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ABSTRACT

The relative impact of the aging process, pervasive changes in higher education, and career socialization experiences on college faculty members' distributions of work effort was studied. Secondary analyses were completed on the following surveys: the Carnegie Commission on Higher Education Survey (1969) and the Survey of the American Professoriate (1975 and 1977). The sample consisted of white males with appointments in humanities, social science, and natural science departments at Carnegie I institutions. Influences on faculty role performance were determined by testing 11 propositions concerning the changes that could be attributed to age, cohort socialization, environment, and life course. Areas of study included: mean hours devoted to instruction at each time of data collection; measures of service to the department and university; age-related changes in interest that might account for faculty role performance; the effect of socialization experiences (e.g., graduate education, promotion) on the behavior of faculty of the same career age who are evaluated at different times; the effect of the recency of appointment on preference for research and acquisition of grant support; and the effect of tenure and rank on research interest and funding acquisition. (SW)

AGING AND FACULTY DISTRIBUTION OF THEIR WORK EFFORT*

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Introduction

With the exception of a few landmark studies (Bowman, 1939; Wilson, 1941; Lazansfeld and Theilens, 1958) professors were rarely the subjects of systematic inquiry, especially as an occupational group in the work force. However, attention to numerous facets of the academic role increased exponentially as the size of profession doubled over the decade of the 1960's. Finkelstein (1984) has collected a sample of this literature and displayed the large body of findings on U.S. academicians.

During the 1970s and 1980s, changes in academe led researchers to focus their attention on the relationsnip between aging processes and role performance . Although the body of literature burgeoned, the results were inconsistent and sometimes contradictory (Lawrence & Blackburn, 1985a; Clark, Corcoran & Lewis, 1984). Variations in the conceptualization of the problem have contributed to the lack of agreement about the cause(s) of career interest and productivity changes that may occur over time (Lawrence & Blackburn, 1985b). Studies using psychological paradigms have focused on individual differences in ability or development and neglect factors in the environment that might constrain behavior (Baldwin & Blackburn, 1981; Braskamp, et al, 1982). When sociological paradigms have been applied, the emphasis has been on environmental antecedents of behavior change (e.g., roles, rewards, socialization processes . . .) with few systematic controls for individual differences in psychological functioning (Long, 1978; McCain, O'Reilly, & Pfeffer, 1982).

The difficulty of drawing conclusions about the impact of age on role performance has been further complicated by the dependence on conventional cross-sectional and longitudinal research designs. Differences between age

groups sampled at one time or within a cohort measured at different times are confounded by social change (variations in institutional conditions at the times of data collection) and cohort effects (variations in the life experiences of people born or beginning their professional lives during different historical periods). Hence, it is risky in either case to conclude behavioral change is a function of age and generalize age related differences to subsequent generations of professors (Schaie, 1965; 1977; Riley, 1979).

Psychologists have created quasi-experimental designs for studying behavior change over the life course. Non-linear statistical models have also been developed that allow one to systematically take into account the contributions of and interactions among the three potential sources of behavioral change - aging processes, social change, and cohort effects. To date, however, there have been few attempts to apply these methodologies in studies of faculty productivity.

This paper reports the findings from a sequential analysis of data gathered from national samples of faculty members surveyed in 1968, 1975, and 1977. Specifically, the researchers sought to assess the relative impact of aging process, pervasive changes in higher education, and career socialization experiences on professors' distributions of work effort.

Theoretical Framework

In this section of the paper, we review briefly the definitions of age, cohort and environmental effects. We also present the supporting rationale for several propositions about the impact of these general factors on faculty distribution of effort at different points in their academic careers. We conclude with a brief overview of a life-course perspective on career change and the propositions that logically follow from it.

A behavior that is a function of age (maturation processes) occurs among all people at a predictable time. Differences in behavior between age groups that are caused by variations in the life experiences of people who enter a social system at different points in time (e.g., generations) are called cohort effects. Variations in behavior that can be traced to role requirements at given times as well as similar shifts in behavior that occur across age groups at a particular time due to pervasive changes within an institution or the general culture are classified as environmental effects. Most likely, however, variations over the life course of an individual or differences between age groups are due to interactions among these components or dimensions of behavioral change. For a more complete discussion of the theoretical issues see Schaie (1965, 1977), Dannefer (1984), Riley (1979).

