurs as relationships develop from contact opportunities and dissolve in the face of conflicting demands for time and energy. The process begins with people bumping into one another as a function of random chance and exogenous factors. People who would not otherwise seek one another out can find themselves neighbors, colleagues in the same company, assigned to the same project team, or seated next to one another in class. It is rude not to strike up a relationship (e.g., Blau, 1977; 1994, on the opportunities and constraints that social structures create for relations to emerge, Feld, 1981, on the social foci from which relations emerge; Festinger, Schachter, and Back, 1950, for the classic study in this genre). People in these relationships often discover that they do not enjoy one another, or cannot work well together, so they disengage in favor of more compatible contacts. The selection process in which new (hoped to be) compatible contacts replace existing (known to be) incompatible ones means that relations on average weaken and decay over time. Add disruptive events such as geographic mobility, career shifts, or family change, and decay can be expected to be more rapid.

Embedding inhibits decay: repeated contact is more likely between people with a long history together or many mutual friends and acquaintances.

analysis.

Longitudinal evidence is rare, but clear, on this point. For example, combining results from the few prior studies of decay in large populations with longitudinal network data on a study population of bankers and colleagues in a large financial organization, Burt (2000a, 2001) shows that factors known from cross-sectional evidence to be associated with strong relations are also associated with slow decay (also see Blumstein and Kollock, 1988:483-486): Decay is slower in relations between colleagues with a strong prior relationship, working in the same division of the company, or connected indirectly through many third parties.

RELATED WORK

There is little theory or research explicitly on attachment decay, but inferences can be drawn from related work. For example, research in organizational behavior has focused on the degree, dimensions, and process of becoming attached to an organization (again, see Whetten and Godfrey, 1998; Elsbach, 1999, for recent review and discussion). The research is typically based on a cross-section of people with respect to organization(s) with which they are affiliated. Decay is not a central issue in such research (though it could be if one thinks of dimensions of attachment each forming and decaying in interdependent processes over time). For example, absenteeism and turnover could be studied for decay factors in as much as employees less attached to an organization are more likely to exit (Mathieu and Zajac, 1990). Krackhardt and Porter (1985, 1986) offer a promising approach. They measure the network around an employee, then wait to see how many of the employee's contacts leave the company. They report higher employee commitment in networks with more turnover. In other words, networks dampen the effect of turnover on employee commitment.

I looked for guidance from research on educational institutions in particular. It seems safe to say that graduation from an elite school is a valued attachment since it is associated with differential access to the inner circle of American business (Useem, 1984; though the access advantage is modest relative countries such as France with its *grande écoles*, e.g., Schmidt, 1996). There is research on who gets admitted to elite schools (e.g., Cookson and Persell, 1985,

on the flow of students from preparatory schools into elite universities; Klitgaard, 1985, on factors in admission to elite colleges; Karen, 1990, on how the admissions staff function). There is a great deal of research on the career consequences of graduating from an elite school (e.g., Bills, 1988, on education credentials being more important to entry than promotion; Durbin and Kent, 1989, for a historical view on educational institutions for women; Spilerman and Lunde, 1991, on the variable importance of specific educational credentials at different levels of an organization; Persell, Catsambis, and Cookson, 1992, on elite boarding schools mitigating gender bias in subsequent career choices; Riordan, 1994, on the increased occupational achievement of women who spent more years in a women's college). In all the research, however, I found nothing on decay in attachment to university. Moving from the Web of Science to Education Abstracts turned up descriptions of alumni projects in trade journals such as the Chronicle of Higher Education and the Journal of Education for Business. There is also Currents, published by the Council for the Advancement and Support of Education, directed at university staff who manage external relations such as alumni affairs (e.g., see Webb, 1993; and there is a dense network of information communication with annual meetings of alumni officers from seven of Chicago's peer schools). At the risk of oversimplifying, the relevant projects described in these trade media are efforts to strengthen relations with and among graduates; event projects such as sponsoring dinners or conferences, and service projects such as creating meeting facilities, or providing electronic directories through which graduates could contact one another. Decay is not studied. It is presumed. The practical concern is what alumni officers can do to strengthen the school connection with graduates despite decay.

Looking beyond network analysis, organizational behavior, and education, research in marketing can be helpful. Factors that affect decay in customer loyalty could similarly affect decay in alumnae attachment. Much of the work on customer loyalty reads as if it were written by the admissions director with whom I opened the paper: focus on the loyalty of the most lucrative, core, customers, provide brand-differentiating services to that core, and pursue all within a general perspective of

marketing through an enduring company relationship with the customer. In fact, Reichheld (1996) offers business advice on managing customer loyalty as a function of employee loyalty because the two phenomena are interdependent and determined by similar antecedents. A theme that runs across studies of customer loyalty is that service matters as much or more than product value. For example, hospital pharmacy directors are less likely to discontinue buying from a manufacturer that provides added services such as educational programs or specialized services (Szeinbach, Barnes, and Garner, 1997). Perceived quality of service is more important than perceived product value in predicting retail customer loyalty (Leung, Li, and Au, 1998). Customer loyalty to an on-line banking service is primarily determined by satisfaction with the service, next by brand recognition, and least by switching and search costs (Methlie and Nysveen, 1999). Such findings highlight the importance of a woman's experience while at the GSB to her later attachment, and that will be a central finding from the analysis.

DECAY HYPOTHESIS

In sum, alumnae attachment can be expected to decay over time, more slowly when the school is deeply embedded in an alumna's network, more quickly when disruptive events compete for the alumna's time and energy. For example, attachment should continue stronger over time for women who were close with GSB graduates before they attended the GSB, whose relationships with GSB graduates were combined with stable relationships such as family, who attended the GSB at a time when women were more likely to form relationships with colleagues, who went on to achieve a prominent position in the business world, or whose lives subsequent to the GSB left time for the GSB. The empirical question is how quickly attachment decays, and how much specific decay factors speed or inhibit decay.

THE STUDY POPULATION AND SURVEY

To better understand what happened to women after they graduated from the GSB, several interested constituencies cooperated in 1998 to conduct a mail survey of

the alumnae. Discussion of the survey rationale, questionnaire, sampling, and fieldwork is in reports available on the internet (see acknowledgment note). The following is a quick overview to provide a sense of the data and their adequacy as a sample.

Expanded to cover the interests of each constituency supporting the survey, the final questionnaire was 31 pages long and required as much as two hours to complete. It included questions about the alumna's current situation: household, her current job, her network of core personal and professional contacts, and her values and opinions on work and barriers to women in business. It also included life-history questions on the timing and nature of family events, and the timing and substance of events in her career.

The study population was the 4,673 women living in the United States who obtained an M.B.A. degree from the GSB. They ranged in graduation year from 1937 to 1997, and in year of birth from 1914 to 1972. There were large numbers of them in California, Illinois, New York, and Texas, but 99% of the variance in the number of alumnae in a state can be predicted from per capita income in the state, the number of women in the state labor force, and a dummy variable adjusting for the disproportionate number of alumnae in the area around Chicago.

The survey respondents were a representative sample of the study population. A questionnaire was mailed to everyone in the population. About one in five returned it (814 respondents, 17% response rate). A low response rate was expected because of the difficult questionnaire. The low rate nevertheless raised concerns that the respondents might not be representative. A short-form questionnaire (one side of a letter page) was constructed to get a sense of the alumnae not responding. The short-form questionnaire asked for date of birth, current household composition, family income, and employment status. If working, the alumna was asked to indicate by category the number of employees in the organization, and her job rank (individual contributor, manager, middle manager, senior manager, most senior manager in firm). The form was mailed to a stratified random sample of one in five non-respondents, of whom 39% returned it. Data on the 814 survey respondents were compared to data maintained by the GSB on all

graduates and data from the non-respondent short-form questionnaire. There were no statistically significant differences between the respondents and non-respondents with respect to the GSB program from which they graduated, the year in which they graduated, the region of the United States in which they live, their current household composition, family income, job rank (20% are senior managers, and 10% are the most senior manager in their organization), or the size of the organization for which they work. The one bias revealed was that women on the periphery of the labor market were less likely to return the questionnaire (28% of non-respondents were retired, housewives, or unemployed versus 12% of respondents), however, the bias is only statistically significant for women over the age of 65.

———— Figure 2 and Figure 3 About Here ————

In sum, the respondent alumnae are representative of working women in the study population, who in turn, are distributed across the United States in proportion to income and working women in the general population.

