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ABSTRACT

The relationship between productivity and aging in the context of the college faculty roles of teaching, research, and service is considered, based on a literature review on worker and faculty productivity and on theories of aging (i.e., biological, physiological, psychological, and sociological perspectives). It is concluded that faculty productivity is not a function of chronological age but rather of a variety of personal characteristics and environmental forces that are in dynamic interaction over time. Personal characteristics that are important elements include: motivation, interests, willingness to take risks, career success and position, and knowledge and abilities. Environmental forces that affect productivity include: education and training, institutional climate, mentorships, colleague support, and socialization processes. Faculty can and will remain highly productive throughout their careers if encouraged to do so by institutional policies and practices. Principles to guide policies and practices geared toward improving faculty productivity are identified, and directions for change are suggested for dealing with policy issues at the levels of individual, department, and institution. (SW)

THE EFFECTS OF AGING ON FACULTY PRODUCTIVITY

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ABSTRACT

A commonly held view is that college and university faculty constitute an aging work force whose productivity can be expected to decline over time. This paper examines the relationship of productivity and aging in the context of the principal roles of faculty. A review of the literature is presented on the theories of aging (i.e., biological, physiological, psychological, and sociological perspectives) and on worker and faculty productivity. Based on this review, the authors conclude that faculty productivity is not a function of chronological age but rather of a variety of personal characteristics and environmental forces that are in dynamic interaction over time. Faculty can and will remain highly productive throughout their careers if encouraged to do so by institutional policies and practices. The paper concludes with policy recommendations that would help to maintain the vitality of individuals and institutions.

I. INTRODUCTION

"Retrenchment" and "reallocation" have become the academic buzzwords of the 1980's, evoking an image of shrinking resources, a loss of quality and vitality, and an uncertain sense of mission. These are not just buzzwords, however, for they also represent a reality facing many institutions of higher education, not only now but for the foreseeable future. Since faculty represent one of the key resources of an institution, maintaining and/or improving the productivity of faculty is paramount. Is this feasible, given the commonly held view that the faculty in our academic institutions constitute an aging workforce and that aging naturally leads to a decline in productivity?

Underlying the concern over an aging faculty is the perception that many colleges and universities have become "tenured-in" by the now middle-aged and older faculty who were hired in the expansion years of the late 1950's and 1960's. Faculty are stereotyped as a bimodal population with young, bright, and creative faculty on one end and old, staid, and obsolete faculty on the other end. As a result,

> Junior faculty have little to look forward to, and senior faculty have begun to feel that they are perceived as obstacles and as an unwelcome burden on the institution's salary account. (Brookes and German, 1983, p. 1)

The problem thus becomes one of eroding institutional and individual vitality.

Does this concern reflect a significant crisis in American higher education, or assumptions and assertions that are unwarranted by the facts? Patton (1979) challenges the view that the age structure of colleges and universities is out of balance. Based on an analysis of data from two large national surveys in 1972 and 1975, he concludes that, in general, faculty are normally distributed by age. Differences by type of institution and discipline were noted, however. The fact that aberrations were found even within these aggregated data suggests that an aging faculty may indeed be a significant problem

for certain institutional types as well as for individual institutions or departments.

The purpose of this paper is to examine the relationship of productivity and aging in the context of the three principal roles of faculty: teaching, research, and service. Theoretical constructs and research findings from the physical and social sciences and their attendant policy implications will be presented.

II. DEFINITIONS AND MEASURES OF PRODUCTIVITY

Before discussing the various theories on productivity and aging, one must be able to define productivity in the context of the faculty's three major roles. This implies being able to define clearly teaching, research, and service. Unfortunately, this is not easily accomplished either in the philosophical or the practical sense. Many activities of the professor do not fall neatly in one category or another. Although most of the faculty productivity literature focuses on these roles separately, Blackburn notes that

> Breaking down academic work into separate roles and finer and finer phases may miss the essence of work in academia. Analyzing the parts may not produce an understanding of the whole. (1974, p. 76)

A factor which further complicates the productivity issue is the fact that different priority levels are accorded to each of the roles (Martin, 1977, p. vii). In contemporary academe, service generally receives the least and research the greatest priority in personal value systems and institutional reward structures.

In addition to defining teaching, research, and service, one must grapple with the notion of "productivity." Muckler (1982) discusses three types of productivity:

1) Technical productivity which "concerns the direct goods or services produced by individuals or work groups coupled with the tools of the workplace."

2) Economic productivity which "will not automatically result from increased technical productivity -- as is so commonly assumed. Greater investment in the workplace for increased technical productivity may result in increased and noncompetitive costs for the products and services."

3) Social productivity or "the desirability and/or usefulness of the products or services produced." (p. 15)

Related to these definitions is the widely held, but erroneous assumption that increased productivity inevitably yields positive economic and/or social benefits.

Using these definitions and assumptions as a starting point, Muckler distinguishes the problems associated with productivity "measurements" versus "assessment." The former case deals with issues of validity, reliability, completeness, and fairness in measurement specification and utilization. Productivity assessment (or evaluation), on the other hand,

> . . .goes beyond human output per se and must be viewed in terms of the impact of productivity on the system of which the human is a part. Productivity assessment will be limited by the nature and conditions of productivity measurement, but it cannot be determined by human output alone (p. 13)

Concern with technical productivity in academia has led to a long history of faculty effort reporting (Blackburn, 1974; Finkelstein, 1978). Hodgkinson (1981) suggests that this time-and-motion approach to faculty productivity, which was borrowed from business and industry, is now incompatible with the aims of higher education and is antiquated when compared to current business and industry approaches to human resource development. What is needed is focus on the quality of the product, not the quantity. Hodgkinson therefore proposes using a "value-added" approach as the "yardstick of equality and productivity" (p. 7). This suggests that the primary problem in higher education is one of productivity assessment; that is, evaluating performance along two dimensions: 1) the technical, economic, and social aspects of productivity in relation to 2) the three primary roles of faculty. Evaluating performance

objectively presents many dilemmas because of conflicting standards, priorities, and evaluative purposes among and between faculty and administrators. The personal investments at stake are high:

> When my career is on the line, so is my entire selfhood. My professorship is my identity. Nothing matters more. (Blackburn, 1978, p. 67)

Teaching/Instruction

Surveys of the literature (Centra, 1981; Finkelstein, 1979, Seldin, 1980; Miller, 1974) indicate that the characteristics of good teaching factor into three categories: facilitation of student learning, competence in disciplinary specialization, and a positive attitude toward both students and subject matter, which might also be described as the apparent desire to be a good teacher.