Change as a Function of Age

A small group of researchers has investigated the variance in work performance that can be accounted for by age-related changes in intellectual factors (see for example, Pelz & Andrews, 1976) and in career satisfaction (see for example, Cares & Blackburn, 1978). However, the major emphasis in the research has been on ontogenetic changes in need states and the impact of these shifts on role performance (see for example, Hodgkinson, 1974; Baldwin & Blackburn, 1979; Braskamp, et al, 1982).

Based on extant research in which age related changes in values, and work performance were the focus, we generated the following propositions that could be tested with our data set:

(1) There will be differences between aged groups in distribution of effort at each time of data collection and as they age, cohorts will exhibit the same behavior pattern.

(2) The older professors' interests will be primarily in teaching whereas younger professors will want to spend more time in research.

(3) Professors will experience a mid-life crisis and as a result, they will exhibit sharp changes during those years with no consistent pattern within group in the distribution of effort.

Variation as a Function of Cohort

Research suggests that graduate school and early career socialization experiences that are particularly intense (for example, tenure and promotion decisions) have a lasting effect on work performance (Blackburn, 1985; McCain et al, 1982). Since institutional and disciplinary norms may change over time, it follows that professors who are socialized during different eras may hold different values and prefer different activities. As a consequence, variations between subgroups of professors who began their careers in different years (appointment cohorts) reflect differences in persistent behavior patterns rather than change resulting from aging process (Ladd & Lipset, 1979; Bayer & Dutton, 1977).

Again, based on our review of the research, we put forth the following preliminary propositions for testing:

(4) As a consequence of changes in professional career socialization experiences (graduate education, promotion and tenure decisions),

there will be differences between professors from the same discipline who entered the system at different times but are surveyed at the same points in their careers. Those appointed more recently, will exhibit a greater preference for research and will have acquired more grant support at each career stage.

(5) The differences between appointment groups will persist but there will be little variation in preferences and distribution of effort within cohorts over time.

Change as a Function of Environment

Changes in productivity that occur over time within groups or individuals can be traced to antecedents in the environment. In particular, academic and administrative roles organize the activities of the occupants and can constrain their access to resources and thus affect work behavior (Morgan, 1970; DeVries, 1977; Dannefer, 1984; Blackburn, Behymer & Hall, 1978). But, social reinforcement in the form of salary incentives and prospective job security can also influence the distribution of effort to research, teaching and service among professors (Guzzo & Bondy, 1983; Ladd & Lipset, 1973; Tuckman, 1976). Finally, pervasive changes in professional norms such as the value shift toward specialization that occurred during the 1960s (Parsons & Platt, 1968) can have a general and similar effect on all persons who are in a system at that time.

The findings to date support the following testable propositions:

(6) Because of differential role expectations, untenured faculty members will be more likely than tenured professors to be interested in research and seek and acquire funding for their studies.

(7) Because seniority increases faculty access to resources that enhance their chances of success, the professors from earlier appointment cohorts will be more likely to have funding for their research.

(8) Differences between tenured and untenured professors in their preference for research will be greatest in the 1960s and will diminish in the late 1970s due to general emphasis given to scholarship.

A Life Course Perspective of Change

The discussion of theoretical issues so far has emphasized studies that have assessed the main effects of select individual attributes and environmental factors. However, there is a growing body of literature on the possible interactive effects of these variables. For example, there is an ongoing debate among higher educators regarding the mediating influence of environmental factors on age related changes in self-concept (e.g., Clark, Corcoran, & Lewis, 1983). Several researchers have found that when institutional types and "other key variables" are held constant, age differences in productivity disappear (Loeb, Faber, & Lowry, 1978; Fulton & Trow, 1975; Clemente & Hendricks, 1973). Bayer and Dutton concluded that with regard to productivity and age "a nonlinear function provides a more appropriate representation of the actual relationship" (1977, p. 274). The diverse interpretations of results underscore the need to utilize a theoretical framework and quasi-experimental methodology that allows for the systematic testing of alternative explanations within the same data set.