PATTERNS OF ATTACHMENT AND DECAY

Looking for research results consistent across alternative indicators, I measure attachment with the three network indicators in Figure 2: the probability of citing a GSB graduate as a close friend, the number of an alumna's core contacts who graduated from the GSB, and their centrality in the alumna's network. All three network indicators show in Figure 3 how attachment decays after graduation. The indicators are averaged in the graphs to the left in Figure 3 for each year after graduation in the recent cohorts, then for broader time intervals around older cohorts as alumnae become more rare (numbers of alumnae are given in Figure 5 below). Attachment is also plotted by alumna age in the graphs to the right in Figure 3 to show the lower levels of attachment observed among older alumnae. Age and years-since-graduation are correlated because most alumnae graduated when they were young, but age itself (quite apart from years since graduation) involves obligations that compete with the GSB for alumna attention, and is associated for Americans generally with the social network narrowing to a select

few contacts (e.g., Marsden, 1987; Burt, 1991; see Moore, 1990, on gender differences, kin ties in particular narrowing with age more quickly for men). Regression equations to the right in Figure 3 show the statistically significant decay in attachment after graduation, and the higher level of decay for alumnae who were older when they graduated (test statistics are given in parentheses).

PROBABILITY OF GSB CLOSE FRIEND

Figure 3A describes the probability of citing a close friend who graduated from the GSB. Respondents were asked “Do you count any GSB graduates among your close friends?” Those who answered yes, were asked to “Name the one or two with whom you are most close.” Of the 814 respondents, 808 answered the question. The probability of a GSB close friend is .8 for women who just graduated, which declines linearly over the first twenty years or so after graduation at a rate of .1 every five years. The means across the top of the graph in Figure 2 show that an alumna with any GSB graduates in her network is likely to cite one of them as a close friend. The probability of citing a GSB close friend is .80 if there is one GSB graduate in the network, then over .90 if there are two or more GSB graduates in the network.

NUMBER OF GSB GRADUATES

Figure 3B describes the number of core contacts who graduated from the GSB. Even if an alumna has no close friends who graduated from the school, she is attached to the GSB to the extent that a large number of her core professional or social contacts graduated from the school. At various points in the questionnaire, respondents were asked to name people with whom they had specific kinds of relationships. One was the sociometric question in the preceding paragraph asking for the names of one or two close friends who graduated from the GSB. Another asked for the name of a key contact for their entrepreneurial activity (if they had engaged in any such activity). Another seven sociometric questions were taken from prior studies of manager social capital to elicit the names of core social and professional contacts; people with whom the respondent discussed personal

matters, or socialized, or was her immediate supervisor, or was an essential source of support for success in her job, was her most difficult colleague, has been one of her most valued contacts in the sense of being most important to her achievements, or with whom she would discuss new job opportunities (e.g., see Burt, 2000b, for review). Of the 814 respondents, 793 completed the sociometric questions. The resulting networks vary around a mean of 12.3 contacts, from a minimum of four contacts, up to the maximum of 20. The number of GSB graduates among the contacts varies from none to 12. I combined the counts above six GSB graduates because there are so few and to avoid problems with outliers in the analysis. The frequencies across the bottom of Figure 2 show that the distribution is still skewed, so I analyze log counts (results with logs of the untruncated distribution are similar and results with raw counts are similar, but weaker). Figure 3b shows that alumnae just graduating from the school had on average two GSB graduates among their core contacts. The number declines over time to one after a decade, and virtually none after thirty years.

CENTRALITY OF GSB GRADUATES

Figure 3C describes the centrality of GSB graduates in alumnae networks. Even if an alumna has no close friends who graduated from the school, or cites only one or two GSB graduates, she is attached to the school to the extent that her other core contacts have strong relationships with the one or two GSB graduates. The centrality measure is computed from two network questions, one asking for the relative strength of the respondent's relationship with each cited contact (especially close, close, less than close, distant), and the other asking for the matrix of relations between each pair of cited contacts (especially close, distant, or something between those two extremes). The matrix question is complex; 783 of the 814 respondents completed it. Responses to these questions can be used to compute a score c_{ij} that varies from 0 to 100 with the extent to which contact j has

strong relations with alumna i and with the other contacts in her network.² Summing the c_{ij} across GSB graduates j measures the extent to which GSB graduates are central in alumna i's network. The scores vary from 0 to 33 points, beginning in Figure 3C with a average of five and a half points for women who just graduated, then declining over time at a rate of one point every six to seven years, to near-zero after thirty years.

CONSTRUCT VALIDITY³

The network indicators make sociological sense as measures of attachment, but it would be reassuring to have a behavioral data to compare with the three network indicators. I have data on two kinds of alumna behavior consistent with attachment to the GSB. The data are limited, but obvious, indicators of attachment, so their consistency with the network indicators supports use of the network indicators as measures of attachment.

One behavioral indicator is membership in an alumni club. The GSB has more than 50 alumni clubs world-wide. Most are organized around events such as guest speakers. Only a handful maintain a roster of dues-paying members that could be used to locate members among the respondent alumnae. The oldest and largest of these is the GSB Club in Chicago, which draws the bulk of its members from the Chicago metropolitan area and Illinois more generally.

²The sum of the c_{ij} scores across all contacts defines a network constraint index used in studies of manager social capital (e.g., Burt, 1992:54-56; 2000b:Fig. 3). The index begins with a measure of the extent to which alumna i's network is directly or indirectly invested in her relationship with contact j: $c_{ij} = (p_{ij} + \sum_{q \neq i,j} p_{iq}p_{qj})^2$, for $q \neq i,j$, where p_{ij} is the proportion of i's relations invested in contact j, p_{ij} equals $z_{ij} / \sum_q z_{iq}$, in which variable z_{ij} is the reported strength of relationship between persons i and j ($0 \leq z_{ij} \leq 1$, where 0 is a distant relationship and 1 is especially close). Scores are here multiplied by 100.

³A reviewer for this journal stressed the importance of this section because s/he had a concern about the precedent of using network data in identity work. The reviewer foresaw a "large number of future studies examining the importance of an attribute by asking 'Do you count any [people with attribute X] among your close friends?'" While the graduation attribute was appropriate for this study, it was "reassuring that the name generator/interpreter format is consistent with the behavioral data." This is an important point with which I completely agree, but the point is not limited to network data. It applies equally to opinion data on attachment. In research purporting to measure attachment with survey responses to "How attached are you to the organization? 1 2 3 4 5," I would be reassured by data showing that respondents who answered "5" were behaviorally more attached than respondents who answered "1."

Being a dues-paying member of the GSB Club is an observable attachment to the GSB that is consistent with the network measures of attachment. I found 85 survey respondents living in Illinois who were members of the GSB Club, and compared them to respondents living in the same areas who were not members. Club members relative to non-members were more likely to name a close friend who graduated from the GSB (4.62 chi-square, 1 d.f., $P = .03$), name more GSB graduates among their core contacts (4.9 t-test, $P < .001$), and the GSB graduates they named were more central in their networks (2.8 t-test, $P < .01$).

Financial support is a second behavioral indicator. Of respondents, 28% had never made a contribution (non-supporters), 48% had given something to the school at one time or another, and 24% had made a higher-than-average cumulative contribution to the school (high-supporters).

Alumnae high-supporters are more attached to the school through their social network. This seems consistent with other elite schools (e.g., Karen, 1990:238, cites an internal Harvard report in which alumni with multiple ties to the university were more likely to “work on recruitment and Schools Committees.” and recall the admissions director with whom I began this paper). There is no difference across the three support categories in the probability of citing a close friend from the GSB (4.23 chi-square, 2 d.f., $P = .12$), but there is association with the number of GSB graduates cited: 21% of the alumnae with no GSB graduates in their network were high-supporters versus 41% of those with four GSB graduates in their network. The high-supporter distinction is key. Relative to the middle category of giving, low-supporters cited negligibly fewer GSB graduates (-0.9 t-test) while high-supporters cited a significantly high number of graduates (2.3 t-test, $P = .02$). Similarly, GSB graduates are negligibly less central in the networks of low-supporters (-1.5 t-test), but significantly more central in the networks of high-supporters (2.6 t-test, $P < .01$).

In sum, there are two levels of attachment in the network data. Citing a close friend who graduated from the GSB is an intuitively obvious indicator of attachment, but it is least corroborated by the behavioral data. Joining an alumni club and making a contribution to the school are associated with a higher level of attachment

indicated by citing multiple GSB graduates as core contacts who hold a central position in the alumna's network.

DECAY FACTORS

Decay factors are listed down the rows of Table 1. Decay in the probability of citing a GSB close friend is described by a logit model in the second column of the table. Decay in the log number and centrality of GSB graduates in the alumnae networks is described by regression models in the last two columns.

———— Table 1 About Here ————

The factors in Table 1 do not explain all decay, but they explain much of it. How much can be inferred from the test statistics for the two aging variables “Years after graduation” and “Age at graduation.” Both variables measure the more complex lives of older alumnae, more complex in the sense that older alumnae are more likely to have other issues related to family, health, and work that compete with the GSB for their attention. Decay measured by each of the three attachment indicators is closely associated with both age variables in Figure 3. In Table 1, however, no direct association remains for either age variable with any of the three attachment indicators when the listed decay factors are held constant.