Measuring the qualitative dimension of teaching is currently accomplished by using student ratings, faculty self-assessments, peer ratings, and objective assessments of student learning. Student ratings are most commonly used and generally have been found to be both reliable and valid. Self-evaluations by faculty generally involve paper-and-pencil ratings based on assessments of video and/or audio tapes. While peer evaluation is also sometimes based on videotaped class sessions, it is more frequently performed on the basis of general knowledge and impressions gained through informal means or through classroom visits. The measurement of student learning as a surrogate measure of quality in teaching has received great attention in recent years. Based on the seductive generalization that students learn more from good teachers, measurement of student learning is particularly congruent with the increased used of MBO and other output measure philosophies. In general, comparatively little research has been done on the reliability and validity of these alternative methods of measuring the qualitative aspects of teaching.

There are, of course, several familiar ways of measuring faculty teaching productivity on a strictly quantitative basis including: course and/or student credit hours; student contact hours; number of doctoral committee memberships or chair positions held. The concern for wholistic assessment suggests that quantitative measure divorced from qualitative measure of teaching will be viewed generally by faculty as an unacceptable measure of productivity.

Research/Scholarship

The reviews of the literature (Centra, 1981; Blackburn et al, 1981; Dressel, 1976; Finkelstein, 1978; Seldin, 1981) conclude that the traditional measures of research productivity focus more on the quantitative (or outcomes) dimension rather than on the qualitative dimension which involves assessing creativity, originality, significance of contribution, and continuity of effort over time. Quantitatively, research is usually measured by numerical counts of conference presentations or of publications. Frequently used qualitative measures include citation counts and peer ratings. Although questions can be raised regarding the objectivity, reliability, and validity of most of these measures, the greatest concern is in an apparent overreliance on quantitative measures.

Service

Of the three roles, service is the least well-defined. Its definitions range from the vague--"any work activity that is neither teaching nor research" (Blackburn, 1974, p. 89) or "anything a particular faculty member deems it to be" (Haberman and Quinn, 1977, p. 140)—to specific specialized services such as Extension activities (Long, 1977).

In general, service activities are of two basic types: 1) activities internal to the university which support the basic functioning of the organization (e.g., committee service and governance) and 2) activities external to the university (e.g., consulting and professional association activities)

(Blackburn, 1974; Dressel, 1976). External activities are particularly subject to debate at the philosophical and operational levels. The definitional waters become increasingly murky when the issue of fees and honorariums arises (Blackburn, 1974): at what point is an activity characterized more by entrepreneurship than by intellectual or scholarly purposes?

Measures for service include: 1) self-reported data on time spent; 2) evaluations by peers or external constituents; 3) committee memberships or chair positions held; and 4) number of participants in noncredit courses, workshops, or other such programs (Centra, 1981; Seldin, 1980). Since very little research has been conducted on the service role of faculty, not much is known about the validity, reliability, or utility of the various measures. It is known that even though service is generally accorded a lower priority than instruction and research in terms of time and effort, there are nonetheless expressed and unexpressed institutional expectations that must be met, despite the fact that they count little in performance evaluations (Blackburn et al., 1981).

III. THEORIES OF AGING

Overview of Theoretical Constructs

Kimmel (1980) defines age as an index of the passage of time, the speed of change. Some of the different types of age noted by Kimmel and others (Huyck and Hoyer, 1982; Schuster, 1980; Troll, 1982) include: chronological, biological, psychological, social, functional, and perceived. Chronological age is only a rough indicator of different types of development:

> Thus, one person who is chronologically 35 years old may be psychologically 45 (is responsible, has set goals to achieve before retirement, and has a sense of intimacy and generativity) but is socially 21 (still in training for a profession, unmarried, childless) and may be biologically 65 (has high blood pressure and graying hair). (Kimmel, 1980, p. 30)

Theories of aging are many and diverse, both within and across disciplinary fields.[1] Overviews of the literature (Huyck and Hoyer, 1982; Riegel, 1977; Schuster, 1980; Troll, 1982) suggest that the current theoretical paradigms differ in three major ways.

1) **Presupposition on the origin of behavior.** The "mechanistic" (passive) view contrasts with an "organismic" (active) view. The former assumes that the individual is a "blank page" shaped solely by external forces. The latter view assumes that the individual is an integrated organism with the power to control various life forces and to determine responses to them.

2) **Nature of development changes over time.** The contrasting models here are often referred to as "quantitative" and "qualitative" in their approach. Quantitative models assume that development occurs continuously and gradually over time and that new information, skills or abilities can be added. Qualitative models view development as a progression of discontinuous leaps and jumps wherein each new stage is a qualitatively different restructuring of old ways.

3) **Role of the environment.** Again, the dichotomy is passive versus active. An active environment assumes that there are interactive cultural and historical effects on individual development. Some of these effects derive from cohort or generational experiences while others derive from historical events which affect the entire society. A passive environment assumes no such effects.

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[1] See Table 1 in Appendix A for a categorization of some of the major theorists.

The Biological Perspective on Aging

Gerontological biology has, for the most part, focused its concern on the unit of the individual cell. Older cells, for instance, can be distinguished from younger cells on a number of counts (Finch and Hayflick, 1977; Woodruff and Birren, 1983). First, they contain increasing numbers of "lipofus-- granules of pigment -- which are produced as byproducts of normal cell functioning. These lipofuscins are, in a sense, refuse and may clog and endanger the cell over time as they accumulate. On the other hand, they may serve a helpful purpose at times, since they apparently counteract superoxides, compounds which form in the blood and destroy DNA function, also thereby threatening cell life. Older cells are less capable of repairing damage caused by radiation and other injuries, they are more likely to produce mutations and are less able to respond to stress.

More recently, attention has been given to the molecular, systemic, and genetic components of aging. One of the more promising theories here is "Cross-linking" which hypothesizes that inter and intra molecular cross-linkages lead to a buildup of collagen, a connective tissue protein, which results in reduced elasticity of the tissue. Autoimmunity theory suggests that aging cells synthesize and release antibodies which destroy normal cells, resulting, therefore, in a weakened immune system. Another theory suggests that aging is related to impairment of the endocrine and autonomic nervous systems, which reduces the body's ability to maintain stable conditions in such things as temperature, blood glucose, blood pressure, heart rate and the like. Geneticists theorize that longevity is genetically determined and influenced by familial and environmental factors.

It is quite clear, however, that even if these factors could be controlled and the aging processed slowed dramatically, which would increase the average individual's life expectancy, we would still not have extended the

human life span -- the outer age limit for the human species. This limit remains unchanged, no matter how vigorous one's cellular structure nor how unstressed one's life, at approximately 120 years.