The life-course perspective provides such a theoretical and analytical framework (Riley, 1979; Atchley, 1975; Clausen, 1972). In brief, proponents of the life-course perspective hold that changes in individual and group

behavior result from ongoing interactions between individuals and their environments. However, alterations in the environment may also occur as a result of these interactions. Consequently, the social experiences of different generations may be quite different and lead to variations in developmental patterns over time. When one applies this perspective to the study of academic career patterns, it becomes clear that investigations must consider: (a) the impact of chronological age and career age (length of time since entering the profession) on professional behavior; (b) the range of career options open to individuals as a result of individual differences in ability and experiences and institutional differences in resources (personnel, fiscal and physical); and (c) the attractiveness of career options as perceived by individuals with different predispositions and as defined by institutional norms.

Such a perspective on career change leads us to postulate: Variations in professional behavior over the life course can be accounted for by:

(9) interactions among role requirements, individual activity preferences, aging process and changes in the institution, and

(10) the mediating influence of the behavior outcome measures on one another.

Method

The study reported here is the third phase of an ongoing effort to distinguish the main and interactive effects of aging, cohort, and social change factors on faculty career patterns. In the first phase, we reanalyzed interview and vitae data gathered from a panel of University of Michigan professors, controlling for discipline, college, sex, and race (Lawrence &

1985a). By comparing (a) scholarly productivity change within cohorts of professors appointed as assistant professors at the same point in time (appointment cohorts), and (b) differences between appointment cohorts at the same points in their careers but measured at different times, we gained some preliminary insights into the effects of the three general factors on scholarly activities. However, there were several critical limitations to the data set that restricted our ability to use more powerful statistical models (see Lawrence & Blackburn, 1985a).

In a subsequent study (Lawrence & Blackburn, 1985b), we repeated the one-way anova and regressions using as our data set the sequential national surveys of the professoriate conducted in 1968, 1975, and 1977. The 1968 survey was conducted for the Carnegie Commission by the American Council of Education. The 1975 and 1977 surveys were conducted by Ladd and Lipset. The general advantages of these sequential data sets are: (1) that they have many identical and several similar items and oftentimes utilize multiple indicators of a single concept (e.g., productivity can be measured as scholarly production or distribution of effort); and (2) they drew their random samples from the same populations. The availability of repeat measures allows one to measure actual change over time. This is an advantage over studies that used statistical models with underlying assumptions about behavioral change with age that do not seem to be supported by recent data (e.g., Allison & Stewart, 1974).

In our second study, we used only the respondents from the Carnegie I Research Institutions who held appointments in the natural sciences[1] and again placed controls on sex and race so that our sub sample included only white males. While we recognize that race and sex as well as discipline and

institution can limit the range of career options at a given time and may affect socialization experiences, the demographic composition of the survey samples precluded meaningful analyses using these variables.

We used analysis of variance techniques to test trends found in the panel study. Although the results were not statistically significant, a comparison of mean publication rates for each appointment cohort at successive times of data collection underscored the influence of cohort membership (year of initial appointment as an assistant professor) on publication rates during the previous two years. Each successive cohort published more articles at the same career stage, e.g., the people who were initially appointed in the 1960s published more articles between 1973-1975 than the respondents appointed in the 1950s had published in 1966-1968. Furthermore, although relative differences in rates persisted, there seemed to be a decline in the publication rates of all appointment cohorts in 1975 and a similar increase in 1977. This finding pointed to social change effect. (These data are displayed in Table 1).

Using an analytic strategy proposed by Schaie (1965), we calculated estimates for cohort, age, and time of testing effects for each sequential data set (1968, 1975, and 1977). We then followed his process of logical deduction in which we systematically compared the contributions of the three components of change to shifts in scholarly production. The general premise was that change over time in this productive behavior could be the result of age, cohort, or social change acting one (main effects) or acting in concert

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[1] Disciplines subsumed within the Natural Sciences are: Astronomy, Botany, Chemistry, Geology, Math, Physics, and Zoology.

with one or more of the other components (age x cohort, age x social change, social change x cohort, or age x cohort x social change). The overall conclusion was that interactions between appointment cohort and time of testing accounted significantly for changes in publication rates over the time period 1968-1975.

While Schaie's model enabled us to derive a general measure of the interactions that led to change, we realized the analytic process needed further refinement if we were to identify the aspects of the environment and cohort differences which were interacting and producing change over time. Hence, we undertook the preliminary study reported herein.