EMBEDDING FACTORS

Alumnae networks containing a GSB connection embedded in family, work, or a long-term friendship show less attachment decay. First, the embedding factor “GSB graduate in family” in Table 1 equals 1 if any of the alumna's contacts is a relative and a graduate of the GSB (otherwise 0). The results in Table 1 show that having a kinship connection with the GSB has no effect on the probability of citing a GSB close friend, and a weak tendency to increase the number of GSB graduates cited, but it dramatically increases the centrality of the graduates in the network (which is the condition most associated with contributions to the school).⁴ Second,

⁴Positive associations are to be expected for the embedding factors in Table 1 because they contain an element of the dependent variable. Alumnae who cited no GSB graduates will

the primary effect in Table 1 of a colleague connection to the GSB is to increase the number of GSB graduates in the network (13.6 t-test). The centrality of the graduates is also affected (7.2 t-test), but the probability of a GSB close friend is unaffected. Third, having a connection to the GSB that pre-dates the alumna's graduation, or a long-term friendship with a GSB graduate, increases the probability that one or more of the alumna's cited contacts will be a close friend who graduated from the GSB, increases the number of GSB graduates she includes among her core contacts, and increases the centrality of the cited graduates within her network. Note that both aspects of duration matter. Knowing a GSB graduate for a long time increases all three network indicators, but a substantial component in the effect is the binary distinction between alumnae who knew a GSB graduate before they left the school versus those whose current relationship(s) with GSB graduates began after they left the school ("Relationship with a GSB graduate pre-dates graduation" in Table 1).⁵

Table 2 illustrates decay inhibited by embedding. The 793 respondents who completed the network questions cited a total of 9,778 core contacts. Reading down the Table 2 rows, 2,264 contacts were cited as people with whom the alumnae most often discussed personal matters, 1,507 were cited as people with whom the alumnae most often socialized in the sense of going out for lunch or

have a score of zero on each embedding factor and a score of zero on each network indicator of attachment. I ignore for the purposes of this paper the statistical niceties of separating out the redundant element. I have in Table 3 evidence of statistically significant embedding effects, and use Table 1 to show the variable relevance to decay of the different forms of embedding.

⁵This makes it all the more interesting to distinguish relationships in place before an alumna entered the GSB, but the school only keeps a record of graduation date, and the alumnae themselves often could not remember when they began their coursework. The criterion in Table 1 for a relationship pre-dating graduation is that it began at least a year before graduation. I checked on the importance of pre-GSB relationships with an interpolated measure. I had start dates reported by many of the survey respondents, and it is by and large correct to say that campus students entered the school two years before they graduated, so I imputed their start dates from their graduation dates where their start date was missing (for a total of 740 observations). I created a pre-GSB dummy variable equal to 1 if the longest relationship with a GSB graduate (last embedding factor in Table 1) was older than an alumna's start date. Re-estimating the equations in Table 1 using the pre-GSB variable in place of the pre-graduation variable in Table 1 yields weaker effects, e.g., the 13.6 t-test predicting log number of GSB graduates drops to 5.7 and the 9.4 t-test predicting log centrality of GSB graduates drops to 4.9. The effects are still strong, but weaker than those reported in Table 1. I conclude that entry to the GSB is less consequential than exit as a criterion identifying relationships in place before leaving the GSB.

dinner, visiting one another's homes, etc., 745 were cited as close friends who had graduated from the GSB, and so on. Columns of the table distinguish contacts by their primary role relationship with the alumnae. The 1,270 contacts related to the alumnae by marriage or blood are relatives. The 6,199 contacts with whom alumnae worked who are not family are non-kin colleagues. The 1,953 contacts cited as a friend but not a colleague or relative, are just a friend, and 356 other contacts were cited who were none of the above (neighbors, advisors, etc.). Where contacts play two or more roles for the alumna, they are assigned to the strongest role (e.g., relatives at work who are also cited as an alumna's friends are coded as relatives in Table 2).

———— Table 2 and Figure 4 About Here ————

The role relationships distinguished across the top of Table 2 are not equally subject to decay. An alumna whose father graduated from the GSB will have at least one GSB graduate — her father — among her core contacts for the life of her father. An alumna whose boss graduated from the GSB will have at least one GSB graduate among her core contacts for as long as her boss is a core contact. In contrast, the relationship with a GSB graduate who is just a friend, or less, is more subject to decay because it is more exposed to the normal vicissitudes of relationships.

Duration is a complication. There is an inertia to decay in which relations that have lasted for a long time are more likely to survive into the future (Burt, 2000a). A GSB graduate who has been a friend for many years is likely to continue to be a friend into the future, even if he or she is just a friend. The complication is that family relationships tend to have a long duration and a low decay-rate, not because of time, but because of kinship.

The point is illustrated in Figure 4. The graph contains all 1,069 GSB graduates cited as core contacts. They are ordered on the horizontal axis by the years that have passed since the alumna citing them graduated. They are ordered on the vertical axis by the number of years for which they have been known to the alumna citing them. The bold line up the diagonal of the graph separates contacts known before the alumna graduated (above the line) from contacts met after she

graduated (below the line). The solid dots are relatives. Solid dots well above the diagonal are parents and siblings for the most part, known for a long time to the alumna. Solid dots close to the diagonal are primarily spouses met while enrolled in the GSB (there are also step-siblings), and those few below the diagonal are family acquired after graduating from the GSB.

———— Table 3 About Here ————

To separate the embedding effects of duration and role, decay is predicted in Table 3 at the level of individual relationships. Results are similar across the three network indicators of attachment. The association with years in the center of the table shows that alumnae longer away from the GSB are less likely to have GSB graduates among their core contacts, as already illustrated in Figure 3. The controls show that (immediately after graduation, when years after graduation equals zero) relatives, non-kin colleagues and contacts known before graduating are unlikely to be GSB graduates. However, decay is significantly slower when colleagues or long-term friends are cited. There is no significant decay adjustment for relatives (relatives are simply unlikely to be GSB graduates for the average alumna), but the probability of a non-kin colleague being a GSB graduate is significantly higher than expected from the years for which an alumna has been away from the GSB (2.4 z-score), and higher still for long-term friends (5.2 z-score).

GSB EXPERIENCE

The GSB is a natural experiment in organizational attachment in that the school has been such a varied experience to alumnae over the years. There are reasons to expect little attachment to the school. One reason is the large number of students involved. About a thousand students have graduated each year for the last decade. Another reason is the flexible curriculum which promotes individual choice at unknown cost to interpersonal relations. There are few courses required of all students, no courses that all students complete at the same stage of their coursework, and no fixed seating. Relations cannot develop between GSB students as readily as they can between students in schools that have fixed seating

(so you are more likely to know the people next to you) or a fixed curriculum (so you have more repeated exposure to a small number of people over time).

Cohort Demography

Cohort demography is an attachment-relevant factor in an alumna's experience of the GSB. Figure 5 shows how the size and gender composition of the GSB MBA population have changed over time. From fewer than 100 graduates a year in the 1930s and 1940s, the school expanded to the 200 per year displayed in Figure 5 for the 1950s, and on to 1000 graduates per year through the 1990s. The expanding scale of operations could be expected to weaken alumna attachment by decreasing the frequency with which any pair of students have opportunity to interact. In fact, cohort size in Table 1 increases alumna attachment, presumably by providing more opportunities for students to meet compatible people with whom relations develop. Most pronounced is the tendency for alumnae in larger cohorts to cite a close friend who attended the GSB (3.4 z-score).

———— Figure 5 About Here ————

Gender balance also changes over time. The numbers of men and women enrolled in the school increase over time (top graph in Figure 5), but there were so few women enrolled before the 1970s that the proportion female increases over time (bottom graph in Figure 5), from 2% in the 1960s, to 26% in the 1990s. The homophily effect in network analysis refers to the tendency for relations to develop between similar kinds of people, and gender is a homophily factor (e.g., Kanter, 1977, is an often-cited source in organizational behavior; Williams and O'Reilly, 1998, for review). The expanding number of women in the GSB means that there are more women available for friendships in later cohorts so alumnae from later cohorts are more likely to have relations with GSB graduates. Sure enough, the proportion of women in an alumna's graduating cohort is positively associated with her probability of citing a GSB close friend on the survey (4.6 z-score). However, the homophily effect increases with the extent to which people of a kind are in the minority (the classic reference is Durkheim's, 1897, analysis of lower suicide rates in minority religions; Reagans and Burt, 1998, offer illustrative results in

organizations), so relationships between women when women were rare should be stronger than relations in later cohorts containing hundreds of women. Consistent with the prediction, the percent women in a cohort, holding cohort size constant, has a negative association with alumna attachment: Alumnae who graduated in cohorts containing numerous women are less likely to cite a GSB close friend (-2.1 z-score in Table 1), cite fewer GSB graduates among their core contacts (-2.3 t-test), and the cited GSB graduates are less central in the alumna's network (-2.5 t-test).