The Physiological Perspective on Aging

Atchley defines physical aging as "the result of many processes that gradually decrease the viability and increase the vulnerability of the body" (1983, p. 44). It is well to be reminded that: a) "the rate of decrement in a number of systems may be no greater from 60 to 70 years old than from 30 to 40 years old;" b) "not all functional changes in older persons are due to aging: some are pathological, others are due to misuse or disuse;" and c) there is great individual variability in the type and rates of change (Weg, 1983, pp. 249, 252).

COMPLEX FUNCTIONS. Some of the most significant declines with age are in those functions or qualities involving more than one system; principal among these, physical energy and homeostasis While the decline in energy level does not necessarily affect work capability, it does increase the time required to recover from work. In the case of homeostasis, the body becomes less able to respond fully to physical and emotional stress and to return quickly to normal functional levels. Another complex function in which noticeable decline occurs is coordination, particularly in the performance of unfamiliar or complex tasks. The range of decline here, however, is so wide as to defy generalization. Social and job-related skills may remain significantly unaffected prior to age 75 or 80 (Atchley, 1983).

SYSTEMIC FUNCTIONS. Systemic changes over time include the following (Atchley, 1983; Kimmel, 1980; Mourad, 1980; Troll, 1982; Weg, 1983): a loss in stature and in muscle strength, tone, speed, and flexibility; decreases in breathing capacity which result in lower metabolic rates; increased susceptibility to common digestive disorders; increased evidence of cardiovascular

arrhythmia and of arterial hardening; some loss in the function of the kidney; increased susceptibility to illness in general as well as to particular pathogens such as arthritis, pneumonia, cancer and tuberculosis; and losses in vision, hearing and smelling.

In summary, it is clear that the body's ability to function decreases with age. Because this is a gradual process, however, performance may not be significantly affected because of a tendency to develop adjustments and compensations both psychologically and physiologically for lost capabilities. As for the probability of aging leading to serious impairment of functions, data suggest that this occurs in less than 20% of the older population. This would imply that biological aging should not significantly affect the productivity of faculty on the whole since their activities typically do not rely on extensive sensorimotor skills. The performance of individuals will vary, however. Even those disciplines which do rely more on sensorimotor skills, such as the performing arts and clinical medicine, might be minimally affected since they involve long-practiced skills.

The Psychological Perspective on Aging

INTELLIGENCE THEORY. This perspective is concerned with the assessment of the individual's mental power and the quantitative description of that power as an "intelligence quotient" (I.Q.). Most intelligence theorists follow the lead of R. B. Cattell in dividing mental function into two constructs: "crystallized" intelligence, which includes language skills and the repetition of established habits, and "fluid" intelligence, which governs sensorimotor coordination, new learning and speedy performance. Based on longitudinal studies, Schaie (1983) concludes that decline in the individual's cognitive power generally will be measurable only after age sixty, but before seventy-five. Such decline may be evident first in "fluid" intelligence. Even through the mid-seventies intellectual decline may be quite modest,

particularly among those with no cardiovascular disease or arthritis, those with a positive socio-economic status (or stimulating environment), those who manifested a flexible personality style in middle years and those who manifest greater initial intelligence. Since faculty generally possess all three of the latter characteristics, they may be expected to experience even less decline in intelligence than the general population.

LEARNING AND MEMORY THEORY. (Woodruff and Birren, 1983; Field, 1982; Schuster and Ashburn, 1980). Researchers in this field may generally be divided into two groups: those who view learning and memory as stimulus-response associationism, and those who utilize an information processing model of memory and learning. This latter view supposes an analogy to computerized processes for the entry, storage and retrieval of information.

Early research in associationism indicated significant decline with age. More recently, however, investigators have identified noncognitive factors such as time pressure which negatively influence the performance of older people on learning exercises. While elimination or mediation of these factors can significantly improve the performance of older individuals, demonstrated learning ability remains measurably better in younger subjects.

Although there is ambiguity in the collective research, it seems to be generally true that: 1) older individuals do not automatically commit learnings to as "deep" or "meaningful" a level of memory as young individuals, and thus they experience decreased retention; 2) when older learners are guided in the organizing and depth assimilation of new knowledge their learning is improved; but, 3) difficulty in retrieving learning causes memory performance levels still significantly lower than those of young individuals. Thus, older faculty may experience greater difficulty than their younger counterparts in assimilating or retaining new learnings; that there is practical significance of this for productivity, however, is arguable.

PERSONALITY PROCESSES. A substantial body of empirical research focuses on the question of whether the personality remains consistent or changes over time (Huyck and Hoyer, 1982; Kimmel, 1980; Reedy, 1983). Since the dimensions of the personality are many and complex, it is not surprising to find that research shows consistency for some traits and change for others.

The personality characteristics which are thought to be stable or consistent across time and therefore not related to age include: 1) personal constructs (i.e., ways of perceiving the self and the world; 2) cognitive style (i.e., ways in which thought is structured; 3) adaptive characteristics (e.g., styles of coping, achieved life satisfaction, goal directed behavior); 4) basic personality traits ("People become more consistently themselves." [Reedy, 1983, p. 121]); and 5) tendency toward rigidity or conservatism. The summary view in the literature is that these characteristics indicate "substantial individual stability in most aspects of personality during adulthood" (Huyck and Hoyer, 1982, p. 228).

The characteristics which have been found to change with age include: 1) an increase in interiority (i.e., tendency towards introspection; 2) an increase in desurgency (i.e., tendency to be serious); 3) an increase in cautiousness; 4) an increase in conformity and passivity; and 5) a tendency towards less stereotypic sex-type qualities (e.g., women become more assertive and men become more submissive). Some of these changes may be due to cohort effects rather than age per se.

To the extent that faculty productivity is a function of general personality traits, these findings predict little change in productivity over time. Reedy's general conclusion that the "past is prologue to the future" seems appropriate (1983, p. 132). It is possible, however, that the increased interiority, cautiousness, and passivity might be factors which would contribute to a decline in productivity, particularly for males. The female tendency to

become more assertive might suggest an increase in productivity for women faculty.