The theoretical assumptions about the life course that underlay the earlier analyses guided this more recent secondary analysis of the sequential national surveys. Specifically, we assumed that individual differences will combine with variations in the social environment to affect productivity over time and productivity at one time will have a reciprocal affect on the environment and influence individuals' subsequent role performance. Hence, one needs to examine variations over time in individual and environmental characteristics and in productivity: (1) within the same cohort measured at different points in time; (2) between cohorts at a given time of data collection; and (3) between cohorts at the same period in their careers but measured at different times.

Our general strategy in the secondary analysis is to proceed from a highly focused examination of variations within a cohort, to comparisons across cohorts and ultimately to the testing of causal models of change over time. The first step in the procedure involves an analysis of the main and interactive effects of individual and environmental properties on each other

and the productivity measures at each time of data gathering. To accomplish this a researcher divides the appointment cohorts into subgroups (e.g., tenured/untenured, age, activity preference . . .) and compares them with respect to distribution on the productivity measure. Using analysis of variance, covariance and regression analysis, one is then able to identify potential interactions among variables as well as how faculty subgroups performed on the productivity measure each time they were surveyed.

Having completed these first steps in the overall analysis, it is then possible to measure change within cohorts over times of testing. Using the results of step one, a researcher can identify possible sources of change within cohorts and use multivariate analyses to test propositions. He or she can next focus attention on differences between cohorts (cross-sequential comparisons) at a given time of data collection and attempt to identify the source(s) of these differences. Shifting focus once more, time sequential comparisons between cohorts at the same point in their careers but measured during different times can highlight the possible sources of change between times of data collection. The final step, testing of causal models involves inspection of data for converging support for a proposition, e.g., the results of the cohort, cross-, and time-sequential analyses all point to the same conclusion.[2]

[2] At this time, we are not ready to proceed with testing of causal models as we do not have all data for all cohorts.

Analysis of Data

Secondary analyses were completed on three successive surveys of the American professoriate. The surveys were the Carnegie Commission on Higher Education Survey conducted by the American Council of Education in 1969; the 1975 Survey of the American Professoriate done by E. Ladd and S. Lipset; and the 1977 Survey of the American Professoriate also conducted by Ladd and Lipset. The data analysis was designed to test several propositions regarding changes in select attributes of professors and in institutional factors that may have occured over time and influenced faculty role performance. The statistical procedures used in the analysis were outlined in the previous section on Method.

Sample. Subsamples were drawn from each of the surveys by placing controls on institution, discipline, sex, and race. Th data used in the secondary analysis consisted of responses from white males with appointments in humanities, social science and natural science departments at Carnegie I institutions.[3] The results for only the natural science faculty members are reported in this paper. The analysis was limited to one discipline category in order to reduce the number of intervening variables in the analysis. (See Table 2 for distribution of subjects across surveys by age and discipline groups.)

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[3] These controls were introduced because we are using these data in a comparison of results with a panel study of University of Michigan faculty members which was composed of males, almost all of whom were caucasian.

Definition of Variables. Faculty role performance was defined as distribution of effort to teaching and service and grant acquisition. In all three surveys, respondents were asked, "During the spring term, how many hours per week are you spending in formal instruction in class? (If on leave, indicate what your normal teaching load would be.)" The 1969 and 1975 surveys also included the similar items for measuring service to the university. In the 1969 survey respondents were asked: how active are you in your own department's affairs (Q16a) and how active are you in the faculty government of your institution (committee membership, etc.) (Q 16b). The corresponding items in the 1975 survey were: how involved have you been in departmental affairs in recent years (Q 57a) and how involved have you been in university affairs in recent years (Q 57b). These variables were used as indicators of distribution of effort to teaching and to department and university service and the coding categories were redefined so they were consistent across surveys.

The surveys did not include a question that asked explicitly about the time devoted to research (as was the case with teaching). However, they did include an identical question about research funding: In the past 12 months, did you receive research support from. (list of institutional, government, foundation, and industry sources) mark all that apply yes. (Q 54, Q 68, Q 52 in the respective surveys). In the absence of a direct measure, it seemed reasonable to assume the acquisition of research support provided an indirect measure of time given to research.[4]

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[4] In a previous analysis, we used publication rate as an outcome measure and decided to use grant acquisition in this analysis as an alternative index of scholarship.