Degree Programs

Within cohorts, degree programs create attachment-relevant differences among the alumnae. There are evening and weekend programs for students who typically work while attending the GSB part time. There is a campus program for students attending the GSB full time. Of the 4,673 alumnae in the study population, 37% graduated from the evening or weekend programs and 57% graduated from the campus program. Relative to students in the evening and weekend programs, students in the campus program are younger, more similar in age, and have more opportunities to meet other students in their cohort for a variety of reasons associated with them spending all of their time in school activities. Table 1 shows that alumnae who graduated from the campus program were more likely to cite a GSB close friend in the survey (2.3 z-score), and cite more GSB graduates among their core contacts (3.7 t-test).

A few of the alumnae graduated from the GSB's executive program. The program was the first MBA program designed solely for executives (begun in 1943). Class sessions are clustered so that executives from across the country can fly into town for short visits to complete their classwork. Beyond convenience, classes for the executive program are separated from the other MBA programs because the executives are more mature and more varied in age than students in the other programs. Average alumnae age at graduation from the executive program is 40 (versus 27 for the campus program), with a 5.5 year standard deviation (versus 3.3 for the campus program). The executives have family and work demands that limit

the attention they can give to the GSB, however, the program is small (70-80 graduates per year over the last decade), students have extensive contact because they are in Chicago at the same time for several days at a time to attend class sessions, the students take more of the same courses together, and the students have in common the fact that they are all going through the program as a mid-life transition. The result is more contact opportunities with people of similar interests, from which interpersonal attachments develop. Table 1 shows that alumnae who graduated from the executive program were more likely to cite a GSB close friend in the survey (2.4 z-score), and cite more GSB graduates among their core contacts (3.5 t-test).

Program Embellishments

The GSB is like other business schools in continuously renovating its curriculum, but there were two embellishments to the programs that I checked for their impact on alumna attachment. One was the construction of a new classroom building, later named the Gleacher Center, for students in the evening, weekend, and executive programs. The building represented a dramatic improvement in the quality of classrooms, and opportunities for casual discussion in the bookstore, library, and food courts (and an alumni center in 1999). Students began taking courses in the new building in the 1994/95 academic year, so I have data on alumnae who graduated with experience of the building in 1995, 1996, or 1997. Although the building was widely praised by students and faculty, there is no evidence in Table 1 that it is yet associated with higher alumna attachment to the school.

———— Figure 6 About Here ————

Unambiguous is the success of an embellishment to the campus program. The flexible curriculum meant that first-year students had little time together in shared events, and student dissatisfaction with the program was evident from student evaluations of the GSB in the first Business Week ratings of business schools.

The Leadership, Exploration, and Development (LEAD) program was begun in 1989 to strengthen the student sense of community. The program is a pass-fail “course” that all campus students are required to complete in the autumn quarter of their first year at the GSB. Every student in the LEAD program is at the same stage of beginning their course work. Every other course the student will take contains people at different stages of their course work, some early in their first year, others late in their second year. The LEAD program began with experiential activities in sharp contrast with the cognitive role students traditionally played in the classroom. In fact, LEAD drew critical comment from students and faculty because the activities were in such contrast to the rest of the GSB curriculum. The point that wiser minds saw was that the LEAD activities being distinct from the rest of the GSB curriculum would be important to the program’s ability to create a sense of community among the students (van Gennep, 1908, is the classic reference here, but there are many empirical studies of initiation rituals strengthening attachment, e.g., see O’Reilly and Chatman’s, 1996, review of recruitment to strong-culture organizations). The content of the program changes from year to year as determined by a full-time director and second-year students who serve as facilitators, but the core idea for the program continues to be one of putting the students through experiences together to broaden their perspective on their studies and one another.

The result is a lot of time spent by new students collaborating with one another, and a dramatic increase in student attachment after graduation. Table 1 shows that, above and beyond the high tendency for campus students to cite GSB graduates, campus alumnae who participated in the LEAD program cite a still larger number of GSB graduates among their core contacts (3.4 t-test), and the cited graduates are significantly more central in the alumna’s network (3.0 t-test).⁶

⁶Effects of the LEAD program might seem to be confounded with period effects since LEAD is a mandatory program after 1989. If the program were required of all students, then the LEAD effects in Table 1 could be due to the program, or changes in the economy after 1989, or changes in the school. However, only students in the campus M.B.A. program are eligible and required to enroll in the LEAD program, which leaves the evening and weekend students as a control group.

The effects are illustrated in Figure 6. The graph at the top of Figure 6 shows that the probability of citing a GSB close friend is high for alumnae from the campus program, explaining why the increase associated with the LEAD program is statistically negligible in Table 1. The graph at the bottom of Figure 6 shows little difference between the campus, evening, and weekend programs in the centrality of GSB graduates, so the increased centrality associated with the LEAD program clearly stands out in the graph and in Table 1 (and I note again that centrality is the attachment indicator most associated with alumnae financial contributions to the school). The steeper slope to decay during the years of the LEAD program (relative to the slope of projected decay for the campus program or the observed rate of decay among alumnae from the evening and weekend programs) suggests that LEAD was more successful in its later years, or that its attachment effect decays faster than the pre-LEAD attachment for campus students. However, statistical tests for a stronger LEAD effect in later years are negligible (0.4 t-test for a higher LEAD effect on centrality after 1995, 1.6 after 1996). The summary conclusion is that LEAD increased alumnae attachment to a new high, even a decade after graduation.

OTHER EVENTS

A woman graduates from the GSB at some level of attachment determined by her GSB experience and the extent to which she has family, friends, or colleagues who graduated from the school. It is surprising to see the extent to which that level of attachment is unaffected by subsequent events in the alumna's life. Putting aside two events — leaving the Chicago area and marriage — I could find no mobility, family, or career events that have a direct association with decay after embedding and variation in GSB experience are held constant.

Geographic Mobility

Geographic mobility is potentially relevant because there is a concentration of GSB graduates in the Chicago area. Alumnae who continue to live in Chicago after graduation are more likely to bump into and develop relations with GSB graduates.

The results in Table 1 show no effect on the probability of citing a GSB close friend, but alumnae still living in the Chicago area at the time of the survey do have a larger number of GSB graduates more central among their core contacts (2.4 and 2.3 t-tests respectively). The mobility effect is a step function in that alumnae who moved many states away are no less attached to the GSB than alumnae who moved one state away. Adding to the models in Table 1 predicting number and centrality of GSB graduates a variable distinguishing alumnae who lived outside the midwest at the time of the survey adds nothing to the accuracy of the models (0.2 t-test for log number, 0.7 t-test for log centrality). Geographic mobility is a decay factor only with respect to leaving the immediate area around the school.

Family

Family provides a set of events that can erode attachment by competing with the GSB for alumna attention. For example, the number of GSB graduates an alumna cites as core contacts is significantly lower if she ever married (-4.4 t-test). Number of marriages does not matter beyond the first marriage (-4.4 t-test for number of marriages), though divorce is a disruptive event that can break a person away from earlier attachments, and alumnae who have gone through a divorce cite a significantly lower number of GSB graduates among their core contacts (-2.5 t-test). Children are another consideration. The probability of citing a GSB close friend is .62 for alumnae who have had no children, .57 for those with one child, .52 for those with two children, .44 for those with three or more (2% of the alumnae had more than three children). Number of GSB graduates cited declines similarly with more children (-5.2 t-test). Figure 7 shows how the probability of a GSB graduate among an alumna's core contacts changes with family and marital status. The highest probability, .75, occurs among alumnae who have not yet married. The lowest probability, .32, occurs among alumnae who are divorced with children and have not remarried. The death of a parent is another potential source of decay. Alumnae who had gone through the death of a parent were less likely to cite a GSB close friend (-3.2 t-test), and cited fewer graduates among their core contacts (-4.4 t-test).

———— Figure 7 About Here ————

However, when time, embedding, and GSB experience are held constant, family events are for the most part irrelevant to attachment. Marriage, divorce, and children have no direct associations in Table 1 with the probability of a GSB close friend, or the number of GSB graduates cited as core contacts. Adding death of a parent to the prediction is similarly irrelevant (e.g., -1.1 t-test predicting number of GSB graduates cited). To the extent that family events affect attachment, marriage is the key event. Marriage creates a strong attachment in the alumna's network that makes GSB graduates less central (-3.9 t-test in Table 1), though children or divorce have no effect on centrality. The inference is that family events work primarily to erode attachment. Women lured away from the GSB by marriage do not return after divorce.