LIFE-SPAN THEORIES. Most life-span theories conceive of development as a sequence of stages. They generally share the following assumptions:

1) Everybody goes through life in the same way (universality).
2) Everybody goes through the stages in the same order (sequentiality).
3) There is a predetermining end point to the sequence (teleology).
4) There is a good way, as well as a bad way, to go through the sequence (adaptation) ...
5) The good way is in tune with current middle-class values (class bias). (Troll, 1982, p. 15)

Stage theories based on structure (e.g., the works of Piaget, Kohlberg, and Loevinger) see development as a gradual transformation. Stage theories based on life situations, on the other hand, see development as the mastering of a series of developmental tasks in the context of life events (e.g., Havighurst, Clark and Anderson, Levinson, and Gould). Stage theories based on issues explain development as a series of responses to crises or decision turning points which lead to qualitative different states (e.g., Freud and Buhler). Nonstage theories see development not as evolving from an antecedent state but rather as a response to situation specific, socially derived factors (e.g., Bandura, Ahammer, Baltas, Brim and Neugarten, and Datan). More recent theories such as Riegel's dialectical analysis take a holistic approach and focus on development as the interaction and synchronization of four dimensions: inner-biological, individual-psychological, cultural-sociological, and outer-physical.

Weathersby and Tarule's (1980) synthesis of some of the recent theories suggests the following life phases:

1) Age 30 to early 40's -- a time of settling down and become one's own person through deep commitments to work and family.

2) Early 40's to 50's -- midlife transition, reexamination and modification of fit between self and life structures followed by a period of restabilization.

3) 50's to early 60's -- more reexamination and search for new directions, new sense of accomplishment, mellowing of feelings.
4) 60's and beyond -- review of accomplishments, awareness of value and meaning of past life events, focus on affective domain.

While most of these theories have intuitive appeal, they have not yet been proven by empirical research, and are limited in their ability to deal with potential sex, ethnic or class differences (Huyck and Hoyer, 1982; Kimmel, 1980; Reedy, 1983; Weathersby and Tarule, 1980).

One of the key areas of debate is related to the midlife transition. Kimmel (1980) notes that many studies have observed a midlife crisis phenomenon while others have not. There is some evidence to suggest that the form and nature of this transition may be due to socially determined cohort and historical effects rather than to being an inherent part of developmental process.

Keeping in mind that the predictive power of the stage theories is largely unknown, particularly at the individual level, they can nonetheless be used to develop a plausible hypothesis for faculty productivity over time. The 30's to the early 40's would be a time of increasing productivity as the person establishes a professional identity and moves through critical career stages associated with tenure and promotion. Entering the midlife transition period in the mid-40's would lead to a temporary drop in productivity, followed by a period of restabilization and a new peak in productivity. During the 50's the search for new directions might lead to a change in the nature of productivity. The tendency to focus more on past accomplishments rather than on new challenges, would mean in later years either declining productivity or maintenance at the level set in the 50's. It is likely that these general patterns would vary considerably across the disciplines and perhaps between the sexes.

The Sociological Perspectives

The sociological perspective on aging examines individual and group change over time within the context of social structures and processes. Aging from this perspective is defined as the

> ... passage from one socially defined position to another in the course of growing up and growing old. Such passage is usually marked by the occurrence of socially acknowledged events...(Bengtson and Haber, 1983, p. 73)

GENERAL ROLE THEORY. Role theory assumes that the role taken by a person is determined by the needs of the situation and the expectations of other participants (Back, 1976). Expectations, or "norms", act as "prods and brakes" on behavior. Age-related norms can vary depending on sex, social class, ethnicity and birth cohort (Neugarten and Hagestad, 1976). Research by Neugarten, Moore and Lowe (1968) suggests that people's awareness and acceptance of appropriate age-related behavior increases with age.

"Status" represents the formal office or social position accorded by society and often denotes a collection of rights and responsibilities (Rosow, 1976, p. 457). One of the major ways in which status is ascribed is through the work setting.

Within an individual's life-span, the timing and type of roles assumed depend on individual choices and the range of social options available. Research shows that people adapt easily to changes in roles if those changes occur as the result of normal and predictable life course events. Major stress is incurred however, when a role transition is caused by unexpected or off-time events. Delaying some role transitions, can relieve sources of role conflict or overload demands (Neugarten and Hagestad, 1976).

One theorist, Rosow (1976), challenges the prevailing assumption that status a role are invariably complementary. He identifies four types of roles based on whether there is a presence (+) or absence (-) of status in

onnection with the role and whether the role itself is diffuse (-) or developed (+). The four role types identified then, are as follows (p. 462):

Role Type	Status	Role
Institutional	+	+
Tenuous	+	-
Informal	-	+
Non-Role	-	+

Rosow hypothesizes that the relative importance of these roles change over the life span. Institutional roles peak in their importance in middle age, remain stable for a while, and then begin to decline. Tenuous roles, on the other hand, have minimal importance until well into middle age when they begin a steady increase (e.g., increase in honorific roles). Informal roles fluctuate somewhat and are of moderate importance. In old age tenuous roles are of highest importance, informal of moderate importance, and institutional of lowest importance. This shift creates an effective role deficit which Rosow suggests policy should try to minimize.

In applying this model to faculty productivity the roles of teaching and research might be categorized as "institutional" roles, while service falls more into the "tenuous" category. Based on the model, one could predict a decline in teaching and research productivity in the later years accompanied by an increase in the service role. This corresponds to the notion of a faculty member's activities undergoing a shift as he/she becomes the academic equivalent of the "elder statesman."

DISENGAGEMENT AND ACTIVITY THEORIES are flip sides of the same. Disengagement theory, assumes that aging is a mutual withdrawal between the aging person and the various social systems. This disengagement may be initiated either by the individual or by society. A key assumption is that disengagement is a natural process which the individual gladly accepts (Cumming and Henry, 1961). Activity theory on the other hand, assumes that

aging is an "uphill affair" wherein the individual wants to maintain the activities of middle age as long as possible and gives them up only involuntarily.

These two theories were tested in a study by Havighurst, Neugarten and Tobin (1968). Their findings support both theories to a certain extent: as people grow older they do regret a drop in role activity but at the same time accept this as an inevitable part of growing older. On the basis of this, one would predict a decline in productivity for some faculty and a reluctance to retire on the part of others.

SOCIAL LEARNING THEORY. This theory assumes that socialization "builds on attitudes and skills acquired earlier" (Brim, 1965, p. 19). Socialization in later life is limited by the effects of earlier learning or the lack of it. Thus there is a high degree of continuity over time in behavior patterns. This theory predicts that faculty productivity in later years will follow the patterns established earlier in the career, particularly if reinforced by appropriate rewards and punishments. This theory points to the difficulty in encouraging a faculty member to become productive in a role for which there is not a history of learned behaviors appropriate to that role.

AGE STRATIFICATION THEORY is part of a body of literature that explores society by looking at various strata within it, usually along class or ethnic lines. The concept of age stratification was developed by Riley, Johnson, and Foner (1972) and is summarized in Riley (1976). Basically, this model sees society as

> ... a shifting age structure of roles, in which age (or life-course stage) defines the locations of individuals alive at any time (Riley, 1980, p. 190).