In light of our propositions with respect to cohort effects, subjects were assigned to one of four groups based on their total number of years of service in higher education (excluding graduate research or teaching positions). The four cohorts consisted of all faculty members initially appointed as assistant professors between 1940-49, 1950-59, 1960-69, and 1970-79. Initial appointment was taken to be the marker event that signified entrance to the system and the ten year intervals were taken to define "generations" of professors based, in part, on the assumption that people who have been in the system 7-10 years should have experienced the first "rite of passage" - the tenure decision. In addition, these people may have some influence over the selection of new professors. Age groups were created by dividing the age range into decades as follows: persons aged 65 years or older, 64-55 years, 54-45 years, 44-35 years, 34-25, and 24 years or less.

The variable used as a surrogate for differential role expectations and constraints on behavior was tenure status. The correlation between this variable and academic rank was strong ($r = .794$, $df=2,5$, $p < .001$) and in all but the oldest cohort, there was sufficient dispersion to support its use instead of the rank variable which is more difficult to interpret. The individual attribute selected for analysis was interest in teaching and research. This variable was used because of the general assumption made in developmental studies that preferences for these activities change over time and in a systematic fashion among all faculty. In addition, it is frequently assumed that after achieving tenure, faculty are freer to pursue individual interests and hence this attribute becomes a more critical factor in determining faculty behavior. The questionnaire items that correspond with each of these variables were identical in all three surveys.

Results

The means and standard deviations for each of the variables are reported by appointment cohort and time of data collection in Table 3. The correlations between chronological age and appointment cohort were strong and, therefore, the results of analyses are reported by cohort only (the correlations, all significant at <.01, were .774, .765, 781 in 1969, 1975 and 1977, respectively).

Change as a Function of Age

Proposition (1) asserts comparisons across cohorts and within cohorts over time should reveal consistent differences in distribution of effort that reflect ontogenetic changes in individual attributes. Cross-sectional comparisons of the mean hours devoted to instruction at each time of data collection did not indicate any significant differences between cohorts. The magnitude of the change in the amount of time spent in teaching was about the same in all groups. On the basis of the literature, one would anticipate the amount of time and degree of change on this variable within the 1950 and 1940 cohorts would have been greater than in the 1960 and 1970 cohorts. Hence, the trend does not seem to be attributable to aging alone.

Comparisons of the grant acquisition variable indicated that in 1969, the 1950 and 1960 cohorts were more likely than the 1940 cohort to have obtained support for their research. In 1975, the 1940 and 1970 cohorts were similar and on the average, had less grant support than the 1950 and 1960 cohorts. But in 1977, the younger cohorts became more alike and the older cohorts did too. Again, the variations in scores within cohorts between times of testing as well as differences between cohorts did not suggest an age-related pattern of change.

Measures of service to the department and university were collected in 1969 and 1975, but not in 1977. This means less time for age-related change to occur. The differences between cohorts were in the expected direction, with the older cohorts giving more time to university service than the younger ones. However, there were substantial increases in departmental service across all cohorts between times of testing (is trend is discussed in more detail under environmental issues).

Proposition (2) is aimed at age-related changes in interest that might account for changes in faculty role performance. The cross-sectional comparisons of the preference measure indicated significant differnces between cohorts in both 1969 and 1977. In each year the older professors were more interested in teaching. However, the change between times of testing within cohorts was not as anticipated and across all cohorts there was an increased interest in research.

As was the case with proposition (1), the data revealed cross-sectional differences at each time of testing. However, the direction of change within cohorts did not support an aging interpetation of change.

Proposition (3) is derived from the developmental literature that asserts the age 40 transition period is a time of unusual flux when the search for new meaning can result in diverse behavior patterns. This is in contrast to the earlier phases of development when professors are moving into their new career or the later phases when they have resigned themselves to certain opportunity constraints.

In evaluating this proposition, we focused on the 1950 and 1960 cohort measures gathered in 1969 and 1977 respectively. We assumed that the standard deviations ought to be greater during these times, indicating no strong

central tendency within this age group. If one looks at the means for both preference and distribution of effort measures, it is clear that the data do not fit our search interpretation. The standard deviations were no greater than for other cohorts at these times and in fact, within the 1960 cohort . there was more diversity when they were younger (compare the 1960 and 1970 sds).