Career

Career events could be expected to affect attachment. One issue is the direction they take. The GSB could be expected to be more relevant to a woman who continues to work, less relevant to a woman who leaves the labor force. Prestige is another issue. The GSB is an elite institution. An alumna who does not go on to distinguish herself could find it embarrassing to maintain contact with other GSB graduates.

Consistent with these remarks, alumnae who had retired or were otherwise not working outside their home were less likely to return the survey questionnaire (see "sample respondents" above), those who had reached a senior position included more GSB graduates among their core contacts (3.2 t-test, where senior is any level above middle manager), and the number of graduates cited increases (2.2 t-test) with "labor market status" distinguished at three levels: (1) unemployed at the time of the survey, (2) working part-time, or (3) working full-time.

However, attachment has no direct association with senior position or labor market status when embedding and variation in GSB experience are held constant in Table 1. The lack of association continues to be true if senior position is limited to CEO (a higher achievement than reaching any senior position), if family income

is added to the prediction (more wealthy alumnae are presumably more often sought out), if a variable is added to distinguish alumnae who engaged in entrepreneurial activities (an achievement in its own right, and a reason to keep in touch with other graduates as a source of business), if job satisfaction is added to the prediction, or if the three-category labor variable is made more specific by replacing it with two predictors, one distinguishing unemployed or retired alumnae, the other distinguishing alumnae working full-time.

CONCLUSIONS

To study decay in attachment to an organization, I analyzed data on women who obtained an MBA from the University of Chicago's Graduate School of Business (GSB). I measured attachment in terms of network embedding: Attachment increases with the extent to which an organization is embedded in the network around a person, and embedding increases as the person has strong relations to individuals affiliated with the organization. An organization is relevant to you as it is relevant to your friends, colleagues, and acquaintances. Behavioral data corroborate the network data in that alumnae measured to be more attached are more likely to have joined an alumni club and made a financial contribution to the school.

Other things equal, the hypothesis was that alumnae attachment could be expected to decay over time, more slowly when the school is deeply embedded in an alumna's network, more quickly when disruptive events compete for the alumna's time and energy. The empirical question for the paper was to determine how quickly attachment decays, and how much specific decay factors speed or inhibit decay.

As expected, attachment declines across the years after graduation (linearly for the first decades), and decay is inhibited when connections with GSB graduates are embedded in stable relations of family, work, or long-term friendship. Of the explained variance in alumna attachment, 4% comes from GSB connections embedded in family, 13% comes from GSB connections embedded in work, and 61% comes from GSB connections embedded in relationships that pre-date

graduation from the GSB.⁷ Decay is also inhibited by GSB programs that encouraged or enhanced interpersonal relationships for the women when they were enrolled in the school. Differences between GSB programs account for 8% of the explained variance in attachment. Decay is remarkably robust to events after graduation. Events subsequent to graduation are a small piece in the puzzle, 2% to be exact. An alumna's attachment today was largely determined while she was in school.

The results should be of practical value to people who design programs to build personal attachment to organizations, and of theoretical interest to scholars who study such connections. The practical implications are three: to promote university attachments that last, (a) know that the time to build the attachments is while the student is enrolled (as opposed to hoping that alumnae can be recovered after they graduate), (b) embed the attachment in other stable relationships such as family, work, and long-standing friendships (e.g., recruit relatives and close friends of former graduates, and applicants from organizations that employ many former graduates), and (c) create emotional experiences at university that encourage interpersonal relationships (e.g., the LEAD program at the GSB). More generally, the results combine with longitudinal analysis of decay (Burt, 2000a; 2001) to highlight the critical role that embedding plays in inhibiting relationship decay. What is so striking about the alumnae is the lasting effect of embedding set in place so long ago.

⁷Percentages in this paragraph were determined as follows: Estimate parameters for a canonical correlation model predicting the network indicators of attachment in the columns of Table 1 from the decay factors down the rows. There is a .88 canonical correlation for the first linear composite. Predictor contribution to explained variance is the product of the predictor's correlation with the linear composite defined by all 18 predictors times its standardized regression coefficient defining the linear composite. The sum of contributions from the seven "Other Events" in Table 1 is 2%. The sum of contributions from the six "GSB Experience" predictors is 8%. The contribution from "Years" is 1%. The remainder is embedding: 4% from "GSB graduate in the family," 13% from "Colleague GSB graduate," 61% from "Relationship with a GSB graduate pre-dates graduation," and 11% from "Longest relationship with a GSB graduate."

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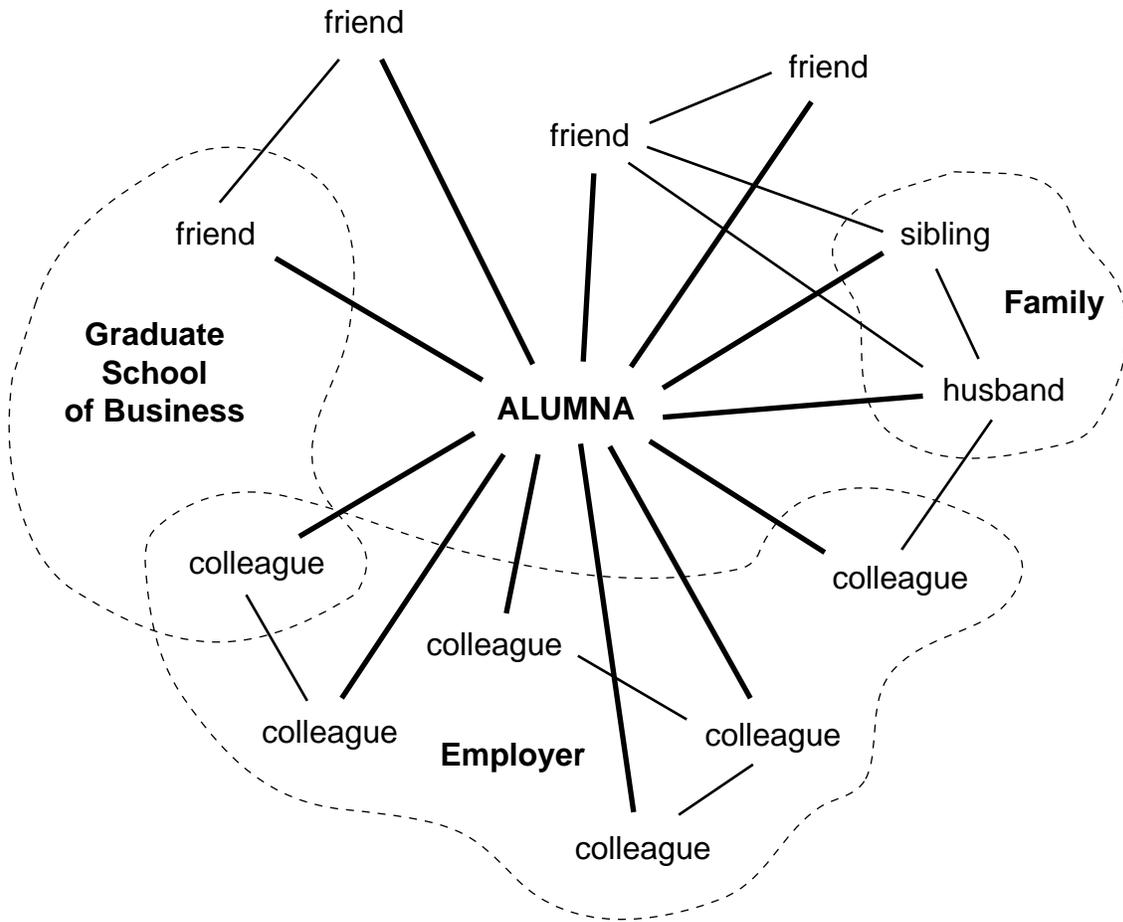
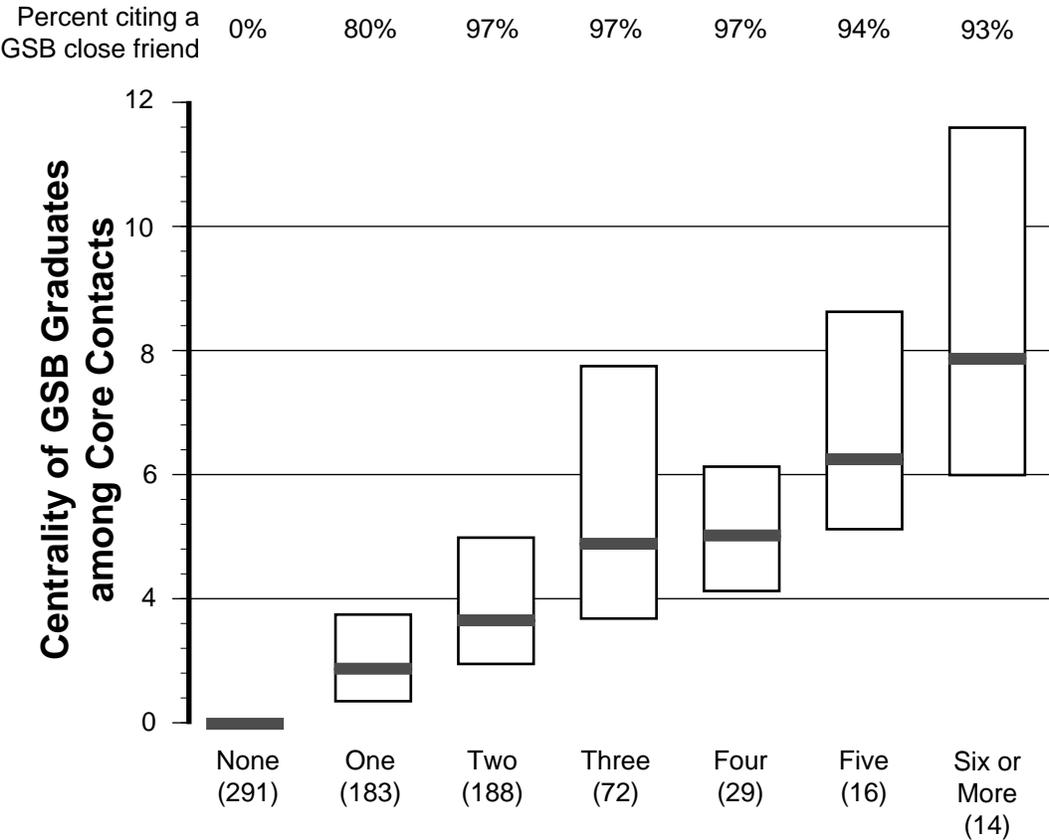