People within an age cohort share certain common experiences which differentiate them from people in other strata. The utility of this approach when applied to the issue of an aging faculty is to think of the faculty who are moving through the system as a cohort of people who began and will finish

their careers at about the same time. Their future productivity is to a large measure determined by the norms and experiences they have shared as a cohort group. Thus, faculty productivity will depend on the norms and expectations at work at the time they enter the system. Once established, productivity patterns might well continue at the same level throughout the career stages.

IV. PRODUCTIVITY

Productivity in the Organizational Context

PRODUCTIVITY DEFINED. The productivity of a business or industrial organization depends upon its technology and its worker performance. This performance is often expressed as a function of ability interacting with motivation:

$$\text{Performance} = f(\text{Ability} \times \text{Motivation})$$

Since ability and motivation act upon each other in a multiplicative fashion, both must be present or the product is zero. Each has the potential to increase the effect of the other, yet if either term is low, the result will be lowered.

ACCOMMODATION AND MOTIVATION. Accommodation and motivation are generally the foci of any attempts to improve productivity. "Accommodation" is the process of maximizing the congruence or "fit" between worker characteristics and job requirements. Heaton's rationale for accommodation is, "We can maintain standards by (1) excluding below average performers and (2) selecting only those tasks at which we excel" (1977, p. x). The worker characteristics used to predict this accommodation can include both personality traits and on-the-job behaviors. The most sophisticated approach to accommodation employs matrices based on taxonomies of worker characteristics and job requirements (Dunnette and Fleischman, 1982).

Two views of motivation represent a polarized dichotomy: "the radical reinforcement position" versus "expectancy" motivation theory. The first

perspective, with no acknowledgement of human intentionality, views motivation as a function of past rewards and punishments; individuals will be highly motivated to repeat behaviors for which they have been highly rewarded. On the other hand, expectancy theory ignores the past and maintains that:

> People are motivated to expend effort if they believe that there is a reasonable probability that their effort will accomplish a desired outcome and that the outcome will be followed by intrinsic and/or extrinsic rewards that lead to satisfaction (Kast and Rosenzweig, 1979, p. 246).

In addition to these motivation concepts there are several approaches which are based explicitly or implicitly on Maslow's framework of the five sequential types of needs which humans seek to satisfy: physiological, security, social, esteem, and self-actualization. A final motivation theory, which incorporates elements of those already described, is Raynor's "Open Path" theory. Raynor believes that people are motivated by a desire to feel good about themselves and, accordingly, will choose actions at which they can succeed and which will lead toward further successful actions (Raynor and Entin, 1982).

SATISFACTION. Social scientists have been attempting for the past half century to assess the effect of job satisfaction on performance. This attempt is based on the premise that happier workers are harder workers, a logical and appealing idea. According to Perrow, however, the evidence has not emerged to support this logic.

> By 1954 there had been about fifty studies of the relationship between attitudes and performance, and two psychologists, Brayfield and Crockett, paused to survey the studies carefully...there was little evidence that attitudes bore any simple or even appreciative relationship to performance (1973, p. 99).

LEADERSHIP. While the leadership style of supervisors may significantly affect job satisfaction, it seems to have less effect on motivation and even less effect on productivity. Perrow believes that Fiedler's "Contingency Theory" may hold some promise for predicting leadership effect upon

productivity, although it is highly conditionalized in its detail. This theory generally maintains that task-oriented leadership is more effective in situations which are highly favorable or unfavorable to the leader, while leadership based on interpersonal skills is more effective in situations of ambiguous favorability for the leader (Perrow, 1972).

REWARDS. Most often the term "rewards" in the productivity literature refers to extrinsic rewards. These include pay raises, promotions, bonuses, vacations, prizes and status symbols. Generally extrinsic reward is effective in stimulating productivity when: the reward system has been jointly developed by employer and employee; the rewards are perceived by employees to be worthwhile; the goals for productivity are attainable; and, the productivity measures are perceived by employees to be adequately specific, complete and valid (Muckler, 1982).

PARTICIPATIVE CONTROL. Katzell and Yankelovich (1975) conclude that, while participation in decision-making clearly improves job satisfaction and employee retention, it seems to improve productivity primarily in the context of those MBO programs where employees have a significant need for increased autonomy and self-regulation.

WORK GROUPS. Increasing attention has been focused on the use of small work groups as a means of improving productivity within an organization. Experimental data do indeed support the proposition that a group's productivity is greater than the summed productivity of its parts, largely owing to the element of competition and the immediacy of social gratification operative in the small group situation. Efficiency of such groups varies with the degree of group cohesiveness and commitment to organizational goals (Kast and Rosenzweig, 1979).

FUNCTIONAL AGE. Evidence can be found that the variance in functional level among workers within the same age cohort is not only great, but may

actually increase with time. This stresses the importance of measuring worker capability by some means other than chronology. A number of interesting and constructive programs have been utilized to evaluate the functional age of workers. The most effective of these employ a form of the earlier described "accommodation" process. A job description, carefully specifying the kind and degree of required skills, both physical and social, is matched to an equally detailed description of worker health and competencies. The assessment of the worker's strengths is made on the basis of on-the-job as well as in-office observations by a physician.

PRODUCTIVITY INTERVENTIONS. Hulicka (1974) suggests that the first appropriate intervention for an organization concerned about its older employees' motivation and productivity level is to carefully assess the ageism operating within the institution which may discourage the motivation of older employees. Beyond this, it is appropriate to consider the likely reorientation in priority which a person in mid-life is experiencing and to translate these new priorities into specific career objectives. It may not, however, be possible for the individual worker's goals to be satisfactorily adjusted within the context of the current position; or, changes in physical capability may limit the individual's ability to perform the necessary tasks. A number of options exist for continuing to utilize this worker productively within the organization including the following: 1) job redesign, a form of accommodation in which the position is adjusted to the individual; 2) creation of new careers, a rechanneling of skills and knowledge already possessed by the worker; 3) job training, for self-improvement in a current position or as preparation for a new job; and 4) elective retirement.

Undergirding the intervention strategies outlined above is the assumption that each employee is unique and her/his welfare must be considered

individually. One mode which may be first used in evaluating the worker's special strengths and needs, and subsequently employed in guiding the choice of interventions, is the assessment center. Such a center, which may be internal or external to the organization, serves as consultant to employer and employee. It utilizes tests, interviews and simulated experiences to estimate the worker's current skills, attitudes, needs and aptitudes. From this information both worker and organization can be guided toward maximum productivity and job satisfaction (Moses and Byman, 1977).