Variation as a Function of Cohort

Proposition (4) assumes differences in the socialization experiences of cohorts will cause differences in the behavior of people of the same career age but measured at different times. To test this proposition, comparisons were made along the diagonals, between groups who had been in the system the same amount of time (e.g., 1960 cohort in 1969 is comparable with the 1970 cohort in 1977, etc.)

The first comparison was for the interest measure. The t tests indicated significant differences between the 1960 and 1970 cohorts during their initial years as assistant professors ($t = 5.22$, $p < .01$). The more recent cohort had a much stronger interest in research. Similar comparisons between the 1950 and 1960 and1940 and 1950 cohorts also revealed significant differences ($t = 4.67$, $p < .01$ and $t = 1.57$, $p = .01$, respectively) and in each instance, the younger cohort indicated a greater interest in research. Together, these findings cast some doubt on career stage theories that assume professors socialized in different times but in similar disciplines and institutions of employment will have the same interests at the same places in their careers.

Changes in the teaching and grant activity variables were evident, but the direction was in opposition to the trend in the interest data. Time in classes was greater for the younger cohort in each pair and fewer grants had

been acquired. If distribution of effort is a main effect of preferences, one would expect the younger cohorts to spend less time teaching and to have more grants. Thus, some other variable is mediating the effect of preference on effort. (Since the trend across cohorts was in the same direction, this finding is discussed in more detail under environment.)

Proposition (5) fits with the expectation that socialization experiences have a lasting effect on careers and thus, the pattern of values and activities established early on persist over time. It follows that the differences within cohorts between times of testing should be small

Differences within cohorts are evident with respect to preferences, or career interests, in 1969 and 1977. The means for all cohorts except the 1950-59 group declined significantly between 1969-1977 (at this time we cannot explain why the 1950 group was different). With regard to distribution of effort, the time spent in instruction was significantly larger in 1977. The number of grants acquired in the 12 months immediately preceding data collection dropped off within cohorts.

Taken together, the findings do not support the assertion that professional interests and activities are stable over time. Rather, they suggest changes in interest were occurring within cohorts, perhaps as a result of resocialization brought about by shifts in disciplinary norms or the reward structures of their institutions (we cannot confirm either of these possibilities now, but we are running anova between salary and preference and effort measures). The possible environmental effects are discussed later in this paper.

Change as a Function of Environment

Proposition (6) holds that behavior changes as a result of role expectations. Studies of the academic profession have found that expectations vary by rank but are most clearly articulated for junior professors and untenured faculty members. Therefore, because the correlation between rank and tenure was high ($r = .823$, $p < .01$) we stratified the samples by tenure status but retained the control for cohort.[5]

The t tests of the significance between the means of tenured and untenured professors revealed no significant differences in reported professional interests. Only one of the comparisons of tenured and untenured professors on the grant acquisition measure was statistically significant (there was a difference within the 1960-69 cohort in 1969 - $t = 1.97$, $p < .05$ - but it was not particularly large.)

Comparison of the mean interest scores for the tenured and untenured groups over time indicated no clear pattern of dispersion around the means. It has been said that the tenure decision allows one more freedom to pursue individual interests (Erickson & Moore, 1978). Yet, the tenure group comparisons in the youngest and next youngest cohorts at each time of testing showed the sds varied in different ways. For example, in 1969 the sds for the untenured groups were greater but in 1975 the tenured group was more diverse. Hence, neither a selection explanation, the institution retains people who are similar, or a liberation explanation, one tenure is achieved people follow up latent interests, is supported. The lack of differences between tenured and

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[5] This was done because of the cohort differences found between people at the same points in their careers but measured at different times.

untenured professors with regard to a grant acquisition may show that this is not as critical a factor as publication in the tenure decision and therefore, junior professors do not experience more pressure to seek outside funds.

Proposition (7) is the anthesis to proposition (6). Whereas (6) assumes the roles of untenured and junior professor carry with them expectations for research productivity that result in greater grant activity, proposition (7) assumes senior professors may be in a better position to acquire grants. This notion is akin to Allison and Stewart's concept of accumulated advantage (1974) in that seniority alone may not be sufficient to explain differences in behavior. Therefore, we assumed as these earlier writers did, that dispersion around the mean indicated how widespread the behavior was within a subgroup.