Figure 1.
Colleagues, Family, Friends, and the GSB
Among an Alumna's Core Contacts.

Figure 2. Measuring Attachment.

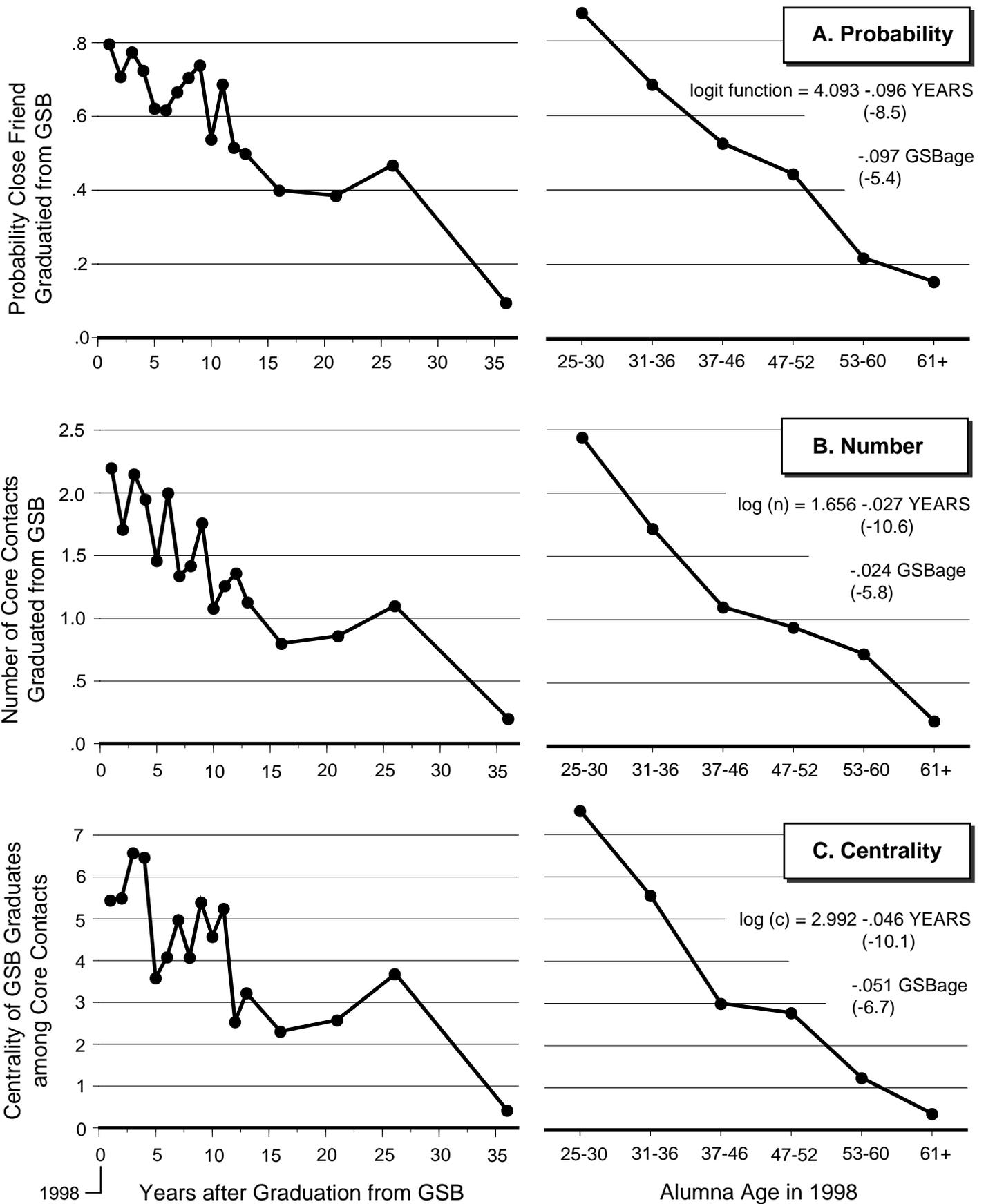


Number of GSB Graduates Cited as Core Contacts

(parentheses contain number of alumnae at each level,
boxes span 25th to 75th percentile, horizontal bar at median)

Figure 3. Attachment Decay.

(YEARS is years after graduation; GSBage is age at graduation; test statistics in parentheses)



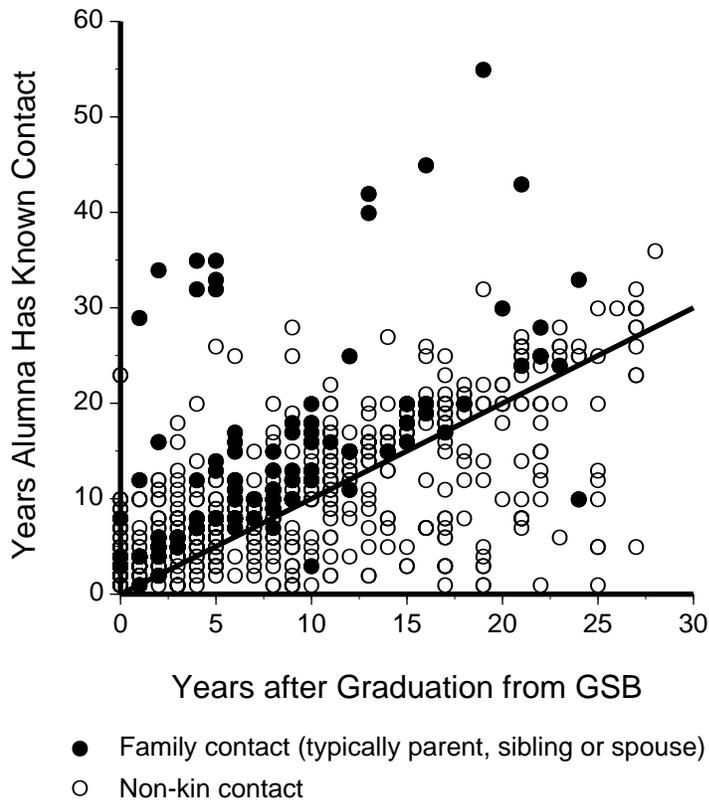


Figure 4.
Alumna Time in Relationships
with GSB Graduates.