Productivity in the Professional Context

The majority of the organizational literature addresses productivity issues as they relate to blue-collar workers. The effect of age upon productivity, however, becomes less pronounced as job descriptions approach the "white collar" and "professional" categories (Riley and Foner, 1968). It should not be surprising that productivity appears more affected by age in occupations where physical skills and timed piece work are central concerns.

SCIENCE. The field of scientific research is closely allied with, and at points overlaps, higher education. Wayne Dennis (1966) was the first researcher to conduct a reasonably well-designed, longitudinal study of the effects of age on productivity among scientists. Dennis' conclusion: scientists reach optimum productivity in their forties and fifties, declining after sixty.

In contrast, Pelz and Andrews (1976) discovered a bimodal or "saddle-shaped" curve in productivity among scientists over the career span; that is, a productivity peak occurred between the late thirties and early forties, followed by a ten to fifteen year decline, ending in another major productivity surge in the fifties. Pelz and Andrews conjecture that this may represent a concentration of "innovative" work followed some time later by an emphasis on "integrative" work. They also note that the fluctuation in productivity seems to parallel, and may be explained by, the variation in "internal motivation"

which scientists experience. Those who indicated that they were stimulated toward productivity by their own creativity and past ideas, and that they desired a high degree of research freedom, experienced little decline in the forties and fifties. On the other hand, those who were not interested in self-direction, and this number increased after forty years of age, experienced a severe plunge in the early fifties. Those in upper-level positions recouped by the mid-fifties; however, assistant scientists with low self-motivation experienced productivity decline from the forties forward (Pelz and Andrews, 1976).

Knorr et al. (1979) explain the variation in productivity observed by Pelz and Andrews as the result of position rather than age; that is, the second productivity surge represents those who become supervisors in research groups and, by gaining access to group resources, are able to publish more heavily despite a decline in actual research time.

Several other factors are mentioned in the scientific literature as direct or indirect contributors to productivity. Knorr et al. conclude that the thesis "good leadership leads to high morale which leads to productivity" may be false in the industrial scientific setting, but it is true for academic scientists. This distinction appears to be based on: 1) the comparatively small size of the university's functional units; 2) the unique organizational mission which supports faculty autonomy; and 3) the fact that the academic supervisor has more real power and less symbolic power than the non-academic counterpart. The elements of supervision which appear to influence productivity are the planning and coordinating function, the integrative function, and the career promoting function.

ENGINEERING. The quality of performance in engineering generally peaks in the early thirties and declines throughout the career thereafter (Kopelman et al., 1974). Some share of this remarkable slide is undoubtedly due to the

short "half-life" of engineering knowledge: within five years of college graduation half of an engineer's knowledge becomes obsolete (Dubin, 1974). Yet, there are clearly other factors involved.

If all engineers are divided into three groups according to performance level, the top group's worst score, at career end, is still twenty percentile points above the best score of the middle group (Kopelman et al., 1974). What characterizes the top performers? They take fewer company "refresher" courses, they take fewer post-degree college courses, and they spend the same amount of time reading professional journals as the lowest performance group; however, they receive their master's degree at some time or receive their bachelor's degree before age twenty-four, they work longer hours, and, perhaps most importantly, they expect to succeed. Since engineering firms have a quickly narrowing pyramid of hierarchy, the achievers have often moved as far as they can by age forty. At that point, both expectation and performance begin to decline.

Meanwhile the lower groups, who were never as optimistic, see others move beyond them into the few upper positions, and as this happens, their expectancy and performance decrease more dramatically than the upper group's.

We are reminded of Raynor's theory, which maintains that achievement is stimulated by an open career path, with a series of realistic goals, each of which is intermediate to future, more ultimate goals. Clearly, the typical engineer's setting does not provide that open career path.

Productivity in the Faculty Context

Most studies on the teaching role of faculty focus on the constituent elements of effectiveness rather than how effectiveness might change over time. One cross-sectional study (Linsky and Strauss, 1975) did find that classroom performance had a low, negative correlation with career age. The authors of the study concluded, however, that the cross-sectional methodology

was masking a curvilinear relationship wherein effectiveness would improve for a time, plateau, and then decline. Since many studies have shown that teaching effectiveness is highly correlated with personality variables such as aggressiveness and extroversion (Sherman and Blackburn, 1975; Isaacson, McKeachie, and Milholland, 1963), a decline such as this is not inconsistent with theories of increased introversion in the later years. Some cross-sectional studies, however, show no age patterns over time (Blackburn, 1983). Thus, the evidence is inconclusive regarding age-related changes in teaching effectiveness

Studies do suggest that as faculty get older their interest turns increasingly from research to teaching (Fulton and Trow, 1974). There is an inverse relationship, however, between rank and the amount of time devoted to teaching (Baldwin, 1979). It appears, then, that as the professor moves through the various career stages, an increased interest in teaching may not be fulfilled due to the demands of the other research and service roles. In terms of seeking assistance in improving teaching, it has been shown that younger faculty are more likely than older faculty to participate in faculty development programs (Baldwin, 1979).

If there is little information on teaching, there is even less on <u>service activities</u>. Studies do show that older faculty spend more time than younger faculty in internal service activities such as governance (Blackburn, 1983). In terms of external service, Bayer and Dutton's (1977) cross-sectional study found a parabolic relationship between age and paid consulting; that is, increasing into mid-career and then declining thereafter. Lanning and Blackburn's (1979) data on paid consulting showed appreciable declines after age 50 for those faculty who exhibited mild involvement prior to that time. For faculty who were moderately or very active, there was a stable pattern of consulting activities beginning at age 35. Wide variations were noted across

disciplines. Patton's (1980) study found no differences in the average teaching loads of consultants and non-consultants when controlling for type and quality of institution. Service and research activities are correlated; that is, those active in research tend to be active in service, those inactive in research are also inactive in service (Fulton and Trow, 1974; Pelz and Andrews, 1976).

The preponderance of studies on faculty productivity focus on research activities. Overviews of the literature (Behymer, 1974; Hall, 1975; Blackburn, Behymer and Hall, 1978; Finkelstein, 1978) present the following as correlates of productivity: 1) institutional affiliation (type and quality), 2) colleague climate, 3) high individual interest in research, 4) academic rank, 5) years in higher education, 6) disciplinary field, 7) early publication and previous publication, 8) frequent communication with scholars elsewhere, 9) graduate level teaching, 10) journal subscriptions, and 11) time allocation to academic roles. Some things which have been found not to be correlated with productivity include department size (Finkelstein, 1978), and tenure status (Behymer and Blackburn, 1975; Lawrence and Blackburn, 1984).