If one examines only the average scores, there is a general tendency for the middle cohorts to have more success in 1969 and 1973. In 1977, however, there tends to be slightly more success within the younger cohorts. An examination of the standard deviations shows that in 1977, fewer people in the 1940 and 1950 cohorts were acquiring grants (the means dropped below 2 and Sds increased). Within the 1960 and 1970 cohorts the standard deviations were still relatively large but the means were greater than 2, suggesting that grant acquisition continued to be more widespread within the groups.

These data are in the direction predicted by Allison and Stewart - viz, the accumulative advantage among a few senior professors results in their continued success in acquiring grants whereas success among others falls off over time. On the other hand, the findings also suggest that the expertise of younger cohorts may be more generally in keeping with funding priorities and therefore, more of them are able to find research support. Further analysis of individual and institutional variables is needed before conclusions may be drawn.

Proposition (8) assumes pervasive changes in higher education, the shift toward specialization in academe, and the growing emphasis on research that occurred in the 1970s, had a similar effect on all members of the professoriate. Several of the findings support this interpretation.

The changes in preference were generally the same for all cohorts and were toward a greater interest in research. The shift was most dramatic within the 1960 and 1970 cohorts which is logical if one assumes these professors were in graduate school and going through their early professorial socialization when the change occurred. However, the data suggest some resocialization of professors was occurring as a result of changes in disciplinary and/or institutional norms.

The distribution of effort to service activities is also interesting in light of the increased departmental influence that accompanied the specialization in the 1970s. Professors in general participated more in department activities than university service.

The grant acquisition measure is difficult to interpret, but the decline across all cohorts may reflect increased competition for funds. This shift in norms and values may have led more professors to apply for funds, thus decreasing the chances of success among those who applied.

Life Course Perspective

It is clear from the preceeding sections that the main effects of age, cohort socialization and environment did not explain between or within group differences. Hence Proposition (9) asserts variations over time are due to interactions among cohort, age, tenure status (environmental factor) and professional interests (individual attribute). This proposition was tested by

(a) holding cohort constant and computing anovas among the predictor variables (age, tenure status, and interests) and (b) computing anovas for each of the predictor variables and two distribution of effort measures (teaching and grant acquisition).[6] When variance was accounted for by a predictor, the strength and magnitude of the variance at the two times of testing were compared within and across cohorts to assess change over time.

The results indicated that none of the predictor variables accounted for significant variance in the others except for age which had a noticable affect on the tenure measure. Over-all then the results suggested the variance attributable to any one of tnese variables was not being mediated by the others (e.g.. the variance in teaching hours due to preference was not affected by covariation between this variable and tenure status).

The within cohort analyses showed that career interest was a significant predictor of grant acquisition in all cohorts in 1969 and in all but the 1970 cohort in 1977. Furthermore, the variance within cohorts increased within th. 1950 cohort from 15.26% in 1969 to 24.5% in 1977; from 13.8% to 20.91% within the 1940 cohort. Preference was a significant predictor within the 1960 cohort in 1969 (Eta^2 = .102) but not in 1977. Preference was also a significant predictor of teaching in all but the 1970 cohort and the pattern

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[6] These were used because in order to be consistent with statistical model requirements, the lapsed time between measures needs to closely approximate the cohort intervals and measures of only these two outcomes were available in both the 1969 and 1977 surveys.

was the same as for grant behavior. This is reasonable since this term of reference was spring/summer a time when teaching is usually an elective activity, susceptible to preference variations.

Tenure predicted grant acquisition in only two instances (for the 1960 cohort in 1969 and the 1950 cohort in 1977). It did not explain variance in teaching, perhaps because of its elective nature.

Age accounted for small amounts of variance in service in 1969 within the 1960 and 1940 cohorts but did not influence the behavior in 1977. The same was true for grant activity, this time age was significant only for the 1950 cohort.

The general conclusion is that within older cohorts, interest accounted for some of the variation in grant acquisition and its influence increased over time (size of variation and significance levels both increased). Tenure and age, however, did not exert a continuous impact on within cohort variation - their influence was not significant at both times of testing. The trend in the preference-grant data is interesting in light of the findings that suggest fewer senior professors seek and acquire grant funds. It could be that those faculty members with an interest in research are able to use their access to resources in ways that help them sustain their research efforts. Overall, though the data present no clear indication that any of the predictors exert a continuous or the same degree of influence on behavior at the same career phase. The next step in the analysis should be to identify the variables that result in changes in preference at different times of testing.