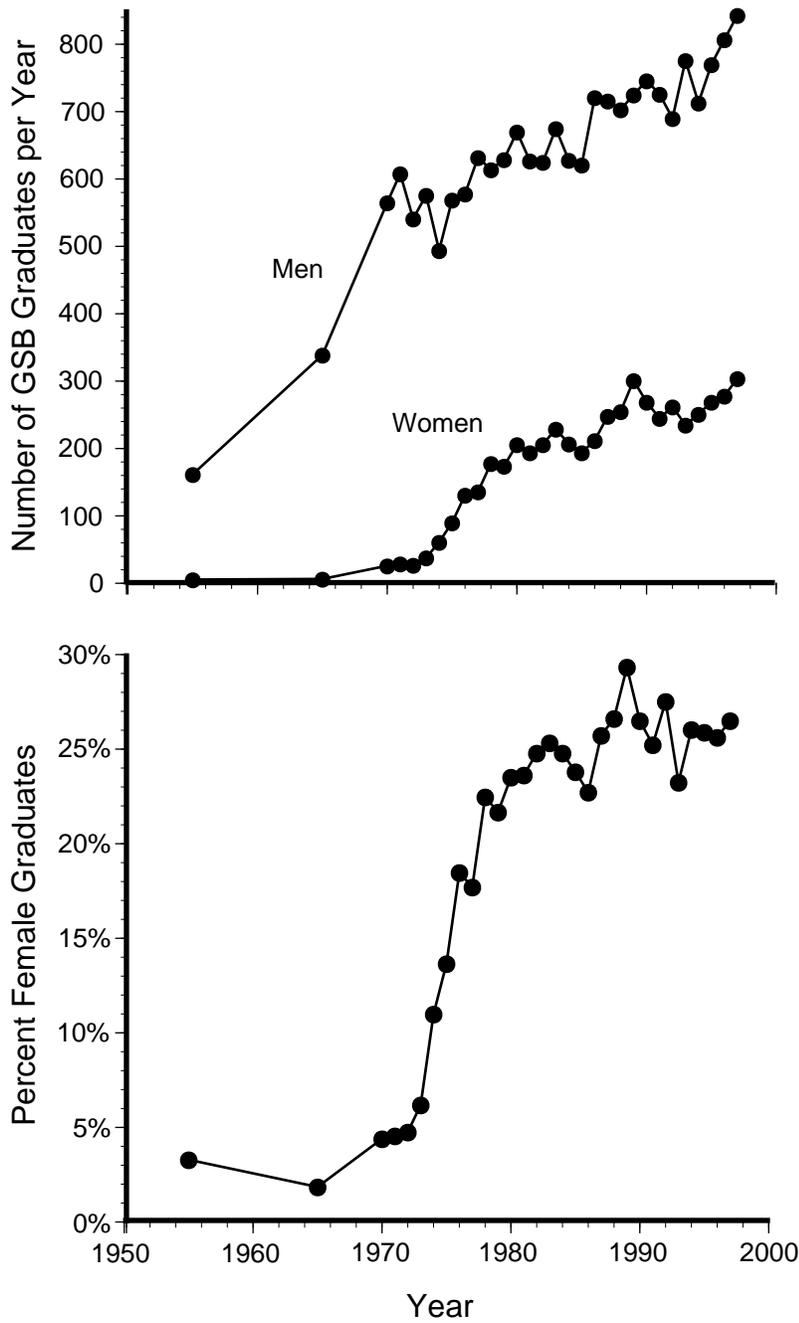


Figure 5.
Demography of the GSB Experience.

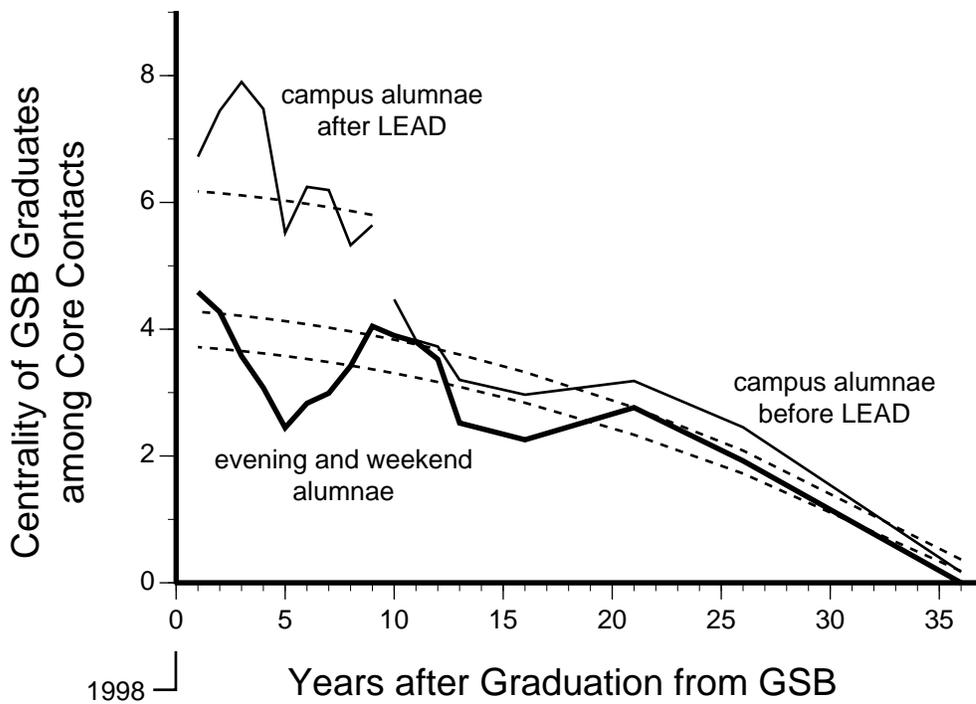
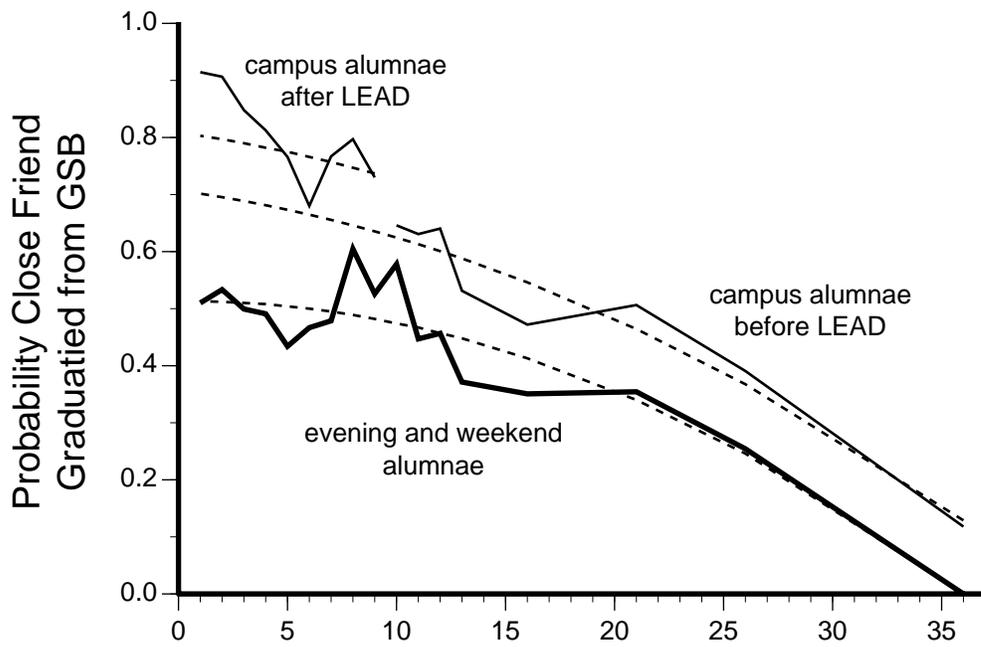


Figure 6.
Effects of the LEAD Program.
 (jagged lines plot moving averages across adjacent years, and dashed lines are regression lines through the smoothed data)