Blackburn (1983) reviews four cross-sectional studies which generally follow the bimodal or "saddle curve pattern" observed by Andrews and Pelz. Table 1 matchs Blackburn's productivity trends with the career stages he described in earlier work. The fluctuation of productivity seems to parallel variation in faculty feelings about career. This is explainable within Raynor's theory as the result of increasing or decreasing motivation, attributable to the presence or absence of a clear, attainable and continuing sequence of career goals.

Bayer and Dutton (1977) note that their data in total lifetime publications by career age suggest the possibility of cohort effects. Lawrence and Blackburn's (1984) recent study of faculty at a major research university

Table 1

Faculty Characteristics and Research Productivity Trends by Career Stages

CAREER STAGE	CHARACTERISTICS	PRODUCTIVITY TRENDS
I. Assistant Professor, first 3 years	anxious, eager, naive	productivity ascends sharply
II. Assistant Professor, 3+ years	oriented, striving, questioning	productivity declines somewhat
III. Associate Professor	established, stable, accomplished	new peak attained
IV. Full Professor, 5+ years before retirement	uncertain, reevaluating, redirecting	productivity declines significantly
V. Full Professor, retirement within 5 years	finishing, summing, withdrawing	continued decline or late surge

Based on Baldwin & Blackburn (1981) and Blackburn (1983)

concludes that cohort effects rather than aging can indeed be more effective in explaining productivity rates over time.

The fact that productivity patterns are established in the years preceding and immediately following the initial appointment as an assistant professor is pointed to in several places in the literature. A number of studies have shown that faculty who are highly productive published early in their careers, often while still in graduate school (Crane, 1964; Clemente, 1973; Behymer, 1974; Cole, 1979; Over, 1982; Hunter and Kuh, 1983). Early publications are often attributable to the influence of a mentor relationship either with a faculty member while in graduate school, or with an older, established colleague during the first academic job (Crane, 1964; Reskin, 1979; Queralt, 1982; Hunter and Kuh, 1984).

As with many other professions, it does appear that intrinsic factors are more significant than extrinsic factors in understanding the motivations of faculty. Austin and Gamson (1983) note, however, that there has been little empirical study done of the intrinsic dimensions of academic work.

Stress as a factor in productivity is receiving attention in current literature. Clark and Blackburn's (1973) research suggests that stress among faculty is mediated by personality factors and that for some individuals, high overload stress can lead to impaired performance.

V. RECOMMENDATIONS

The theories and the research suggest that faculty productivity is not a function of chronological age. It is instead the function of a variety of personal characteristics and environmental forces that are in dynamic interaction over time. Personal characteristics which are important elements include: motivation, interests, willingness to take risks, career success and position, and knowledge and abilities. Environmental forces that affect

productivity include: education and training, institutional climate, mentorships, colleague support, and socialization processes. These interrelated factors can act to reinforce or undermine productivity at given points in time. When a necessary and sufficient set of factors are reinforcing each other, it is clear that the response of individuals will be to remain highly productive throughout their academic careers. When there are an insufficient number of reinforcing factors, or factors are undermining each other, productivity will decline. Thus, maximizing the performance potential of faculty means taking an individualized approach, but in a socially supportive environment.

Principles to Guide Policies and Practices

The following are factors which need to be considered when developing and implementing programs and policies geared toward improving faculty productivity.

1) Programs and policies should acknowledge the faculty member as a whole individual, not simply as a collection of functions, and should recognize the unique characteristics of individuals.

2) Programs and policies should recognize the multiple role demands on faculty and the multidimensional sets of age norms.

3) Programs and policies should clarify role activities, institutional expectations, standards of evaluation, and linkages to reward systems. Recognize multiple models of activities.

4) Programs and policies should recognize variations across groups (e.g., disciplines, ranks, sex).

5) Programs and policies should match the individual with the job and continually seek adjustments which improve the person-task fit.

6) Programs and policies should build on strengths and limit weaknesses.

7) Programs and policies should use consultative processes.

8) Programs and policies should encourage development of social support systems.

9) Programs and policies should build on age-related differences.

10) Programs and policies should reduce the risks to the individual and provide departmental incentives.

These guidelines serve as a foundation for the recommendations for change in higher education policy which are presented below. Directions for change are suggested for dealing with policy issues at three levels: the individual, the department, and the institution.

The Individual

FROM STEREOTYPE TO DIFFERENTIATION. The literature clearly reveals the impossibility of generalizing about large groups of faculty: productivity declines for some but not others; some will experience a midlife crisis and others will not; many will choose to continue working past normal retirement age while others will gladly retire early. The clear message is that decision makers must be careful not to anticipate faculty behavior on the basis of norms and generalizations. Decisions based on such generalizations will be counterproductive to the full development of the individual and to the best interests of the institution. Policies, therefore, need to be flexible in their construction and in their application in order to fit individual circumstances.

FROM OBSOLESCENCE TO ACTUALIZATION. Faculty of any age do indeed have the ability to develop new skills, to improve already existing skills, and to find creative ways of acting out their various professional roles. It would be tragic to assume that faculty are essentially waste material after fifty, and that the only source of vitality is the fresh, new Ph.D..D. Teaching improvement programs, for example, are needed to meet the needs of faculty at all ranks. Grants to support curriculum development can facilitate innovation on the part of senior faculty while newly appointed assistant professors have a need for pedagogical training. Going beyond the teaching role, enlarged career development programs can provide a number of services for improving skills in obtaining research grants, skills in negotiating paid and unpaid consulting activities, and the like. Programs such as these, however, will

not happen unless institutions are willing the invest the necessary resources.

FROM FRAGMENTATION TO INTEGRATION. During the late nineteenth century, the faculty evolved from generalists to subspecialists. A reversal of that process is now called for. Research has shown that productivity is encouraged by diversity of disciplinary perspectives. Conversely, obsolescence is encouraged by following too narrow a path, detached from other approaches and other branches of scholarship. Interdisciplinary teaching and research can be encouraged by a number of formal and informal means. The use of joint appointments is one example of the former. Increasing reliance on such approaches, however, has implications for a number of policy areas. Performance evaluation systems, for instance, need to recognize multiple demands and standards and need to allow for possible drops in productivity during transition periods.

In parallel fashion, we need to encourage the integration of the roles played by each faculty member. This integration is important not only because limited energies must not be diffused, but also because the three roles have the potential in interaction to renew and build on one another.