Proposition (10) is the corollary of (9) and asserts that variations in the outcome measures are due primarily to the covariance among them. In other words, time given to one activity will reduce the level of involvement in

other activities. Multiple correlations were run among teaching effort, grant activity and the service measures. The results were consistent across all cohorts in the 1969 data set. Teaching and grant activity covaried and time in one had a negative effect on the other. The size of the variation in teaching was greatest within the youngest cohort and variation in research greatest in the oldest one. This may merely indicate that given the option to not teach, younger faculty devote their summers to grant activity or it may support the general conclusion that research and teaching interests may be compatible but time spent preparing grants takes away from teaching. Among the senior professors it may be that being more inclined toward teaching, they elect to teach in the summers or the data may lend further support to the general conclusion about competitive time commitments.

The results of the analysis of the 1977 data were on the same directions as the 1969 analysis. Hence, it appears that future analyses ought to use an index of distribution of effort composed of teaching and service together rather than a single outcome variable.

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TABLE 3
AVERAGE SCORES BY APPOINTMENT COHORTS
AND TIMES OF DATA COLLECTION

APPOINTMENT COHORTS	NATURE OF APPOINTMENT[a]			ACTIVITY PREFERENCES[b]			DISTRIBUTION OF EFFORT[c]			
	1969 M SD	1975 M SD	1977 M SD	1969 M SD	1975 M SD	1977 M SD		1969 M SD	1975 M SD	1977 M SD
							Teach	2.42 (.896)	2 32 (1.11)	2.70 (.762)
1940-1949[d]	1.05 (.266)	1.10 (.447)	1.01 (.099)	2.46 (.810)	2.10 (.718)	2.26 (.794)	Res	2.22 (.744)	2 35 (.875)	1.84 (.818)
							U Serv	3.21 (1.33)	2.35 (.875)	
							D Ser	2.50 (1.27)	1.80 (.768)	
							Teach	2.32 (.882)	2 54 (.960)	2.65 (.850)
1950-1959[e]	1.17 (.452)	1.0 (0)	1.02 (.134)	2.21 (.738)	2.20 (.588)	2 27 (.674)	Res	2.46 (.630)	2.50 (.628)	1.98 (.744)
							U Serv	3.15 (1.27)	2.23 (.961)	
							D Serv	2.37 (1.22)	1.65 (.767)	
							Teach	2.42 (.878)	2.46 (.740)	2.76 (.793)
1960-1969[f]	1. (.545)	1.16 (.368)	1.15 (.359)	2.16 (.820)	2.24 (.680)	1.87 (.694)	Res	2.43 (.648)	2.54 (.652)	2.13 (.772)
							U Serv	3.77 (1.13)	2.62 (.874)	
							D Serv	2.77 (1.26)	1.52 (.691)	
							Teach		2.45 (.950)	2.88 (.679)
1970-1979[g]		1.87 (.529)	1.92 (.414)		2 16 (.594)	1.69 (.638)	Res		2.34 (815)	2.11 (.819)
							U Serv		2.00 (943)	
							D Serv		1.69 (.856)	

[a]Nature of Appointment: 1 = Regular with tenure; 2 = Regular without tenure; 3 = Yearly, Acting, Visiting, Other

[b]Activity Preferences: 1 = Interests very heavily research, 2 = both but leaning toward research; 3 = both but leaning toward teaching; 4 = very heavily teaching

[c]Distribution of Effort: Teaching: 1 = 0 hours per week this term...3 = 5-8 hours per week...6 = 35= hours per week
Research: 1 = No grants received in last 12 months, 2 = one grant received, 3 = at least 2 grants received
Service: 1 = Heavily involved, 2 = moderately involved, 3 = slightly involved, 4 = not involved

[d]Total 1969 N = 192; 1975 N = 20; 1977 N = 102

[e]Total 1969 N = 216; 1975 N = 46; 1977 N = 5[illegible]

[f]Total 1969 N = 461; 1975 N = 82; 1977 N = 172

[g]Total 1969 N = 0 ; 1975 N = 38; 1977 N = 63