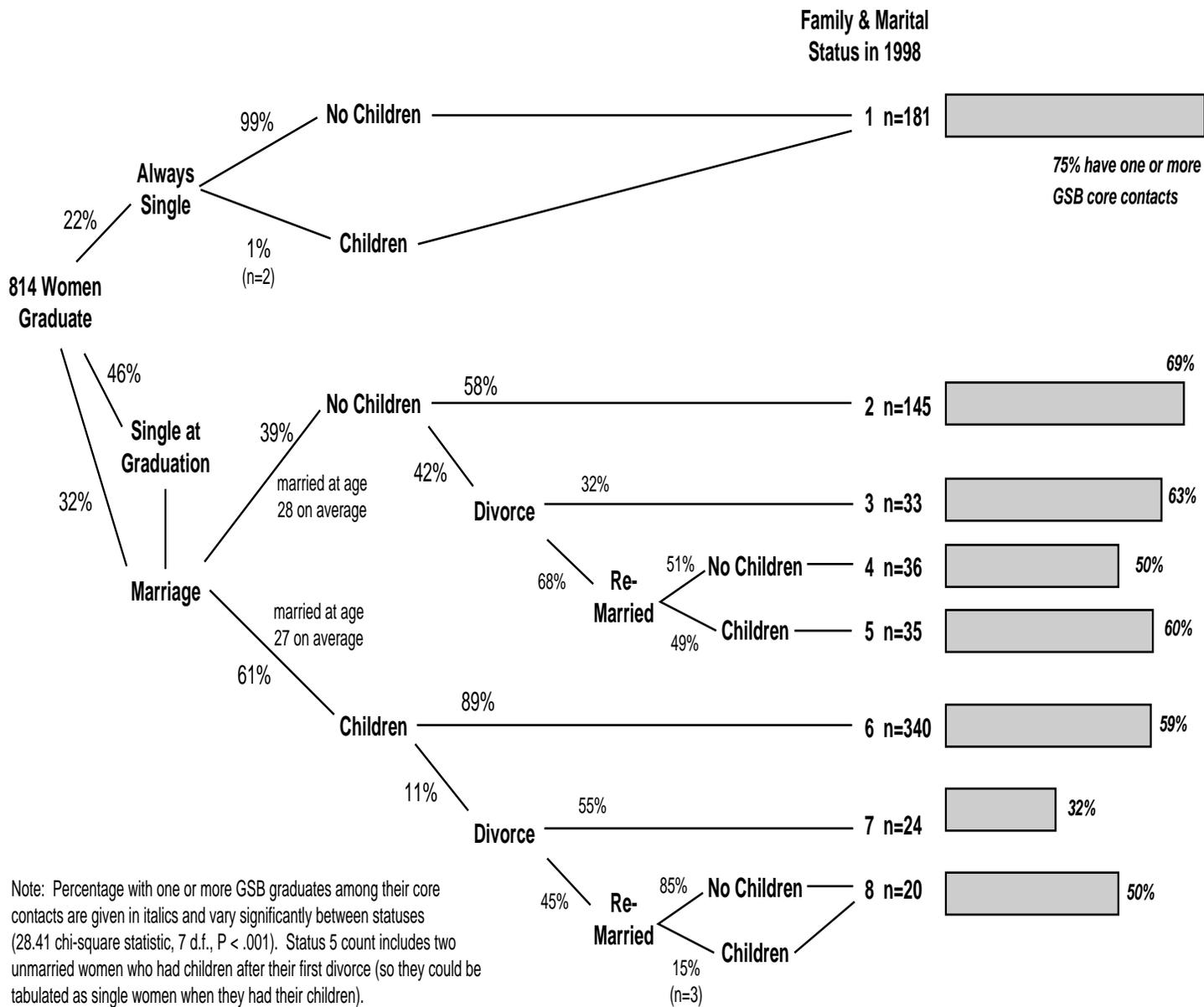


Figure 7.
Paths to Current Family and Marital Status.

Table 1. Decay Factors.

	Range of Scores on Factor	GSB Close Friend	Log Number of GSB Contacts	Log Centrality of GSB Contacts
Predicted variance	—	.575	.712	.637
Alumna in prediction	—	793	793	783
Constant	—	-8.055	.158	.658
Years after graduation	0 to 53	-.031 (-0.6)	-.008 (-1.9)	-.013 (-1.4)
Embedding Factors				
GSB graduate in family	0, 1	-.653 (-1.5)	.077 (1.9)	.915 (12.1)*
Colleague GSB graduate	0, 1	.546 (1.8)	.395 (13.6)*	.412 (7.2)*
Relationship with a GSB graduate pre-dates graduation	0, 1	1.594 (4.5)*	.413 (11.9)*	.648 (9.4)*
Longest relationship with a GSB graduate (in years)	0 to 55	.240 (8.8)*	.019 (9.9)*	.022 (5.6)*
GSB Experience				
Number of students in cohort	168 to 1147	.010 (3.4)*	.0005 (2.0)*	.0007 (1.6)
Percent women in cohort	3 to 29	-.120 (-2.1)*	-.010 (-2.3)*	-.023 (-2.5)*
Campus program	0, 1	.874 (2.3)*	.118 (3.7)*	.116 (1.8)
Executive program	0, 1	1.635 (2.4)*	.221 (3.5)*	.120 (0.9)
Gleacher building	0, 1	-1.054 (-2.0)*	-.060 (-1.1)	-.068 (-0.7)
LEAD program	0, 1	.207 (0.5)	.142 (3.4)*	.252 (3.0)*
Other Events				
Age at graduation	18 to 62	-.045 (-1.2)	-.004 (-1.3)	-.010 (-1.6)
Still lives in Chicago	0, 1	.232 (0.7)	.071 (2.4)*	.138 (2.3)*
Ever married	0, 1	-.490 (-1.3)	-.048 (-1.4)	-.256 (-3.9)*
Ever divorced	0, 1	-.330 (-0.9)	.032 (1.0)	-.023 (-0.4)
Number of children	0, 3	.125 (0.8)	-.018 (-1.3)	.036 (1.4)
Ever a senior manager	0, 1	.227 (0.7)	-.016 (-0.6)	-.037 (-0.6)
Labor market status	1 to 3	.307 (1.5)	.010 (0.6)	.014 (0.4)

Note — Range of scores on row variables are minimum to maximum and test statistics are given in parentheses (asterisk marks a statistic with less than a .05 two-tail probability of being zero). Logit model predicts probability of citing a close friend who graduated from the GSB (622.5 chi-square statistic for prediction, 18 d.f., $P < .0001$; predicted variance is pseudo R^2). Ordinary least-squares regression models predict logs of number and centrality of contacts who graduated from the GSB (log of 1+score).

Table 2. Cited Alumna Relationships

Primary Role Relationship between Alumna and Contact					
	Relatives	Non-Kin Colleagues	Just Friend	Other	Total (N)
Name Generator:					
Discuss personal matters	39.4	29.9	26.9	3.8	100% (2264)
Informal socializing	24.8	22.0	49.1	4.1	100% (1507)
GSB close friend	6.7	16.1	77.2	0.0	100% (745)
Discuss new job	30.7	44.1	20.8	4.4	100% (2163)
Most valued professional contact	5.3	83.0	7.7	4.0	100% (2430)
Essential source of support at work	1.0	93.7	2.1	3.2	100% (2514)
Immediate supervisor, or most difficult colleague	1.1	98.9	0.0	0.0	100% (1385)
Contact in entrepreneurial activity	5.7	76.7	12.5	5.1	100% (176)
Name Interpreters:					
Friend	7.8	47.9	44.3	0.0	100% (4410)
GSB graduate (includes GSB close friend)	9.6	26.4	60.7	3.3	100% (1069)
Total (N)	13.0 (1270)	63.4 (6199)	20.0 (1953)	3.6 (356)	100% (9778)

Table 3. Decay in Individual Relationships.

	Range of Scores on Predictor	Contact is GSB Close Friend	Contact is a GSB Graduate	Log Centrality of GSB Graduate
Predicted variance	—	.251	.189	.117
Alumna contacts in prediction	—	9,570	9,570	9,532
Controls				
Constant	—	-.153	.279	.557
Contact is a relative	0, 1	-2.013 (-6.7)*	-1.230 (-5.4)*	-.104 (-2.2)*
Contact is a non-kin colleague	0, 1	-3.321 (-17.4)*	-2.666 (-15.0)*	-.441 (-14.7)*
Years alumna has known contact	0 to 60	.025 (1.9)	.005 (0.5)	-.006 (-3.6)*
Knew contact before graduating	0, 1	-1.564 (-6.6)*	-1.404 (-6.6)*	-.127 (-5.7)*
Decay				
Years after graduation	0 to 53	-.122 (-10.4)*	-.132 (-10.0)*	-.022 (-9.4)*
Decay Slope Adjustments				
for Relatives	0 to 53	-.018 (-0.8)	-.032 (-1.6)	.003 (0.9)
for Non-Kin Colleagues	0 to 53	.044 (2.7)*	.040 (2.4)*	.015 (7.3)*
for Long-Term Acquaintances	0 to 3060	.0027 (4.5)*	.0034 (5.2)*	.0005 (5.5)*

Note — Range of scores on row variables are minimum to maximum, and test statistics are given in parentheses (asterisk marks a statistic with less than a .05 two-tail probability of being zero, and standard errors are adjusted for autocorrelation between contacts cited by the same respondent, Kish and Frankel, 1974). Logit models predict the probability that the contact is a close friend who graduated from the GSB (719.4 chi-square statistic for prediction, 8 d.f., $P < .0001$), and the probability that the contact is a graduate of the GSB (565.1 chi-square statistic for prediction, 8 d.f., $P < .0001$; predicted variance is pseudo R^2). Ordinary least-squares regression model predicts log centrality of contact who graduated from the GSB (log of 1+score). The slope adjustments are interaction effects for years after graduation respectively times contact is relative, contact is non-kin colleague, and years for which alumna has known contact. The 9,778 contacts in Table 2 are 9,570 here because of missing data on the duration variable.