The Department

FROM AUTONOMY TO INTERDEPENDENCE. Traditionally, the opportunity to be autonomous has been one of the intrinsic rewards of academe. A greater focus on "work groups" as suggested by productivity theory, however, could be beneficial. First, an increase in job satisfaction due to greater social gratification might occur. Secondly, viewing the department's work as a shared agenda rather than a collection of individual work lists would encourage a greater level of "accommodation" (i.e., fit of work to task). "Tasks" of the department could be systematically assembled and then negotiated into individual "job portfolios" based on skills and interests. An alternative approach is to develop individual "growth contracts" in which

faculty set specific objectives for themselves, with a given time frame for achievement of these goals. Both of these approaches would require an assessment of the achievement of objectives and a renegotiation of new goals at regular intervals in order to accommodate the changing development of the individual.

Work group interdependence can also be fostered in team teaching and team research projects. An intervention described by Centra (1981) is the peer development triad wherein three faculty members work together for at least a semester on improving teaching. Changes in behavior are identified through a mutual process of goal clarification, classroom observation, and evaluation. Similar to the peer triad is the notion of "colleague groups" which organize faculty, usually from different departments, around shared interests in teaching or research. Membership can be in more than one group and is based on "lively curiosity" rather than on "certified competence" in a field (Group, 1974, p. 71). Any of the group processes described above would foster the kinds of mentor relationships that are beneficial to productivity. There are other ways in which mentorships could be established. Departments, for example, could be more intentional in matching older and younger colleagues who have compatible interests and styles of work.

FROM JUDGMENT TO ACCOUNTABILITY. Faculty face critical evaluations at the point of promotion to tenure and to full professor. Because there is an "all-or-nothing" aspect to these evaluations, and because they are not tied to behavioral objectives or regular feedback processes, they may be described as judgmental. As an alternative or adjunct means of evaluation, negotiation of job portfolios or growth contracts would include agreement on criteria for the evaluation of the achievement of departmental and personal objectives. Thus, the evaluation process would be integrated into the group planning and work division of a department. In this way, faculty serve to support each other in

accomplishing their mutually established goals, as well as feeling a sense of accountability to peers.

The Institution

FROM STRATIFICATION TO DESEGREGATION. Stratification theory explores the layering of society by characteristics such as age, sex, race, and socio-economic status. Among faculty the strata most apparent are age, discipline, institutional type, role orientation, and sex. Cooperation across institutions but within disciplines is a primary source of research ideas. Although this exchange takes place generally between similar institutional types, there are many potential benefits in joint research or service endeavors which cross traditional disciplinary or institutional boundaries. For example, a coalition of professional school faculty could provide an interdisciplinary approach to current social problems. Another possibility is faculty from community colleges sharing remedial instruction techniques with faculty from four-year institutions which increasingly meet a variety of student learning levels.

FROM STRESS TO SUPPORT. Faculty often feel acutely the institution's demand for ever increasing productivity. Academicians may perceive that they are treated not as a renewable resource but as an elastic one, expected to stretch as needed to compensate for the decrement in less pliable variables. Before pressing its demands further, the institution must provide support for faculty who are attempting to adjust to the new demands of higher education. Included in this support must be concern for the physical well-being of faculty: guided exercise programs, regular physical examinations, and dietary consultation provide physical support for faculty of all ages. Adequate psychological counseling must also be provided if individuals are to make relatively smooth transitions through the developmental stages of life. In addition to the specific health-bestowing benefits of such measures, there is the

important value of communicating to faculty that the institution is concerned for their welfare, a message which is itself stress-relieving.

FROM AUTHORITY TO ENABLING. The administrative and governance units of the institution should broaden their traditional focus on management issues to include an enabling function. This enabling would encompass a wide range of activities which benefit the individual's personal and professional growth. One possibility for large institutions, or for clusters of smaller ones, is the establishment of assessment centers which provide vocational counseling and goal setting for their clients. In the relatively rare case when personal motivation and productivity cannot seem to be restored within the individual's faculty role, "out-counseling" of a positive and supportive nature can be provided.

Conclusion: From Determinism to Optimism

The aging faculty member symbolizes the general condition of higher education in the 1980's: just as middle aged faculty often experience a period of greater introversion and reduced productivity after their first era of professional creativity, so higher education, after the youthful expansiveness of the 1960's, has come to a time of retrenchment and regrouping. Successful adaptation to the new forces affecting individuals and institutions will require an attentiveness to the needs of individual faculty, greater flexibility in organizational structure and management, and revised reward and incentive structures. While some of the developmental changes experienced by aging faculty and by "post-industrial" higher education are inevitable, negative consequences should not be presumed in either case. Optimistic strategies can and should be pursued; to do otherwise is to discount the vitality and resurgency of both the individual faculty member and the higher education system.

APPENDIX A

TABLE 1

Typology of Theories on Aging

ROLE OF THE ENVIRONMENT

Role of Individual	Passive			Active		
Type of Change	Continuous	Discontinuous		Continuous	Discontinuous	
		Stages	Events		Stages	Events
Passive	Scientific Psych: Quitelet (1835) Jones & Conrad (1933) Galton (1869) Miles & Miles (1932) Bayley & Oden (1955) Thompson (1954) Lorge (1936) Babcock (1930) Birren (1965) Gilbert (1935) Behaviorists Skinner (1953) Thorndike (1926) Watson (1915) Social Learning Alexander (1973) Brim (1968) Looft (1973)			Humanists Rogers (1961) Allport (1937) Maslow (1954) Adler Field Theorists Lewin (1935) Schaie (1962)	Structure Piaget (1960) Kohlberg (1973) Loevinger (1976) Life Situations Havighurst (1952) Levinson (1974) Clark & Anderson (1967) Gould (1972) Issues Freud (1935) Buhler (1933) Erickson (1963) Sullivan (1953) Peck (1965) Kuhlen (1940) Lehman (1935)	Sociology Burgess (1926) Mead (1934) Kuper & Bernsten (1973) Rosenmayr (1974) Carp (1965) Neugarten (1964) Kubler-Ross (1969) Lowenthal (1964) Henry (1965) Gutmann (1969)
Active	Biology Minot (1908) Metchnikoff (1908) Child (1915) Pearl (1932) Lansing (1942) Cowdry (1952) Strehler (1962) Kugler (1974) Heilbrunn (1943) Sacher (1959) Hayflick (1965)		Cohort/ Generational/ Historical Ryder (1964) Riley, Johnson Foner (1972) Meacham (1972) Neugarten & Datan (1973) Nesselroade, Schaie & Baltes (1972) Riegel & Riegel (1972) Schaie & Labouvie-Vief (1974) Nesselroade & Baltes (1974) Biology Failla (1958) Sellard (1959)		Dialectical Riegel (1975) Goulet & Baltes (1970) Nesselroade & Reese (1973) Baltes & Schaire (1973) Datan & Ginsberg (1975)	

Note: Dates approximate a major work associated with these theorists.

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